





Management of psychogenic non-epileptic seizures: a multidisciplinary approach

S. Gasparini^{1,2}, E. Beghi³ , E. Ferlazzo^{1,2,4} , M. Beghi⁵, V. Belcastro⁶, K. P. Biermann⁷, G. Bottini⁸, G. Capovilla⁹, R. A. Cervellione¹⁰, V. Cianci², G. Coppola¹¹, C. M. Cornaggia¹², P. De Fazio¹³, S. De Masi⁷, G. De Sarro¹⁴, M. Elia¹⁵, G. Erba¹⁶, L. Fusco¹⁷, A. Gambardella^{1,4} , V. Gentile¹⁸, A. T. Giallonardo¹⁹, R. Guerrini^{20,21}, F. Ingravalle²², A. Iudice²³, A. Labate^{1,4}, E. Lucenteforte²¹, A. Magaudda²⁴, L. Mumoli¹, C. Papagno^{25,26}, G. B. Pesce¹⁸, E. Pucci²⁷, P. Ricci²⁸, A. Romeo²⁹, R. Quintas³⁰, C. Sueri², G. Vitaliti³¹, R. Zoia³² and U. Aguglia^{1,2,4,33} 

¹Department of Medical and Surgical Sciences, Magna Graecia University of Catanzaro, Catanzaro; ²Regional Epilepsy Centre, Great Metropolitan Hospital of Reggio Calabria, Reggio Calabria; ³Department of Neurosciences, Istituto di Ricerche Farmacologiche Mario Negri IRCCS, Milan; ⁴Institute of Molecular Bioimaging and Physiology, National Research Council, Catanzaro; ⁵Department of Mental Health, AUSL Romagna, Ravenna; ⁶Neurology Unit, Department of Medicine, S. Anna Hospital, Como; ⁷Clinical Trial Office, Meyer Children's Hospital, Florence; ⁸Department of Brain and Behavioural Sciences, University of Pavia, Pavia; ⁹Child Neuropsychiatry Unit, Azienda Ospedaliera Carlo Poma, Mantova; ¹⁰Italian Federation against Epilepsies, Milan; ¹¹Child Neuropsychiatry Unit, Department of Medicine, Surgery and Dentistry, University of Salerno, Salerno; ¹²School of Medicine and Surgery, University of Milano Bicocca, Milan; ¹³Psychiatric Unit, Department of Health Sciences, University 'Magna Graecia', Catanzaro; ¹⁴Pharmacology Unit, Department of Health Sciences, Magna Graecia University, Catanzaro; ¹⁵Unit of Neurology and Clinical Neurophysiopathology, Oasi Research Institute – IRCCS, Troina (EN), Italy; ¹⁶Department of Neurology, SEC, University of Rochester, Rochester, NY, USA; ¹⁷Neurophysiology Unit, Department of Neuroscience, Bambino Gesù Children's Hospital, Rome; ¹⁸Italian Association Against Epilepsies, Bologna; ¹⁹Neurology Unit, Department of Neuroscience, 'Sapienza' University, Rome; ²⁰Italian Society of Neurology and Psychiatry of Infancy and Adolescence, Florence; ²¹Department of Neurosciences, Psychology, Drug Research, and Child Health, University of Florence, Florence; ²²Department of Medical and Surgical Sciences (DIMEC), University of Bologna, Bologna; ²³Division of Neurology, University of Pisa, Pisa; ²⁴Epilepsy Centre, University of Messina, Messina; ²⁵CIMEC and CeRiN, University of Trento, Trento; ²⁶Department of Psychology, University of Milano-Bicocca, Milan; ²⁷Neurology Unit, ASUR Marche AV3, Macerata; ²⁸University 'Magna Graecia' of Catanzaro, Catanzaro; ²⁹Pediatric Neurology Unit and Epilepsy Center, 'Fatebenefratelli e Oftalmico' Hospital, Milan; ³⁰Clinical and Experimental Epileptology Unit, Neurological Institute Carlo Besta – IRCCS Foundation, Milan; ³¹University Hospital Policlinico-Vittorio Emanuele, Catania; ³²Department of Health and Biomedical Sciences, Section of Legal Medicine, University of Milan, Milan; and ³³Epilepsy Study Group of Italian Neurology Society, Catanzaro, Italy

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The International League against Epilepsy (ILAE) proposed a diagnostic scheme for psychogenic non-epileptic seizure (PNES). The debate on ethical aspects of the diagnostic procedures is ongoing, the treatment is not standardized and management might differ according to age group. The objective was to reach an expert and stakeholder consensus on PNES management. A board comprising adult and child neurologists, neuropsychologists, psychiatrists, pharmacologists, experts in forensic medicine and bioethics as well as patients' representatives was formed. The board chose five main topics regarding PNES: diagnosis; ethical issues; psychiatric comorbidities; psychological treatment; and pharmacological treatment. After a systematic review of the literature, the board met in a consensus conference in Catanzaro (Italy). Further consultations using a model of Delphi panel were held. The global level of evidence for all topics was low. Even though most questions were formulated separately for children/adolescents and adults, no major age-related differences emerged. The board established that the approach to PNES diagnosis should comply with ILAE recommendations. Seizure induction was considered ethical, preferring the least invasive techniques. The board recommended looking carefully for mood disturbances, personality disorders and psychic trauma in

Correspondence: U. Aguglia, Regional Epilepsy Centre at Great Metropolitan Hospital, Via Melacrino, Reggio Calabria 89100, Italy
(tel.: +390965397971; fax: +390965397973; e-mail: u.aguglia@unicz.it).

persons with PNES and considering cognitive-behavioural therapy as a first-line psychological approach and pharmacological treatment to manage comorbid conditions, namely anxiety and depression. Psychogenic non-epileptic seizure management should be multidisciplinary. High-quality long-term studies are needed to standardize PNES management.

Introduction

Psychogenic non-epileptic seizures (PNESs) are paroxysmal, time-limited alterations in motor, sensory, autonomic and/or cognitive signs and symptoms that are not accompanied by ictal epileptiform activity [1]. Recently, the International League against Epilepsy (ILAE) has proposed a stepwise approach for the diagnosis of PNES [2]. ILAE recommendations provide a scientific basis for the diagnosis of PNES, but their application in clinical practice is also influenced by ethical considerations, particularly when induction procedures are considered. Moreover, numerous studies have explored the occurrence of psychiatric diseases in people with PNESs, the ethical issues linked to the diagnosis and treatment, and the optimal treatment strategy, including psychological approaches and pharmacological treatment. No high-quality studies are currently available. Recognizing that there is insufficient high-level evidence for the majority of issues to draw a guideline, the Epilepsy Study Group of the Italian Neurological Society promoted the formation of a national expert panel to review the existing literature and to formulate consensus recommendations for PNES management. This panel comprised clinicians treating all age groups (from children to the elderly) as well as pharmacologists, experts in forensic medicine and bioethics, and representatives of patients' associations. The inclusion of these different profiles has allowed a comprehensive document to be produced that deals with clinical, ethical and social aspects inherent to the diagnosis and management of PNES.

