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Article

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Dan Iulian Cuciureanu, Antonia Nita, Victor Constantinescu, Tudor Cuciureanu
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First episode of consciousness loss: setting new standards in acute care management

Dan Iulian Cuciureanu[1,2], Antonia Nita[2], Victor Constantinescu, Tudor Cuciureanu[3]

[1]"Prof Dr. N. Oblu" Clinical Emergency Hospital, Iasi, Romania
[2]"Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania
[3]Institute of Gastroenterology and Hepatology, Iasi, Romania

Abstract: There is a high prevalence of patients addressed to the emergency department presenting a first episode of consciousness loss. The high prevalence of patients admitted to the emergency departments (ED) with a first episode of consciousness loss (ECL) is well established. Although there are studies assessing acute management in these patients, there is still need for more data on clinical and paraclinical characteristics which may prompt early etiological diagnosis, especially in countries where integrated medical procedures are lacking and access to specialized medical care is still limited. Sudden death syndrome, early cerebral morphological changes emerging in chronic epilepsy is the main motivation for an early diagnosis of epilepsy. The aim of our study was to evaluate demographic, clinical and paraclinical data in adult patients referred to our emergency hospital presenting a first episode of consciousness loss, in order to avoid misdiagnosis (with personal and social high impact) and unnecessary anti-epileptic treatment versus underestimation of epilepsy diagnosis. *Conclusion*: There is a clear need to improve multidisciplinary circuits in patients with a first episode of consciousness loss at a local level, in order to promote accurate and prompt diagnosis. We consider necessary to build a unitary online platform in order to establish an early and complete diagnosis.

Key words: loss of consciousness, first episode, early diagnosis, multidisciplinary platform.

Introduction

The loss of consciousness represents a condition frequently addressed to the emergency unit. There are numerous possible conditions that can determine the loss of consciousness: cardiac syncope, neurally mediated syncope, orthostatic hypotension, epileptic seizures, psychogenic non-epileptic seizures. Yet, in many cases, the etiology of

ECL remains unknown. The place of EEG in routine evaluation of a first ECL has represented a subject of debate.

Our primary goal was to evaluate the incidence of EEG disturbances in the first days after ECL.

Material and methods

We performed a retrospective observational study over 12 months, between January 2015 and January 2016, in our neurological department that included adult patients addressed for investigating their first episode of consciousness loss.

Inclusion criteria: adult patients (age>18) with an initial non-syncopal amnestic episode of consciousness loss (Transient Loss of Consciousness, T- LoC) admitted in our Neurological unit for further investigations. Epidemiological, clinical and paraclinical (routine EEG in first 24 hours, long-term EEG, cardiological examination, brain imagery) data were assessed.

Results

We included 110 patients (mean age 46.5, S.D ±15.5, female patients - 62%) from 4800 patients with different diagnosis (figures 1 and 2).

Younger patients, both male and female (26 - 45 years) were more affected (figures 3 and 4).

Regarding possible etiologies, 16 % of patients did not associate any comorbidities.

Furthe rinvestigations revealed: cerebral malformations in 7% of patients, cerebral parenchymal sequelar lesion in 30%patients, endocrinological disorders in 5% and psychiatric disturbancies in11 % of investigated patients (figures 5, 6).

Initial standard EEG monitoring showed epileptiform abnormalities in 20% of patients (figure 7).

