

# Psychiatric Evaluation during Epilepsy Monitoring Unit Admission Identifies Undiagnosed Psychiatric Co-Morbidities in Epilepsy Patients

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## Abstract

**Rationale:** Epilepsy patients are known to have multiple comorbidities. Comorbid psychiatric diagnosis contributes to the poor outcome, especially undiagnosed psychiatric conditions. The goal of the study is to properly identify specific psychiatric diagnosis in this patient population, providing targeted treatment recommendation. **Methods:** All patients admitted to Epilepsy Monitoring Unit (EMU) from October 2016 to May 2017 are included in this analysis. Psychiatric evaluation was completed from all ninety-seven patients except one due to family refusal (N = 96). All patients have pre-existing epilepsy diagnosis or suspicion of epilepsy. Psychiatric evaluation includes patient interview, family interview, chart review, and discussion with neurology team. **Results:** Ninety-seven patients were admitted to the EMU between October 2016-November 2017; 96 of those patients received psychiatric intervention. There were 53 (55%) female participants and 43 (45%) male participants; mean age was 43 years old. Of ninety-six epilepsy and epilepsy suspect patients, 61 (64%) reported history of psychiatric illness; 34 (56%) of these patients were treated by their neurologist or primary care doctor for depression or anxiety. Four patients (4.2%) reported pre-existing Post-Trauma Stress Disorder (PTSD) with history of severe trauma. Four patients (4.2%) had autistic spectrum disorder diagnosed at young age; all related to early-onset epilepsy. Five patients (5.2%) had documented, pre-existing Psychogenic Non-Epileptic Seizure (PNES) or conversion disorder evidenced by negative EEG. A few other psychiatric diagnoses were unrelated to epilepsy. Thirty-five patients (36%) who reported no pre-existing psychiatric diagnosis had never had a psychiatric evaluation. After formal psychiatric screening at

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EMU, 56 out of 96 (58%) of patients' psychiatric diagnosis has changed. Ten out of 41 (24%) of the patients with pre-existing diagnosis of depression or anxiety were found to have different types of somatic symptoms. With EEG correlation, 13 (14%) patients were confirmed to have PNES or conversion disorder with mixed symptoms during EMU admission from 5 (5%) diagnosed PNES cases before EMU admission. Nine patients met the criteria of somatic symptom disorder with chronic, non-neurological symptoms. Seven (7%) patients received a new diagnosis of adjustment disorder; four of them were due to uncontrolled epilepsy. Five patients received a new diagnosis of PTSD with severe early life trauma; among them, three patients also received another new diagnosis of chronic somatic symptom disorder. **Conclusions:** Proper diagnosis of psychiatric comorbidities is the first step in treatment. Inpatient psychiatric evaluation during EMU admission identifies more specific psychiatric diagnoses, leading to more targeted treatment recommendations. We strongly recommend integrated psychiatric evaluation for all EMU admissions. Psychiatric consultation with daily inpatient follow-up during EMU admission identified PNES, conversion disorder with mixed symptoms, other somatic symptom disorders and adjustment disorder related to epilepsy, which led to more targeted treatment recommendations. Unrecognized and untreated conversion patients are just as disabled as patients with epilepsy. The misdiagnosis of PNES leads to inappropriate treatment of presumed epilepsy, with significant risk of iatrogenic injury, morbidity and increased cost to patient and to the health care system.

## Keywords

Epilepsy, Seizures, Depression, Comorbidities

## 1. Introduction

Epilepsy is a chronic neurological condition that can have negative cognitive, psychological and social consequences. Epilepsy patients are known to have multiple psychiatric comorbidities, most commonly depression and anxiety [1]. This association has been noted across multiple cultures and settings. Comorbid psychiatric diagnoses contribute to poor outcome, especially if they are undiagnosed and therefore untreated. Patients with epilepsy have a three-times higher risk of committing suicide than their non-epileptic counterparts, with the highest risk in the first 6 months after diagnosis and even higher in patients who had a pre-existing psychiatric diagnosis [2].

Psychiatric comorbidities can precede the seizure disorder or develop after the original diagnosis. Interictal depression in patients with chronic epilepsy can present atypically and is often confused for dysthymia [3]. Additionally, antiepileptic drugs (AEDs) have been associated with psychiatric and behavioral side effects (PBSEs) that affect 17% of patients, medication users [4]. The risk of undesirable psychiatric side effects is highest with Levetiracetam (18%) and Zonisamide (9.7%) compared to other antiepileptic medications [4]. It has been hy-

pothesized that patients with epilepsy are more susceptible to the adverse psychiatric effects of AEDs due to structural and functional brain changes as a result of epileptiform activity [5].