Methods

Panel composition

Members of the multidisciplinary board were identified amongst adult epileptologists, child neurologists, neuropsychologists, psychiatrists, pharmacologists, nurses with experience in the field of neuroscience, and experts in forensic medicine and bioethics with an indisputable knowledge in the field of PNES diagnosis and management, as documented by their scientific

production. All board members were representative of the Italian scientific societies involved in PNES management. The board also comprised representatives of patients' associations. Patients' representatives were included amongst jury members and actively took part in the debate during the conference. Moreover, they were part of the Delphi panel and formulated specific observations on the paper. Details about the consensus conference methodology, event, panel members and role are given in Appendix S1.

The panel chose five main topics: diagnosis of PNES; ethical issues in the diagnosis and treatment of PNES; psychiatric comorbidities of PNES; psychological treatment of PNES; and pharmacological treatment of PNES. Each topic comprised different questions that are listed in Tables 1–5.

Study search, selection and quality evaluation

A thorough literature search was performed using the National Library of Medicine's MEDLINE (PubMed interface) and Embase databases with the terms 'psychogenic seizure/seizures' in different combinations. Search strategies are detailed in Appendix S2. The reference lists of identified papers were reviewed for additional studies.

Studies were selected and evaluated by the Scientific Committee. Duplicates and non-pertinent studies were excluded on the basis of the title and/or abstract. Potentially relevant studies were retrieved in full and examined. Six authors (Aguglia U, Beghi E, Belcastro V, De Masi S, Ferlazzo E and Labate A) evaluated a subset of papers. Each of these six authors independently assigned a rating to the papers and decided whether each paper was suitable to be included amongst the core literature for the consensus. Rating was assigned on the basis of the Classification of Evidence Scheme of the Clinical Practice Guideline Process Manual of the American Academy of Neurology [3]. Briefly, each study was rated from Class I (highest) evidence to Class IV (lowest) evidence according to study design, blinding, representativeness of population, bias assessment and management. Levels of recommendations (from A to U) are detailed in Appendix S1.

Table 1 Diagnosis of psychogenic non-epileptic seizures (PNESs)

Question	References	Rating ^a	Answer	Level of evidence ^a
Is video-EEG recording of an episode the gold standard for confirmation of PNES diagnosis?	Benbadis SR <i>et al.</i> , 2009 [5] Syed TU <i>et al.</i> , 2011 [6]	III III	The diagnostic yield of video-EEG is good, with moderate–high interrater agreement for PNES diagnosis	C
Should prolonged video-EEG monitoring aimed at recording spontaneous PNESs always be used to confirm diagnosis?	Woollacott IO <i>et al.</i> , 2010 [7] Lobello K <i>et al.</i> , 2006 [8] Lawley A <i>et al.</i> , 2016 [9] Jin B <i>et al.</i> , 2014 [10] McGonigal A <i>et al.</i> , 2002 [11]	III III III III III	The probability of recording spontaneous PNESs is 50%–70%, almost always during the first 2 days of monitoring, but this procedure is not cost-effective	C
Is ictal video recording alone, when observed by expert epileptologists, a valid instrument for the diagnosis of motor PNES?	Erba G <i>et al.</i> , 2016 [12]	I	Video recording alone, if observed by experts, is sufficient for accurate diagnosis of motor PNES	B
Is ictal video recording alone, when observed by expert epileptologists, a valid instrument for the diagnosis of non-motor PNES?	Erba G <i>et al.</i> , 2016 [12]	I	Video recording alone, even though observed by experts, is not sufficient for the diagnosis of non-motor PNES	B
Should PNES induction be used during video alone or video-EEG recording for diagnosis confirmation?	Lancman ME <i>et al.</i> , 1994 [13] Walczak TS <i>et al.</i> , 1994 [14]	III III	No data support induction during video recording alone. Induction may be useful during video-EEG	C
Is there a PNES induction technique better than others?	Goyal G <i>et al.</i> , 2014 [15]	III	All induction manoeuvres have 100% specificity and positive predictive value, but different diagnostic yields	U
Are there single signs or symptoms that, if present, allow the confirmation of PNES diagnosis?	Benbadis SR <i>et al.</i> , 2009 [5] Syed TU <i>et al.</i> , 2011 [6] Brown MC <i>et al.</i> , 1991 [16] Azar NJ <i>et al.</i> , 2008 [17] Henry TR, Drury I, 1998 [18] Jedrzejczak J <i>et al.</i> , 1999 [19] Gates J <i>et al.</i> , 1985 [20] Pierelli F <i>et al.</i> , 1989 [21] Saygi S <i>et al.</i> , 1992 [22] Chen DK <i>et al.</i> , 2008 [23] Geyer JD <i>et al.</i> , 2000 [26] Chung SS <i>et al.</i> , 2006 [24] DeToledo JC <i>et al.</i> , 1996 [25] Slater JD <i>et al.</i> , 1995 [27] Devinsky O <i>et al.</i> , 1996 [28] Bell WL <i>et al.</i> , 1998 [29] Reuber M <i>et al.</i> , 2009 [30] Schwabe M <i>et al.</i> , 2008 [31]	III III IV III III III IV IV III III III III III III III III III III III IV	Duration (longer than epileptic seizures, often >120 s [6,16–23]) Fluctuating course of ictal signs and symptoms: sensitivity 42%–69%, specificity 96% [6,23] Asynchronous movements: variable sensitivity (17%–95%), high specificity (78%–100%) [6,17,20,23] Pelvic thrusting: sensitivity 9%–31%, specificity 96%–100% [6,17,20,23] Side-to-side movements: sensitivity 25%–95%, specificity 87%–100% [6,17,20,23] Eye closure/flickering: sensitivity 33%–96%, specificity 95%–100% [5,17,23–25] Ictal crying: sensitivity 5%–32%, specificity 91%–100% [6,14,23,27,28] Seizure awareness/recall: sensitivity 56%–77%, specificity 75%–93% [6,28,29] Susceptibility to interference by other people: sensitivity 55%, specificity 94% [6] Specific linguistic features during seizure description, as detected by means of conversation analysis: able to discriminate PNESs from epileptic seizures (85% correct classifications) [30,31]	C C C C C C C C C C C C C C C C C C C U U

(continued)

Table 1 (Continued)