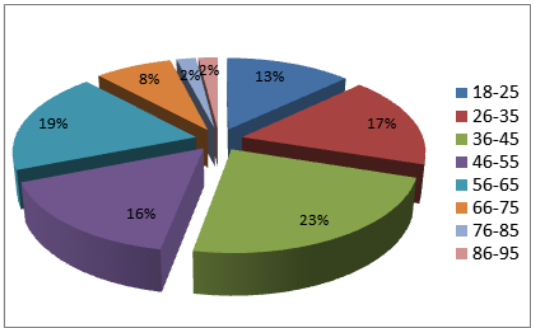

Figure 1 - Patients age

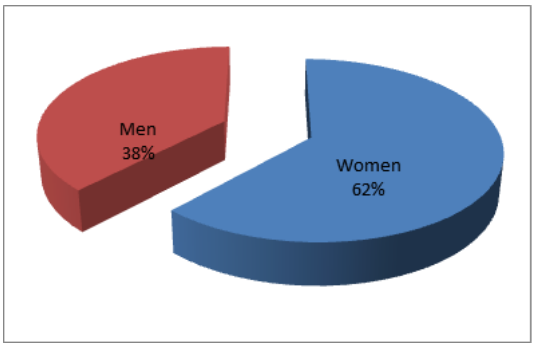

Figure 2 - Patients' gender

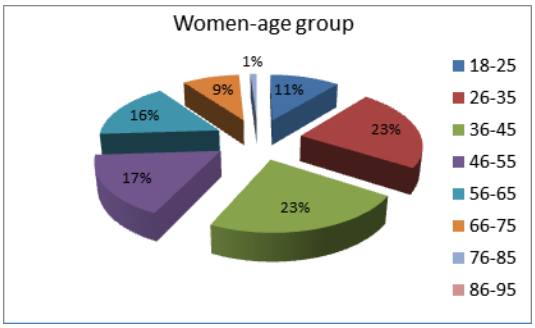

Figure 3 - Decade repartition for women

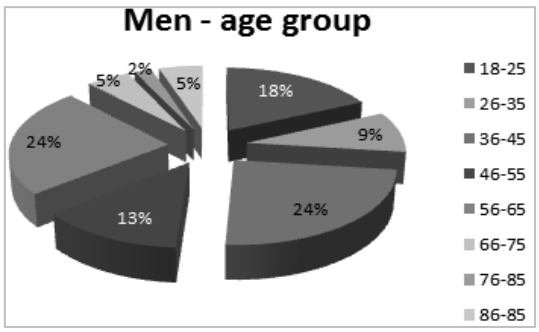

Figure 4 - Decade repartition for men

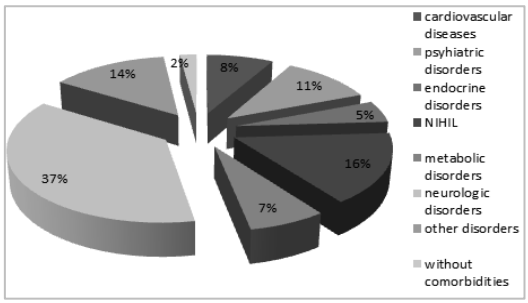

Figure 5 – Comorbidities

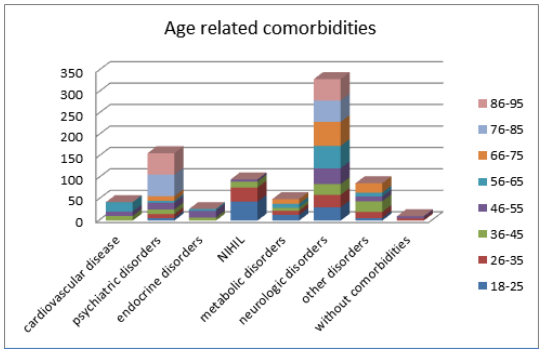

Figure 6 - Age related comorbidities

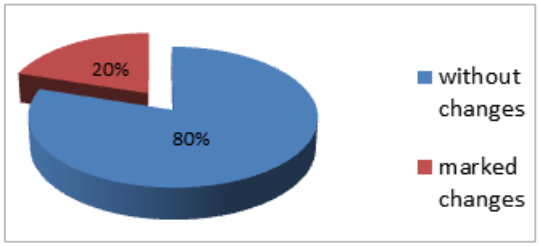

Figure 7 - Standard EEG - epileptiform changes

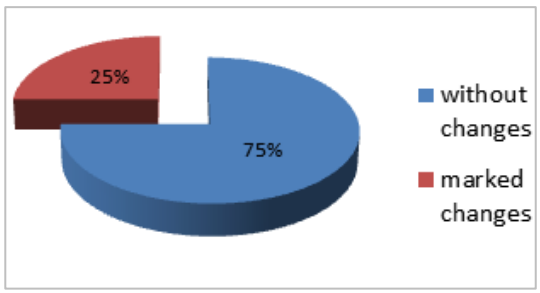

Figure 8 - The incidence of epileptiform changes- age group: 18-25 years

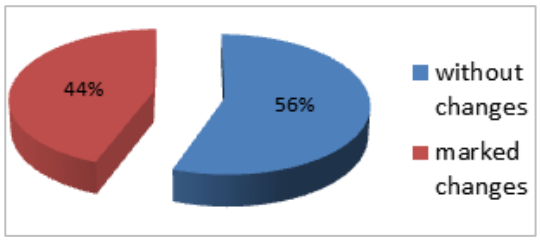

Figure 9 - The incidence of epileptiform changes- age group: 26-35 years