The interaction between epilepsy and depression is bidirectional. Characterizing the psychiatric diagnoses in patients with epilepsy not only improves quality of life and overall health outcomes but it can also have an affect on the seizure disorder itself. Major depressive disorder is an independent risk factor for seizures in adults with a six-fold higher risk of experiencing an unprovoked seizure than non-depressed controls [6]. The aim of this study is to properly identify specific psychiatric diagnoses in this patient population during Epilepsy Monitoring Unit (EMU) admission and provide targeted treatment recommendations to improve overall health outcomes in patients with epilepsy.

## 2. Methods

Institutional Review Board approval was obtained. All patients admitted to the epilepsy monitoring unit (EMU) between October 2016 and November 2017 were included in the study. Patients were admitted to the EMU for seizure diagnosis, monitoring response to medications and dose changes and/or for identification of a seizure focus to determine eligibility for surgical treatment. All patients had an existing diagnosis of epilepsy or suspicion of epilepsy. Admitted patients received a comprehensive psychiatric evaluation. The patients and their families were interviewed separately. A chart review was conducted to identify any previous psychiatric diagnoses, admissions and medications. Information regarding the patient's neurological diagnosis and history was obtained, when possible, from the patient's primary neurologist. There were no exclusion criteria, all patients admitted received a psychiatric evaluation but one patient who opted out due to family refusal. The data was analyzed using descriptive statistics.

## 3. Results

Ninety-seven patients were admitted to the EMU between October 2016 and November 2017; 96 of those patients received psychiatric intervention. Patient demographics and clinical characteristics are shown in **Table 1**. There were 53 (55%) female participants and 43 (45%) male participants; mean age was 43 years old. Patients were admitted to the EMU for clarification of spells, optimization of antiepileptic medications (AEDs), localization of a seizure focus or any combination of these. Patients admitted for AED optimization and/or seizure localization were more likely to have pre-existing, usually refractory, epilepsy and a small percentage of these patients have comorbid psychogenic nonepileptic seizures (PNES). PNES are defined spells/seizure-like behavior captured on video without abnormal EEG findings.

The psychiatric diagnoses identified before and during admission are shown in **Figure 1**. Of ninety-six epilepsy and epilepsy suspect patients, 61 (64%) re-

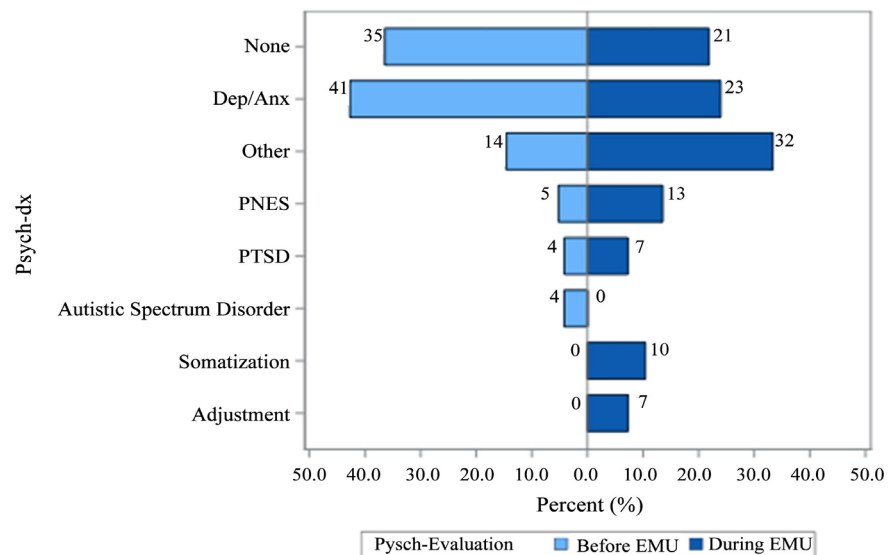
ported history of psychiatric illness; 34 (56%) of these patients were treated by their neurologist or primary care doctor for depression or anxiety. Four patients (4.2%) reported pre-existing Post-Trauma Stress Disorder (PTSD) with history of severe trauma. Four patients (4.2%) had autistic spectrum disorder diagnosed at young age, all related to early-onset epilepsy. Five patients (5.2%) had documented, pre-existing Psychogenic Non-Epileptic Seizure (PNES) or conversion disorder evidenced by negative EEG. A few other psychiatric diagnoses were unrelated to epilepsy. Thirty-five patients (36%) who reported no pre-existing psychiatric diagnosis had never had a psychiatric evaluation (**Figure 1**). After formal psychiatric screening at EMU, 56 out of 96 (58%) of patients' psychiatric diagnosis has changed (**Figure 1**). Ten out of 41 (24%) of the patients with pre-existing diagnosis of depression or anxiety were found to have different types of somatic symptoms. With EEG correlation, 13 (14%) patients were confirmed to have PNES or conversion disorder with mixed symptoms during EMU admission from 5 (5%) diagnosed PNES cases before EMU admission. Nine patients met the criteria of somatic symptom disorder with chronic, non-neurological symptoms. Seven (7%) patients received a new diagnosis of adjustment disorder; four of them were due to uncontrolled epilepsy. Five patients received a new diagnosis of PTSD with severe early life trauma; among them, three patients also received another new diagnosis of chronic somatic symptom disorder.