Question	References	Rating ^a	Answer	Level of evidence ^a
Are there single signs or symptoms that, if present, allow the exclusion of PNES diagnosis?	Syed TU <i>et al.</i> , 2011 [6]	III	Occurrence during sleep: sensitivity 20%–59%, specificity if sleep is EEG-verified 86%–100% [20,22,32–34]	C
	Azar NJ <i>et al.</i> , 2008 [17]	III		
	Gates J <i>et al.</i> , 1985 [20]	IV	Post-ictal confusion: sensitivity 67%–100%, specificity 70%–88% [6,17,27]	C
	Saygi S <i>et al.</i> , 1992 [22]	III		
	Chen DK <i>et al.</i> , 2008 [23]	III	Stertorous breathing: sensitivity 22%–93%, specificity 50%–100% [6,17,23,35]	C
	Bazil CW <i>et al.</i> , 1994 [32]	III		
	Orbach D <i>et al.</i> , 2003 [33]	IV	Abrupt onset: sensitivity 94%, specificity 55% [6]	U
	Seneviratne U <i>et al.</i> , 2017 [34]	III		
Sen A <i>et al.</i> , 2007 [35]	IV			
Are there biomarkers that can confirm or exclude PNES diagnosis?	Pritchard PB 3rd <i>et al.</i> , 1985 [36]	III	If prolactin level is in range a few minutes after a seizure, this supports PNES diagnosis versus bilateral tonic-clonic epileptic seizure: 47%–100%, specificity 74%–100% [36–43]	B
	Laxer KD <i>et al.</i> , 1985 [37]	I		
	Wroe SJ <i>et al.</i> , 1989 [38]	III	Elevated creatine kinase levels support the diagnosis of epileptic seizure: sensitivity 15%–87%, specificity 85%–100% [43–46]	C
	Fisher RS <i>et al.</i> , 1991 [39]	II		
	Ehsan T <i>et al.</i> , 1996 [40]	II	Increase in nesfatin-1 and reduction in ghrelin levels may be useful as markers of an epileptic seizure [47]	U
	Alving J, 1998 [41]	II		
	Shah AK <i>et al.</i> , 2001 [42]	III	Heart rate before, during and after PNES and seizures may vary, but data are conflicting [48–50]	U
	Rao M <i>et al.</i> , 1989 [43]	II		
	Willert C <i>et al.</i> , 2004 [44]	III		
	Petramfar P <i>et al.</i> , 2009 [45]	IV		
	Wyllie E <i>et al.</i> , 1985 [46]	III		
	Aydin S <i>et al.</i> , 2011 [47]	III		
	Opherk C <i>et al.</i> , 2002 [48]	III		
	Da Silva VAP <i>et al.</i> , 2007 [49]	III		
Reinsberger C <i>et al.</i> , 2012 [50]	III			

^aAccording to the American Academy of Neurology Guidelines [3].

Table 2 Ethical and legal aspects concerning psychogenic non-epileptic seizure (PNES) diagnosis

Question	References	Rating ^a	Answer	Level of evidence ^a
Is it ethical to induce PNES in order to make a diagnosis?	Benbadis SR, 2001 [51]	NA	PNES induction is ethical, provided that other diagnostic procedures have proven ineffective or are infeasible	NA
	Leeman BA, 2009 [52]	NA		NA
	Kanner MA <i>et al.</i> , 2009 [53]	NA		NA
Should diagnosis always be communicated to persons with PNES and to family members?	No data available	NA	—	NA
Is a person with PNES right to obtain the status of disability?	No data available	NA	—	NA

NA, not applicable. ^aAccording to the American Academy of Neurology Guidelines [3].

Results

A literature search was performed in February–March 2017 and a total of 4089 unique records were retrieved which were screened in title/abstract or full text for inclusion; 394 were included. The flowchart of included and excluded papers is reported in Fig. 1. The majority of included studies were of low quality: in particular, three were rated as Class I, 17 as Class II, 254 as class III and 116 as class IV. Three papers were not rated, as they expressed personal opinions on ethical topics. The

complete list of rated papers is reported in Appendix S3. Two hundred and ninety-one studies, all rated as Classes III and IV, were excluded because of small sample size (110), study sample overlapping with other included studies (38) and research question not strictly pertinent with the consensus aims (143). Thus, 103 studies constituted the core literature for the consensus. All these papers are cited in the answers to specific questions and are listed in Appendix S3. For each question, the tables report the related references with rating, one or more synthetic answers representing the summary of the

Table 4 Psychological treatment of psychogenic non-epileptic seizures (PNESs)

	References	Rating ^a	Answer	Level of evidence ^a
Does the sole communication of the diagnosis to the person with PNES and to the family influence the prognosis of PNES or of PNES-related psychopathology in children and adolescents?	No data available	—	—	U
Does the sole communication of the diagnosis to the person with PNES and to the family influence the prognosis of PNES or of PNES-related psychopathology in adults and the elderly?	Bodde NM <i>et al.</i> , 2007 [78] Salinsky M <i>et al.</i> , 2016 [79] Mayor R <i>et al.</i> , 2012 [80] Thompson N <i>et al.</i> , 2013 [81] Gambini O <i>et al.</i> , 2014 [82] Razvi S <i>et al.</i> , 2012 [83] Farias ST <i>et al.</i> , 2003 [84] Duncan R <i>et al.</i> , 2016 [85] Duncan R <i>et al.</i> , 2014 [86] Arain AM <i>et al.</i> , 2007 [87] Drane DL <i>et al.</i> , 2006 [88]	IV IV IV III IV IV IV IV IV IV III	The role of communication of the PNES diagnosis on prognosis is unclear	U
Can children and adolescents with PNES benefit from psychological interventions?	LaFrance WC Jr <i>et al.</i> , 2009 [89] Yi YY <i>et al.</i> , 2014 [90]	IV III	There is no robust evidence of efficacy	U
Can adults and the elderly with PNES benefit from psychological interventions?	Mayor R <i>et al.</i> , 2012 [80] LaFrance WC Jr <i>et al.</i> , 2009 [89] Kuyk J <i>et al.</i> , 2008 [91] LaFrance WC Jr <i>et al.</i> , 2014 [92] Myers L <i>et al.</i> , 2017 [93] Myers L, Zaroff C, 2004 [94] Conwill M <i>et al.</i> , 2014 [95] Goldstein LH <i>et al.</i> , 2010 [96] McDade G, Brown SW, 1992 [97] Meierkord H <i>et al.</i> , 1991 [98] Mayor R <i>et al.</i> , 2010 [99] Metin SZ <i>et al.</i> , 2013 [100] Santos N de O <i>et al.</i> , 2014 [101] Zaroff CM <i>et al.</i> , 2004 [102] Rusch MD <i>et al.</i> , 2001 [103]	IV IV IV II IV IV IV III IV IV IV IV IV IV IV IV	Cognitive-behavioural therapy is effective in the treatment of PNES There are no data for other psychological interventions	B U
Is a single psychological treatment superior to others?	No data available	—	—	U
Should the management of persons with PNES be in charge of psychiatrists or psychologists?	No data available	—	—	U