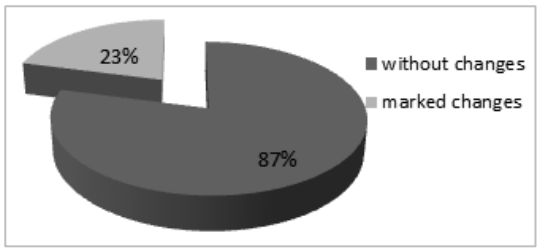

Figure 10 - The incidence of epileptiform changes- age group: 56-65 years

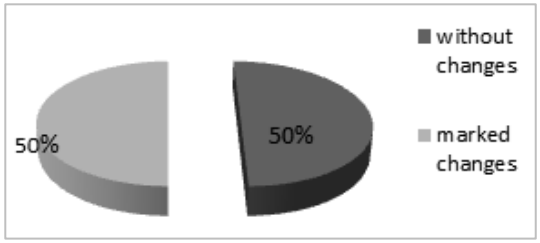

Figure 11 - The incidence of epileptiform changes- age group: 86-95 years

The 36-45 years group and 86-95 group had more EEG abnormalities suggesting an epileptiform caracter of LOSS and no evident correlation with any kind of comorbidities despite the natural history of aging (figures 8-11).

Finaly, epilepsy diagnosis, based on electro-clinical and imagery findings was affirmative in 36% of patients. The highest prevalence was in the youngest and the oldest patients with a male predominance especially for generalized seizures (figures 12-14).