^aAccording to the American Academy of Neurology Guidelines [3].

highlights that the answer to each question in this section is uniquely based on expert opinion (Table 2), taking into account the debate occurring in the literature on these topics. In recent years, some debate around the ethicality of PNES induction has risen. Concerns about undermining the patient–physician relationship caused by an intentionally misleading procedure are counterbalanced by the advantages of obtaining a fast and reliable diagnosis. A debate on the more ethical induction manoeuvres also exists (Table 2). It is unquestionable that some induction techniques (e.g. intravenous saline injection) are invasive and potentially harmful. Moreover, there is a risk

for provoking episodes that are different in semiology from habitual episodes, but changes in clinical manifestations may also occur in spontaneously recorded attacks. The panel considers that PNES induction is ethical provided that (i) other diagnostic procedures, according to clinical practice and scientific evidence, have been ineffective or are not feasible in that particular person; (ii) the procedure is fully explained and is approved by the person with PNES (or legal guardian). In the case of minors with sufficient judgement, their opinion must be sought. It is recommended to proceed according to increasing degrees of direct damage, preferring the use of procedures routinely

Table 5 Psychological treatment of psychogenic non-epileptic seizures (PNESs)

Question	References	Rating ^a	Answer	Level of evidence ^a
Are there drugs of proven efficacy for the treatment of PNES in children and adolescents?	No data available	Not applicable	—	U
Are there drugs of proven efficacy for the treatment of PNES in adults and the elderly?	LaFrance WC Jr <i>et al.</i> , 2014 [92] LaFrance WC Jr <i>et al.</i> , 2010 [104,105] Pintor L <i>et al.</i> , 2010 [106]	II II III	The efficacy of sertraline and venlafaxine is unclear	U
Is withdrawal of antiepileptic drugs safe in persons with PNES without epilepsy?	Oto M, 2005 [107] Oto M <i>et al.</i> , 2010 [108]	IV II	Slow antiepileptic drug withdrawal might be safe	C

^aAccording to the American Academy of Neurology Guidelines [3].

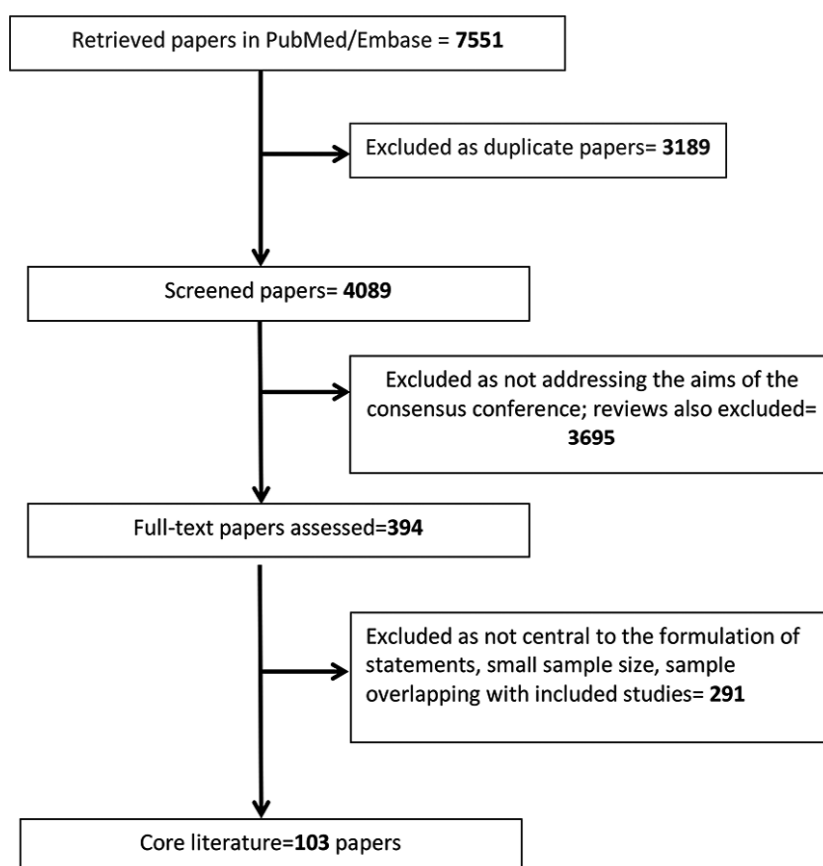


Figure 1 Flowchart of included and excluded studies.

performed during standard EEG (hyperventilation or intermittent photic stimulation) and, subsequently, non-invasive suggestion manoeuvres. When the diagnosis is documented, physicians must clearly and completely inform persons with PNES regarding their health status. The panel recommends adapting the communication to the person’s age and ability to understand the information, aiming at the acceptance of diagnosis. The family members or others may be

informed only if the affected person agrees, provided that he or she is of legal age and able to express valid consent. The legal guardian must always be informed. As regards the right to obtain the status of disability, Italian law does not include PNES amongst disabling diseases. The panel underlines that the presence of disability should be individually assessed considering the comorbid conditions, following a bio-psycho-social approach [4].

Psychiatric comorbidities in persons with PNES

Details about the prevalence and the diagnostic utility of psychiatric comorbidities in persons with PNES are reported in Table 3. In summary, the presence of a psychiatric comorbidity is very common in persons with PNES. However, in adults and the elderly, the prevalence of psychiatric disorders is similar to that reported in persons with epilepsy, whilst data for children and adolescents are scarce. Thus, the panel highlights that the presence or absence of such comorbidities is not helpful for PNES diagnosis; nevertheless, they should be carefully searched for, due to the high frequency of such disorders and the necessity to treat them. Conversely, previous psychic trauma or sexual abuse is more frequent in adults and the elderly with PNES compared to persons with epilepsy (Table 3). Lastly, the panel affirms that there is no robust evidence on the role of psychiatric consultation to confirm or exclude PNES diagnosis. Nonetheless, evaluation by a psychiatrist or psychologist may be necessary to define the psychopathological profile of persons with PNES.

Psychological treatment of PNES

Details about psychological treatments for PNES are reported in Table 4. In summary, the panel states that, although the communication of diagnosis is undoubtedly necessary, it is unclear whether this communication influences the prognosis of PNES or PNES-related psychopathology. There is no robust evidence on the efficacy of psychological interventions in children and adolescents with PNES; however, the panel recommends that this approach should be encouraged. Cognitive-behavioural therapy may be a first-line psychological treatment in adults and the elderly with PNES. There is no robust evidence on the efficacy of other psychological interventions. The panel states that the management of persons with PNES should rely on a multidisciplinary team including a psychiatrist and a psychologist.

Pharmacological treatment of PNES

Details about the pharmacological treatment of PNES are reported in Table 5. In summary, the panel recommends not to use any pharmacological treatment in children and adolescents with PNES, since no study is available. There is no robust evidence on the efficacy of pharmacological treatment in adults and the elderly with PNES. Antidepressants may be useful in adults and the elderly with PNES and concomitant anxiety or depression. The panel suggests that

antiepileptic drugs might be slowly withdrawn in persons with PNES without concomitant epilepsy.

Conclusions and future directions

This consensus statement represents a synthesis of the best available evidence on PNES management. The panel reached complete agreement for each of the discussion points; thus, this document fully expresses the opinion of Italian experts in this field. The contribution of different professional roles and of patients' representatives has allowed recommendations to be formulated that cover problems related to common clinical practice as well as ethical and legal issues.

The absence of high-quality scientific evidence limits the strength of recommendation for many of the topics. Another limitation of this study is the regional nature of the panel's composition; thus, some issues may reflect local peculiarities and may not be generalizable (e.g. regulatory aspects). Yet, many recommendations may be extended to other audiences, since diagnostic tools and therapeutic approaches do not differ across the world.

Even though most questions were formulated separately for children/adolescents and adults, no major differences in evidence and recommendations exist. As regards diagnosis, in agreement with the ILAE recommendations [2], video-EEG recording of an episode can still be considered the gold standard, even though more cost-effective alternatives are needed. Seizure induction is ethically justified, provided that other diagnostic procedures have failed or are not easily feasible. Less invasive techniques, like routine EEG activation manoeuvres, should be preferred over placebo administration. A history of psychic trauma, the presence of suggestive ictal signs and symptoms and the normality of serum prolactin levels may favour the diagnosis of PNESs versus epileptic seizures. Special attention should be paid to the communication of PNES diagnosis, considering the person's age and cognitive status. Many psychiatric comorbidities are common in people with PNES, including depression, anxiety, post-traumatic stress disorders and personality disorders, but none is pathognomonic, since the prevalence in persons with PNES is similar to the prevalence in persons with epilepsy. The presence of psychiatric comorbidities should be assessed to allow the achievement of disability benefits, since PNES is not considered a disabling condition according to Italian law. Data regarding treatment are globally of low quality. All these studies report short-term efficacy data and most carry a high dropout rate. Many psychological approaches, including psychotherapy and other

interventions, are anecdotally reported. Data from a single controlled study indicate that cognitive-behavioural therapy should be a first-line psychological treatment for adults and the elderly with PNES. To date, most interventions still rely on clinicians' experience. In the light of existing evidence, antidepressant treatment should be recommended in adults or the elderly with PNES and concomitant anxiety or depression. The work of this multidisciplinary panel has highlighted a critical need for studies with robust design in the field of PNES management, which are crucial to standardize clinical practice and to respect the needs of persons with PNES.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Details about the consensus conference methodology, event, panel members and role.

Appendix S2. Literature search strategy.

Appendix S3. Complete list of rated papers.