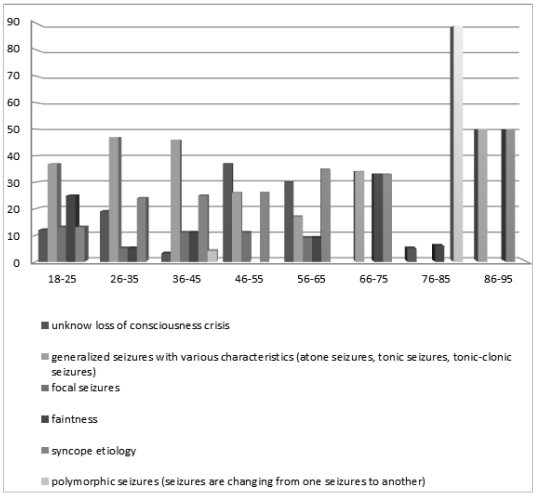

Figure 12 - Discharge diagnosis according to age groups

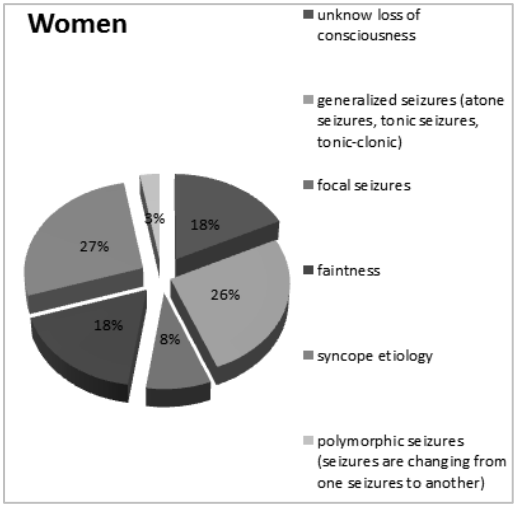

Figure 13 - Women types of seizures

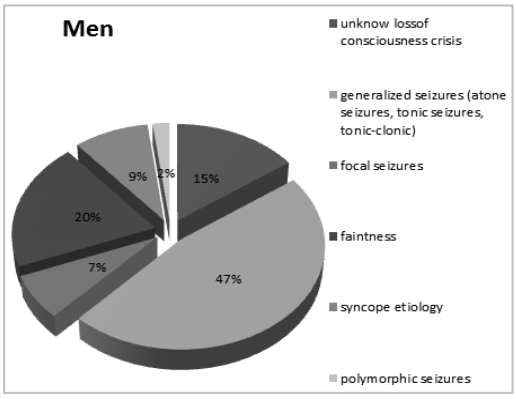

Figure 14 - Men types of seizures

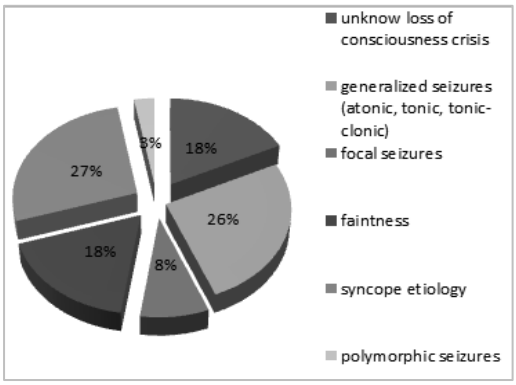

Figure 15 Discharge diagnosis according to standard EEG (without any changes)

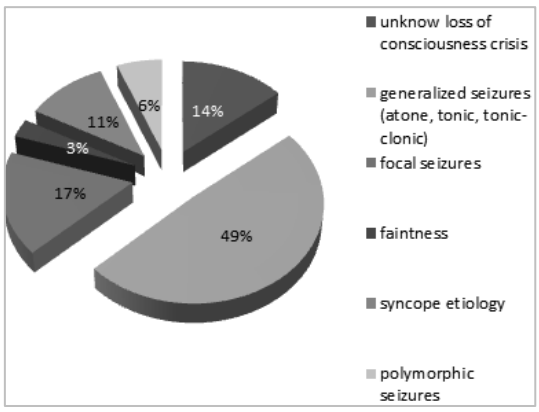

Figure 16 - Discharge diagnosis according to standard EEG with changes

Discussion

According to Smith J, the timing of EEG recording may be important: assessment within 24 hours after seizure revealed interictal epileptiformdischarges in 51%, compared with 34% who had later EEG. Epileptiform activity is specific, but not sensitive for the diagnosis of epilepsy, as the cause of a T-LoC or other paroxysmal event is clinically likely to be epilepsy. We found a great number of patients with epilepsy (72%) having EEG abnormalities while 37% of patients in normal EEG patients (fig 15-16).

EEG has relatively low sensitivity in epilepsy, ranging between 25–56%. Specificity is better, but variable, ranging between 78–98%. About 50% of patients with epilepsy show interictal epileptiform discharges (IED) in the first EEG test. and EEG with epileptiform abnormalities is associated with an increased risk of seizure recurrence (Level A). (Smith J, 2005)l.

The transient nature of consciousness loss episode infers a proeminent and critical place in the clinical management of the history and symptom descriptions. To make a diagnosis of the cause of ECL and to determine the prognosis for the person with ECL, represented by the the risk of future adverse events, one should take into consideration the etiology of the sudden event. Breen and colleagues (2005) showed that 72% of patients presenting symptoms compatible to first seizure and admited to ED, were offered a first seizure clinic appointment in a university hospital within six weeks of referral. The same authors noted that 9% of patients had a subsequent seizure while awaiting review. The study conclusion was that adults who suffer a first possible epileptic seizure and have no neurological complications can be safely managed on outpatient basis.

Yet, prompt diagnostic orientation is highly necessary for complete follow-up.

A large, multicentric, prospective study showed that out of 1419 patients, 1217 were diagnosed with syncope, whereas 202 were diagnosed of non syncopal ECL, which included 36 cases of ECL caused by epilepsy and 166 caused by diverse or unknown causes (Baron-Esquivias et al., 2010).

ECL associated with seizure opens a differential diagnosis, including convulsivant syncope or first manifestation of an epileptic disorder. The report of the Guideline Development Subcommittee of the American Academy of Neurology and the American Epilepsy Society (2015) concerning the management of an unprovoked first seizure in adults, highlighted relevant clinical factors associated with an increased risk of seizure recurrence according to evidence-based

medicine: prior brain insults, epileptiform abnormalities on EEG, nocturnal EEG, which recommend antiepileptic treatment, given the higher risk of recurrent seizure within the first 2 years after a seizure (Krumholtz et al., 2015).