References

- LaFrance WC Jr, Devinsky O. The treatment of nonepileptic seizures: historical perspectives and future directions. *Epilepsia* 2004; **45**: 15–21.
- LaFrance 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 Nonepileptic Seizures Task Force. *Epilepsia* 2013; **54**: 2005–2018.
- American Academy of Neurology. *Clinical Practice Guideline Process Manual*, 2011 Edn. St Paul, MN: American Academy of Neurology, 2011. <http://tools.aan.com/globals/axon/assets/9023.pdf> (accessed 01/06/2018)
- Engel GL. The clinical application of the biopsychosocial model. *Am J Psychiatry* 1980; **137**: 535–544.
- Benbadis SR, LaFrance WC Jr, Papandonatos GD, Korabathina K, Lin K, Kraemer HC. Interrater reliability of EEG-video monitoring. *Neurology* 2009; **73**: 843–846.
- Syed TU, LaFrance WC Jr, Kahriman ES, et al. Can semiology predict psychogenic nonepileptic seizures? A prospective study *Ann Neurol* 2011; **69**: 997–1004.
- Woollacott IO, Scott C, Fish DR, Smith SM, Walker MC. When do psychogenic nonepileptic seizures occur on a video/EEG telemetry unit? *Epilepsy Behav* 2010; **17**: 228–235.
- Lobello K, Morgenlander JC, Radtke RA, Bushnell CD. Video/EEG monitoring in the evaluation of paroxysmal behavioral events: duration, effectiveness, and limitations. *Epilepsy Behav* 2006; **8**: 261–266.
- Lawley A, Manfredonia F, Cavanna AE. Video-ambulatory EEG in a secondary care center: a retrospective evaluation of utility in the diagnosis of epileptic and nonepileptic seizures. *Epilepsy Behav* 2016; **57**: 137–140.
- Jin B, Zhao Z, Ding Y, et al. Diagnostic yield of inpatient video-electroencephalographic monitoring: experience from a Chinese comprehensive epilepsy center. *Epilepsy Behav* 2014; **34**: 77–80.
- McGonigal A, Oto M, Russell AJ, Greene J, Duncan R. Outpatient video EEG recording in the diagnosis of non-epileptic seizures: a randomised controlled trial of simple suggestion techniques. *J Neurol Neurosurg Psychiatry* 2002; **72**: 549–551.
- Erba G, Giussani G, Juersivich A, et al. The semiology of psychogenic nonepileptic seizures revisited: can video alone predict the diagnosis? Preliminary data from a prospective feasibility study. *Epilepsia* 2016; **57**: 777–785.
- Lancman ME, Asconapé JJ, Craven WJ, Howard G, Penry JK. Predictive value of induction of psychogenic seizures by suggestion. *Ann Neurol* 1994; **35**: 359–361.
- Walczak TS, Williams DT, Berten W. Utility and reliability of placebo infusion in the evaluation of patients with seizures. *Neurology* 1994; **44**: 394–399.
- Goyal G, Kalita J, Misra UK. Utility of different seizure induction protocols in psychogenic nonepileptic seizures. *Epilepsy Res* 2014; **108**: 1120–1127.
- Brown MC, Levin BE, Ramsay RE, Katz DA, Duchowny MS. Characteristics of patients with nonepileptic seizures. *J Epilepsy* 1991; **4**: 225–229.
- Azar NJ, Tayah TF, Wang L, Song Y, Abou-Khalil BW. Postictal breathing pattern distinguishes epileptic from nonepileptic convulsive seizures. *Epilepsia* 2008; **49**: 132–137.
- Henry TR, Drury I. Ictal behaviors during nonepileptic seizures differ in patients with temporal lobe interictal epileptiform EEG activity and patients without interictal epileptiform EEG abnormalities. *Epilepsia* 1998; **39**: 175–182.
- Jedrzejczak J, Owczarek K, Majkowski J. Psychogenic pseudoepileptic seizures: clinical and electroencephalogram (EEG) video-tape recordings. *Eur J Neurol* 1999; **6**: 473–479.
- Gates J, Ramani V, Whalen S, Loewenson R. Ictal characteristics of pseudoseizures. *Arch Neurol* 1985; **42**: 1183–1187.
- Pierelli F, Chatrian GE, Erdly WW, Swanson PD. Long-term EEG-video-audio monitoring: detection of partial epileptic seizures and psychogenic episodes by 24-hour EEG record review. *Epilepsia* 1989; **30**: 513–523.
- Saygi S, Katz A, Marks DA, Spencer SS. Frontal lobe partial seizures and psychogenic seizures: comparison of clinical and ictal characteristics. *Neurology* 1992; **42**: 1274–1277.
- Chen DK, Graber KD, Anderson CT, Fisher RS. Sensitivity and specificity of video alone versus electroencephalography alone for the diagnosis of partial seizures. *Epilepsy Behav* 2008; **13**: 115–118.
- Chung SS, Gerber P, Kirilin KA. Ictal eye closure is a reliable indicator for psychogenic nonepileptic seizures. *Neurology* 2006; **66**: 1730–1731.
- DeToledo JC, Ramsay RE. Patterns of involvement of facial muscles during epileptic and nonepileptic events: review of 654 events. *Neurology* 1996; **47**: 621–625.
- Geyer JD, Payne TA, Drury I. The value of pelvic thrusting in the diagnosis of seizures and pseudo-seizures. *Neurology* 2000; **54**: 227–229.
- Slater JD, Brown MC, Jacobs W, Ramsay RE. Induction of pseudoseizures with intravenous saline placebo. *Epilepsia* 1995; **36**: 580–585.
- Devinsky O, Sanchez-Villaseñor F, Vazquez B, Kothari M, Alper K, Luciano D. Clinical profile of patients with epileptic and nonepileptic seizures. *Neurology* 1996; **46**: 1530–1533. Review.
- Bell WL, Park YD, Thompson EA, Radtke RA. Ictal cognitive assessment of partial seizures and pseudo-seizures. *Arch Neurol* 1998; **55**: 1456–1459.
- Reuber M, Monzoni C, Sharrack B, Plug L. Using interactional and linguistic analysis to distinguish between epileptic and psychogenic nonepileptic seizures: a prospective, blinded multirater study. *Epilepsy Behav* 2009; **16**: 139–144.
- Schwabe M, Reuber M, Schöndienst M, Gülich E. Listening to people with seizures: how can linguistic analysis help in the differential diagnosis of seizure disorders? *Commun Med* 2008; **5**: 59–72.
- Bazil CW, Kothari M, Luciano D, et al. Provocation of nonepileptic seizures by suggestion in a general seizure population. *Epilepsia* 1994; **35**: 768–770.
- Orbach D, Ritaccio A, Devinsky O. Psychogenic, nonepileptic seizures associated with video-EEG-verified sleep. *Epilepsia* 2003; **44**: 64–68.
- Seneviratne U, Minato E, Paul E. Seizures by the clock: temporal patterns of psychogenic nonepileptic seizures. *Epilepsy Behav* 2017; **76**: 71–75.