The combination of wake and sleep records gives a yield of 80% in patients with clinically confirmed epilepsy (Smith et al., 2005). EEG place in routine evaluation of ECL should be carefully considered, as epileptic seizure imitators like the loss of postural tone in atonic seizures and cataplexia have misleading clinical similarities. It is estimated that 20–30% of cases are indeed misdiagnosed as epileptic seizures (Chadwick & Smith, 2002). Prolonged interictal sampling using EEG monitoring increases yield by about 20%, and is now more widely available through 24 hour ambulatory multichannel digital EEG. (Smith et al., 2005)

To differentiate an epileptic from a nonepileptic seizure, the clinician has to rely on his "art of listening." This is time-consuming and remains a challenge during a time-limited consultation. Protocols should be in place that ensure proper assessment in the emergency department (NICE, 2014). A detailed history and witness account are essential for diagnosing and managing episodic altered consciousness 20% of patients labelled and treated as epilepsy have other causes for apparent blackouts (Perrig and Jallon, 2008). Some medical societies recommend that patients with a suspected diagnosis of epileptic seizure should be seen by a neurologist or an epilepsy specialist before the diagnosis is made (Scottish Intercollegiate Guidelines Network, 2015).

Symptoms of panic and dissociation may be common in the prodromal phase, although patients may sometimes avoid to provide a detailed description (Stone et al., 2005). More anamnestic and clinical features useful in distinguishing psychogenic non-epileptic attacks ("pseudoseizures") from epileptic convulsions are needed. Psychogenic non-epileptic attacks as part of panic disorders and dissociative disorder are commonly mislabeled (Beghi et al., 2015). Panic symptoms frequently accompany epilepsy and it has been shown that they may worsen or mimic seizures. It has been inferred that almost 50% of adults admitted to intensive care for "status epilepticus" may have psychogenic attacks and not epilepsy. Frontal lobe seizures are easily misdiagnosed as psycho-genic attacks (Bourion-Bedes et al., 2014). There are also patterns of central nervous system syncope related to brain and spinal cord lesions. Data from litterature showed that syncope and psychogenic attacks are the most common reasons for misdiagnosis of epilepsy (Petkar et al, 2006).

Zaidi et al. (2000) performed a head-up tilt test and carotid sinus massage under EEG in 38 patients with uncertain diagnosis and in 47% a diagnosis could be established. In young fainters a common cause of ECL is neurologically mediated reflex syncope, and in particular vasovagal faint. Rapid autonomic adjustments also depend on local environmental biochemistry produced by slower endocrine, and local regulatory mechanisms. Dysautonomic symptoms are proeminent in ECL dscription, yet there are

still no clear-cut quantitfiable measures in clinical set-ups to asssess directly and promptly sympatho excitation or vagal symptoms, resulting in circulatory adjustment deficiences reflected in cardio-circulatory changes, adrenal secretion and renovascular adjustments. Biosignals such as heart rate or blood pressure show a continuous variability that may be altered if there is autonomic dysfunction. Similar to the electrocardiogram, the variability of heart rate can be assessed under resting conditions and during challenge (Hilz et al., 2006). There are various parameters of heart-rate variability describe by post-processing of ECG data (Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996). The standard deviation of the heart rate, the pNN50 (a parameter that indicates the proportion of differences in consecutive RR intervals that are longer than 50 ms), RMSSD (the square root of the mean squared differences of successive RR intervals) as time-domain parameters and Low-Frequncy (LF), High Frequency (HF), LF/HF ratio as frequency domain parameters, recorded during 5 min or more, reflect the influence of the parasympathetic and sympathetic system on heart-rate modulation (Freeman et al., 1995). Schellong test or the Tilt-test may reveal orthostatic hypotension defined as a fall in systolic blood pressure of at least 20 mm Hg or diastolic blood pressure of at least 10 mmHg (Winker et al., 2005).

The "subclavian steal syndrome" is rather rare, but can cause ECL due to retrograde blood flow in the vertebral artery associated with proximal ipsilateral subclavian artery stenosis or occlusion (Osiro et al. 2012). Therefore, when contextual circumstances are in favor of such a haemodynamic phenomena (e.g. effort), ultrasound doppler examination of neck vessels may provide the etiology of the syncope.