35. Sen A, Scott C, Sisodiya SM. Stertorous breathing is a reliably identified sign that helps in the differentiation of epileptic from psychogenic non-epileptic convulsions: an audit. *Epilepsy Res* 2007; **77**: 62–64.
36. Pritchard PB 3rd, Wannamaker BB, Sagel J, Daniel CM. Serum prolactin and cortisol levels in evaluation of pseudoepileptic seizures. *Ann Neurol* 1985; **18**: 87.
37. Laxer KD, Mullyooly JP, Howell B. Prolactin changes after seizures classified by EEG monitoring. *Neurology* 1985; **35**: 31–35.
38. Wroe SJ, Henley R, John R, Richens A. The clinical value of serum prolactin measurement in the differential diagnosis of complex partial seizures. *Epilepsy Res* 1989; **3**: 248–252.
39. Fisher RS, Chan DW, Bare M, Lesser RP. Capillary prolactin measurement for diagnosis of seizures. *Ann Neurol* 1991; **29**: 187–190.
40. Ehsan T, Fisher RS, Johns D, Lukas RJ, Blum D, Eskola J. Sensitivity and specificity of paired capillary prolactin measurement in diagnosis of seizures. *J Epilepsy* 1996; **9**: 101–105.
41. Alving J. Serum prolactin levels are elevated also after pseudo-epileptic seizures. *Seizure* 1998; **7**: 85–89.
42. Shah AK, Shein N, Fuerst D, Yangala R, Shah J, Watson C. Peripheral WBC count and serum prolactin level in various seizure types and nonepileptic events. *Epilepsia* 2001; **42**: 1472–1475.
43. Rao M, Stefan H, Bauer J. Epileptic but not psychogenic seizures are accompanied by simultaneous elevation of serum pituitary hormones and cortisol levels. *Neuroendocrinology* 1989; **49**: 33–39.
44. Willert C, Spitzer C, Kusserow S, Runge U. Serum neuron-specific enolase, prolactin, and creatine kinase after epileptic and psychogenic non-epileptic seizures. *Acta Neurol Scand* 2004; **109**: 318–323.
45. Petramfar P, Yaghoobi E, Nemati R, Asadi-Pooya AA. Serum creatinephosphokinase is helpful in distinguishing generalized tonic-clonic seizures from psychogenic nonepileptic seizures and vasovagal syncope. *Epilepsy Behav* 2009; **15**: 330–332.
46. Wyllie E, Lueders H, Pippenger C, VanLente F. Postictal serum creatine kinase in the diagnosis of seizure disorders. *Arch Neurol* 1985; **42**: 123–126.
47. Aydin S, Dag E, Ozkan Y, et al. Time-dependent changes in the serum levels of prolactin, nesfatin-1 and ghrelin as a marker of epileptic attacks young male patients. *Peptides* 2011; **32**: 1276–1280.
48. Opherk C, Hirsch LJ. Ictal heart rate differentiates epileptic from non-epileptic seizures. *Neurology* 2002; **58**: 636–638. Erratum in *Neurology* 2002; **58**(11): 1708.
49. Da Silva VAP, Bottaro M, Justino MA, Ribeiro MM, Lima RM, De Oliveira RJ. Maximum heart rate in Brazilian elderly women: comparing measured and predicted values. *Arq Bras Cardiol* 2007; **88**: 314–320.
50. Reinsberger C, Perez DL, Murphy MM, Dworetzky BA. Pre- and postictal, not ictal, heart rate distinguishes complex partial and psychogenic nonepileptic seizures. *Epilepsy Behav* 2012; **23**: 68–70.
51. Benbadis SR. Provocative techniques should be used for the diagnosis of psychogenic nonepileptic seizures. *Arch Neurol* 2001; **58**: 2063–2065.
52. Leeman BA. Provocative techniques should not be used for the diagnosis of psychogenic nonepileptic seizures. *Epilepsy Behav* 2009; **15**: 110–114.
53. Kanner MA, Benbadis SR, Leeman BA. Rebuttals and a final commentary. *Epilepsy Behav* 2009; **15**: 115–118.
54. Plioplys S, Doss J, Siddarth P, et al. A multisite controlled study of risk factors in pediatric psychogenic nonepileptic seizures. *Epilepsia* 2014; **55**: 1739–1747.
55. Plioplys S, Doss J, Siddarth P, et al. Risk factors for comorbid psychopathology in youth with psychogenic nonepileptic seizures. *Seizure* 2016; **38**: 32–37.
56. Salpekar J, Plioplys S, Siddarth P, et al. Pediatric psychogenic nonepileptic seizures: a study of assessment tools. *Epilepsy Behav* 2010; **17**: 50–55.
57. Wyllie E, Glazer JP, Benbadis S, Kotagal P, Wolgast B. Psychiatric features of children and adolescents with pseudoseizures. *Arch Pediatr Adolesc Med* 1999; **153**: 244–248.
58. Direk N, Kulaksizoglu IB, Alpay K, Gurses C. Using personality disorders to distinguish between patients with psychogenic nonepileptic seizures and those with epileptic seizures. *Epilepsy Behav* 2012; **23**: 138–141.
59. Krishnamoorthy ES, Brown RJ, Trimble MR. Personality and psychopathology in nonepileptic attack disorder and epilepsy: a prospective study. *Epilepsy Behav* 2001; **2**: 418–422.
60. Scévola L, Teitelbaum J, Oddo S, et al. Psychiatric disorders in patients with psychogenic nonepileptic seizures and drug-resistant epilepsy: a study of an Argentine population. *Epilepsy Behav* 2013; **29**: 155–160.
61. Strutt AM, Hill SW, Scott BM, Uber-Zak L, Fogel TG. A comprehensive neuropsychological profile of women with psychogenic nonepileptic seizures. *Epilepsy Behav* 2011; **20**: 24–28.
62. Arnold LM, Privitera MD. Psychopathology and trauma in epileptic and psychogenic seizure patients. *Psychosomatics* 1996; **37**: 438–443.
63. Binder LM, Salinsky MC, Smith SP. Psychological correlates of psychogenic seizures. *J Clin Exp Neuropsychol* 1994; **16**: 524–530.
64. Akyuz G, Kugu N, Akyuz A, Dogan O. Dissociation and childhood abuse history in epileptic and pseudo-seizure patients. *Epileptic Disord* 2004; **6**: 187–192.
65. Salinsky M, Evrard C, Storzbach D, Pugh M. Psychiatric comorbidity in veterans with psychogenic seizures. *Epilepsy Behav* 2012; **25**: 345–349.
66. Galimberti CA, Ratti MT, Murelli R, Marchioni E, Manni R, Tartara A. Patients with psychogenic nonepileptic seizures, alone or epilepsy-associated, share a psychological profile distinct from that of epilepsy patients. *J Neurol* 2003; **250**: 338–346.
67. Dikel TN, Fennell EB, Gilmore RL. Posttraumatic stress disorder, dissociation, and sexual abuse history in epileptic and nonepileptic seizure patients. *Epilepsy Behav* 2003; **4**: 644–650.
68. Harden CL, Jovine L, Burgut FT, Carey BT, Nikolov BG, Ferrando SJ. A comparison of personality disorder characteristics of patients with nonepileptic psychogenic pseudoseizures with those of patients with epilepsy. *Epilepsy Behav* 2009; **14**: 481–483.
69. Kaplan MJ, Dwivedi AK, Privitera MD, Isaacs K, Hughes C, Bowman M. Comparisons of childhood trauma, alexithymia, and defensive styles in patients with psychogenic non-epileptic seizures vs. epilepsy: implications for the etiology of conversion disorder. *J Psychosom Res* 2013; **75**: 142–146.