Cardiac causes such as transient polymorphic ventricular tachycardia (VT) in the congenital long QT syndrome may also cause ECL and can easily be misdiagnosed as epilepsy and wrong or delayed management, sometimes leading to cardiac arrest and hypoxic brain damage. The STARS (Syncope Trust And Reflex anoxic Seizures) Medical Advisory Committee, with European and North American multidisciplinary members, comprising cardiologists, paediatric and adult neurologists and general physicians, defined this issue as a worldwide concern (STARS, 2007; Fitzpatrick and Cooper, 2006).

Hypoglycaemia and its related causes (including excessive alcohol intake), dismetabolic and endocrine dysfunction (e.g. hypocalcemia, phaeochromocytoma) should also be taken into consideration when investigated a first ECL (Smith, 2001).

The diagnosis of episodic altered consciousness rests largely with the clinical history,despite the remarkable advances in the technology of imaging and neurophysiology.Common reasons for misdiagnosis may be inadequate or missing history—for example, no witnesss, clonic movements or incontinence accompanying syncope or psychogenic attacks, overstatement of family history of epilepsy, overinterpretation of minor

electroencephalography (EEG) abnormalities or normal age specific variants (Perrig and Jallon, 2008).

Evidence-based medicine progress infers the need of new standards in management of a first episode of consciousness loss. Early and successful interventions are conditioned by existence of multidisciplinary protocols and prompt access to specialist care (Beghi et al., 2006; NICE, 2016). Defensive medicine and patients' tendency to ask for more examinations in a medical system based on rather individualized medical approaches than integrative set-ups may lead to diminished efficacy of initial medical examination and also to potential diagnosis and treatment delay. Studies on large populational data have shown that the social and economic burden of delayed or miss-diagnosis of ECL episodes is substantial (Stokes et al., 2004). Furthermore, the Sudden Unexplained Death in Epilepsy (SUDEP) phenomena is a subject of concern among patients experiencing ECL, as studies have shown that some cases of SUDEP may be due to unsuspected disease and arrythmic syncope (Hirsch and Hauser, 2004).

Conclusion

Therefore, it is a clear need to improve multidisciplinary circuits in patients with a first ECL at a local level, in order to promote accurate and prompt diagnosis of patients who are admitted at emergency department for a first episode of loss of consciousness in a region with rather limited access to multidisciplinary routine protocols..

New issues adressed by the present project proposal are based mainly on the need to highlight new biomarkers accesible in routine and emergency set-ups that allow a prompt differential diagnosis. In this respect, we consider that neuro-vegetative patterns examination (e.g. heart rate variability in a routine test and stand-up test, Schellong test) may help the early orientation of the diagnosis, diminishing the percentage of ECL of unknown cases.

Correspondence
Dan Iulian Cuciureanu
E-mail: cuciureanu57@gmail.com

References

1.Breen DP, Dunn MJ, Davenport RJ, Gray AJ. Epidemiology, clinical characteristics, and management of adults referred to a teaching hospital first seizure clinic. Postgrad Med J. 2005 Nov; 81(961):715-8. PMID: 16272236

2.Baron-Esquivias G, Martínez-Alday J, Martín A, Moya A, García-Civera R, Paz López-Chicharro M, Martín-Mendez M, del Arco C, Laguna P. Epidemiological characteristics and diagnostic approach in patients admitted to the emergency room for transient loss of consciousness: Group for Syncope Study in the Emergency Room (GESINUR) study.Europace. 2010 Jun; 12(6):869-76. doi: 10.1093/europace/euq018. Epub 2010 Mar 9. PMID: 20215367

3.Krumholz A, Wiebe S, Gronseth GS, Gloss DS, Sanchez AM, Kabir AA, Liferidge AT, Martello JP, Kanner AM, Shinnar S, Hopp JL, French JA.Evidence-based guideline: Management of an unprovoked first seizure in adults: Report of the Guideline Development Subcommittee of the American Academy of Neurology and the American Epilepsy Society.Neurology. 2015 Apr 21;84(16):1705-13. doi: 10.1212/WNL.0000000000001487.PMID:25901057

4.Smith SJM, EEG in the diagnosis, classification, and management of patients with epilepsy. J NeurolNeurosurg Psychiatry 2005;76:suppl 2 ii2-ii7 doi:10.1136/jnnp.2005.069245

5.Chadwick D, Smith D. The misdiagnosis of epilepsy.BMJ. 2002 Mar 2;324(7336):495-6.