70. Koby DG, Zirakzadeh A, Staab JP, *et al.* Questioning the role of abuse in behavioral spells and epilepsy. *Epilepsy Behav* 2010; **19**: 584–590.
71. Rosenberg HJ, Rosenberg SD, Williamson PD, Wolford GL 2nd. A comparative study of trauma and post-traumatic stress disorder prevalence in epilepsy patients and psychogenic nonepileptic seizure patients. *Epilepsia* 2000; **41**: 447–452.
72. Alper K, Devinsky O, Perrine K, Vazquez B, Luciano D. Nonepileptic seizures and childhood sexual and physical abuse. *Neurology* 1993; **43**: 1950–1953.
73. Tojek TM, Lumley M, Barkley G, Mahr G, Thomas A. Stress and other psychosocial characteristics of patients with psychogenic nonepileptic seizures. *Psychosomatics* 2000; **41**: 221–226.
74. Dixit R, Popescu A, Bagić A, Ghearing G, Hendrickson R. Medical comorbidities in patients with psychogenic nonepileptic spells (PNES) referred for video-EEG monitoring. *Epilepsy Behav* 2013; **28**: 137–140.
75. Proença IC, Castro LH, Jorge CL, Marchetti RL. Emotional trauma and abuse in patients with psychogenic nonepileptic seizures. *Epilepsy Behav* 2011; **20**: 331–333.
76. Lally N, Spence W, McCusker C, Craig J, Morrow J. Psychological processes and histories associated with nonepileptic versus epileptic seizure presentations. *Epilepsy Behav* 2010; **17**: 360–365.
77. Holman N, Kirkby A, Duncan S, Brown RJ. Adult attachment style and childhood interpersonal trauma in non-epileptic attack disorder. *Epilepsy Res* 2008; **79**: 84–89.
78. Bodde NM, Janssen AM, Theuns C, Vanhoutvin JF, Boon PA, Aldenkamp AP. Factors involved in the long-term prognosis of psychogenic nonepileptic seizures. *J Psychosom Res* 2007; **62**: 545–551.
79. Salinsky M, Storzbach D, Goy E, Kellogg M, Boudreau E. Health care utilization following diagnosis of psychogenic nonepileptic seizures. *Epilepsy Behav* 2016; **60**: 107–111.
80. Mayor R, Brown RJ, Cock H, *et al.* Short-term outcome of psychogenic non-epileptic seizures after communication of the diagnosis. *Epilepsy Behav* 2012; **25**: 676–681.
81. Thompson N, Connelly L, Peltzer J, Nowack WJ, Hamera E, Hunter EE. Psychogenic nonepileptic seizures: a pilot study of a brief educational intervention. *Perspect Psychiatr Care* 2013; **49**: 78–83.
82. Gambini O, Demartini B, Chiesa V, Turner K, Barbieri V, Canevini MP. Long-term outcome of psychogenic nonepileptic seizures: the role of induction by suggestion. *Epilepsy Behav* 2014; **41**: 140–143.
83. Razvi S, Mulhern S, Duncan R. Newly diagnosed psychogenic nonepileptic seizures: health care demand prior to and following diagnosis at a first seizure clinic. *Epilepsy Behav* 2012; **23**: 7–9.
84. Farias ST, Thieman C, Alsaadi TM. Psychogenic nonepileptic seizures: acute change in event frequency after presentation of the diagnosis. *Epilepsy Behav* 2003; **4**: 424–429.
85. Duncan R, Anderson J, Cullen B, Meldrum S. Predictors of 6-month and 3-year outcomes after psychological intervention for psychogenic non epileptic seizures. *Seizure* 2016; **36**: 22–26.
86. Duncan R, Graham CD, Oto M. Neurologist assessment of reactions to the diagnosis of psychogenic nonepileptic seizures: relationship to short- and long-term outcomes. *Epilepsy Behav* 2014; **41**: 79–82.
87. Arain AM, Hamadani AM, Islam S, Abou-Khalil BW. Predictors of early seizure remission after diagnosis of psychogenic nonepileptic seizures. *Epilepsy Behav* 2007; **11**: 409–412.
88. Drane DL, Williamson DJ, Stroup ES, *et al.* Cognitive impairment is not equal in patients with epileptic and psychogenic nonepileptic seizures. *Epilepsia* 2006; **47**: 1879–1886.
89. LaFrance WC Jr, Miller IW, Ryan CE, *et al.* Cognitive behavioral therapy for psychogenic nonepileptic seizures. *Epilepsy Behav* 2009; **14**: 591–596.
90. Yi YY, Kim HD, Lee JS, Cheon KA, Kang HC. Psychological problems and clinical outcomes of children with psychogenic non-epileptic seizures. *Yonsei Med J* 2014; **55**: 1556–1561.
91. Kuyk J, Siffels MC, Bakvis P, Swinkels WA. Psychological treatment of patients with psychogenic nonepileptic seizures: an outcome study. *Seizure* 2008; **17**: 595–603.
92. LaFrance WC Jr, Baird GL, Barry JJ, *et al.* Multicenter pilot treatment trial for psychogenic nonepileptic seizures: a randomized clinical trial. *JAMA Psychiatry* 2014; **71**: 997–1005.
93. Myers L, Vaidya-Mathur U, Lancman M. Prolonged exposure therapy for the treatment of patients diagnosed with psychogenic non-epileptic seizures (PNES) and post-traumatic stress disorder (PTSD). *Epilepsy Behav* 2017; **66**: 86–92.
94. Myers L, Zaroff C. The successful treatment of psychogenic nonepileptic seizure using a disorder-specific treatment modality. *Br Treat Cris Interv* 2004; **4**: 343–352.
95. Conwill M, Oakley L, Evans K, Cavanna AE. CBT-based group therapy intervention for nonepileptic attacks and other functional neurological symptoms: a pilot study. *Epilepsy Behav* 2014; **34**: 68–72.
96. Goldstein LH, Chalder T, Chigwedere C, *et al.* Cognitive-behavioral therapy for psychogenic nonepileptic seizures: a pilot RCT. *Neurology* 2010; **74**: 1986–1994.
97. McDade G, Brown SW. Non-epileptic seizures: management and predictive factors of outcome. *Seizure* 1992; **1**: 7–10.
98. Meierkord H, Will B, Fish D, Shorvon S. The clinical features and prognosis of pseudoseizures diagnosed using video-EEG telemetry. *Neurology* 1991; **41**: 1643–1646.
99. Mayor R, Howlett S, Grünwald R, Reuber M. Long-term outcome of brief augmented psychodynamic interpersonal therapy for psychogenic nonepileptic seizures: seizure control and health care utilization. *Epilepsia* 2010; **51**: 1169–1176.
100. Metin SZ, Ozmen M, Metin B, Talasman S, Yeni SN, Ozkara C. Treatment with group psychotherapy for chronic psychogenic nonepileptic seizures. *Epilepsy Behav* 2013; **28**: 91–94.
101. Santos N de O, Benute GR, Santiago A, Marchiori PE, Lucia MC. Psychogenic non-epileptic seizures and psychoanalytical treatment: results. *Rev Assoc Med Bras (1992)* 2014; **60**: 577–584.
102. Zaroff CM, Myers L, Barr WB, Luciano D, Devinsky O. Group psychoeducation as treatment for

- psychological nonepileptic seizures. *Epilepsy Behav* 2004; **5**: 587–592.
103. Rusch MD, Morris GL, Allen L, Lathrop L. Psychological treatment of nonepileptic events. *Epilepsy Behav* 2001; **2**: 277–283.
 104. LaFrance WC, Keitner GI, Papandonatos GD, *et al*. Pilot pharmacologic randomized controlled trial for psychogenic nonepileptic seizures. *Neurology* 2010; **75**: 1166–1173.
 105. LaFrance WC Jr, Leaver K, Stopa EG, Papandonatos GD, Blum AS. Decreased serum BDNF levels in patients with epileptic and psychogenic nonepileptic seizures. *Neurology* 2010; **75**: 1285–1291.
 106. Pintor L, Baillés E, Matrai S, *et al*. Efficiency of venlafaxine in patients with psychogenic nonepileptic seizures and anxiety and/or depressive disorders. *J Neuropsychiatry Clin Neurosci* 2010; **22**: 401–408.
 107. Oto M. The safety of antiepileptic drug withdrawal in patients with non-epileptic seizures. *J Neurol Neurosurg Psychiatry* 2005; **76**: 1682–1685.
 108. Oto M, Espie CA, Duncan R. An exploratory randomized controlled trial of immediate versus delayed withdrawal of antiepileptic drugs in patients with psychogenic nonepileptic attacks (PNEAs). *Epilepsia* 2010; **51**: 1994–1999.