6.National Institute for Health and Care Excellence (UK), NICE. Epilepsies: diagnosis and management (CG137), 2016
7.Perrig S, Jallon P.Is the first seizure truly epileptic? Epilepsia. 2008;49Suppl 1:2-7. doi: 10.1111/j.1528-1167.2008.01442.x.
8.Scottish Intercollegiate Guidelines Network (SIGN).Diagnosis and management of epilepsy in adults. Edinburgh: SIGN; 2015.(SIGN publication no. 143). [May 2015]. Available from URL: http://www.sign.ac.uk
9.Stone J, Carson A, Sharpe M. (2005) Functional symptoms and signs in neurology: assessment and diagnosis. J NeurolNeurosurg Psychiatry 76:2–12.
10.Beghi M, Negrini PB, Perin C, Peroni F, Magaudda A, Cerri C, CornaggiaCM Psychogenic non-epileptic seizures: so-called psychiatric comorbidity and underlying defensemechanisms. Neuropsychiatr Dis Treat. 2015 Sep 30;11:2519-27. doi: 10.2147/NDT.S82079. eCollection 2015.
11.Bourion-Bédès S, Hingray C, Faust H, Vignal JP, Vespignani H, Schwan R, Jonas J, MaillardL. Pitfalls in the diagnosis of new-onset frontal lobe seizures.EpilepsyBehav Case Rep. 2013 Nov 28;2:1-3. doi: 10.1016/j.ebcr.2013.10.002. eCollection 2014.PMID:25667854
12.Petkar S, Cooper P, Fitzpatrick AP.How to avoid a misdiagnosis in patients presenting with transient loss of consciousness.Postgrad Med J. 2006 Oct;82(972):630-41.
13.Zaidi A, Clough P, Cooper P, Scheepers B, Fitzpatrick AP. (2000) Misdiagnosis of epilepsy: many seizure-like attacks have a cardiovascular cause. J Am CollCardiol 36:181–184
14.Hilz MJ, Dütsch M. Quantitative studies of autonomic function. Muscle Nerve. 2006 Jan;33(1):6-20.
15.Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology. Heart rate variability: standards of measurement, physiological interpretation, and clinical use. Circulation 1996; 93: 1043–1065.
16.Freeman R, Weiss ST, Roberts M, Zbikowski SM, Sparrow D. The relationship between heart rate variability and measures of body habitus. ClinAuton Res 1995; 5: 261–266.
17.Winker R, Prager W, Haider A, Salameh B, RüdigerHW.Schellong test in orthostatic dysregulation: a comparison with tilt-table testing.WienKlinWochenschr. 2005 Jan;117(1-2):36-41.
18.Osiro S, Zurada A, Gielecki J, Shoja MM, Tubbs RS, Loukas M.A review of subclavian steal syndrome with clinical correlation.Med SciMonit. 2012 May;18(5):RA57-63. Review.PMID: 22534720
19.Fitzpatrick AP, Cooper P. Diagnosis and management of patients with blackouts. Heart. 2006 Apr; 92(4): 559–568. doi: 10.1136/hrt.2005.068650. PMCID:PMC1860900.
20.Syncope Trust And Reflex anoxic Seizures (STARS),International Medical Advisory Committee (MAC), 2007, www.stars.org.uk
21.Smith SJM. If it's not epilepsy.JNeurolNeurosurg Psychiatry 2001;70(suppl II):ii9–ii14
22.Stokes T, Shaw EJ, Juarez-Garcia A, Camosso-Stefinovic J, Baker R.Clinical Guidelines andEvidence Review for the Epilepsies: diagnosis and management in adults and children in primary and secondary care London: Royal College of General PractitionersLondon: Royal College of General Practitioners, 2004
23.Hirsch LJ, Hauser WA.Can sudden unexplained death in epilepsy be prevented? Lancet. 2004 Dec 18-31;364(9452):2157-8.