#### 4. Discussion

The study demonstrated the high burden of concurrent psychiatric diagnoses in epileptic patients admitted for monitoring. More cases of PNES were confirmed in these patients compared to pre-evaluation. As of 2013, the International

**Table 1.** Patient demographics and clinical characteristics.

	Number of patients (percentage)
<b>Sex</b>	
Female	53 (55%)
Male	43 (45%)
<b>Age (years)</b>	
Mean	43
Range	18 - 85
<b>Reason for admission</b>	
Clarification of spells	35 (36%)
Optimization of AEDs	33 (34%)
Localization of seizure focus	5 (5%)
Combination of $\geq 2$ reasons	24 (25%)



**Figure 1.** Psychiatric diagnoses before/during EMU admission.

League Against Epilepsy (ILAE) compiled a set of diagnostic indicators for the diagnosis of PNES when the gold standard diagnostic method of video-EEG recording is unavailable [7]. The ILAE proposed that the diagnosis of PNES was “probable” if the nonepileptic seizure event was witnessed by a clinician (in person or on video) who deemed the episode to be non-epileptic based on witnessed behavior in addition to characteristic history obtained on evaluation [7]. They also identify a variety of clinical and laboratory factors associated with PNES but none are diagnostic. The Epilepsy Study Group of the Italian Neurological Society is one of the multiple groups highlighting the need for improved and more accurate diagnostic alternatives in spite of the ILAE’s of the proposed diagnostic levels [8]. The development of an objective outpatient PNES screening tool based on age of onset and history by the University of California (Los Angeles) Department of Psychiatry potentially provides an accurate alternative to video-EEG monitoring [9]. The controversy on alternative diagnosis methods and ethical considerations regarding seizure induction are likely responsible for the increase in PNES diagnosis once gold-standard video-EEG was used for diagnosis confirmation in this study, although this conclusion could be complicated by the fact that some patients might have PNES with co-existing epilepsy.

Post traumatic stress disorder (PTSD) was highly correlated with the diagnoses of PNES and somatic symptom disorders, consistent with previous research demonstrating the associations between these diagnoses [10] [11] [12]. Among patients with a diagnosis of depression and anxiety prior to EMU admission, psychiatric evaluation identified that 33% of them developed the depression and anxiety secondary to epilepsy and other comorbid medical conditions. These results were not surprising given the extensive body of research associating the development of depression with the presence of a chronic medical condition. Depression is common in many medical conditions, including arthritis, diabetes,

heart disease, asthma and COPD [13]. While some patients with chronic medical conditions might have had undiagnosed depression in these studies, it is also likely that the financial and emotional burdens from chronic medical conditions and decreased quality of life, which is certainly significant in epilepsy, can contribute significantly to the development of new onset depression [13]. Almost all patients identified with somatic symptom disorder and conversion disorder with PNES or other neurological symptoms have a self-reported history of trauma, some of them meeting the full criteria of PTSD diagnosis. Even if these patients do not have acute, identifiable psychosocial stressors, they may continue to have refractory seizures (either epileptic or non-epileptic) or other somatic symptoms due to either trauma history and subsequent untreated PTSD, depression, anxiety, insomnia, or alcohol use disorder.

Limitations of this study include the small sample size ( $N = 96$ ). A larger sample size is needed to further establish the benefits of psychiatric evaluation during EMU admission. The second limitation is the restriction of psychiatric evaluation to a single epilepsy monitoring unit. A multi-center intervention is needed to increase the external validity of these results.

The results of this study highlight the necessity of targeted psychiatric evaluation and intervention for all patients with epilepsy. The risk of developing depression is highest within the first 6 months after diagnosis, emphasizing the importance of initial screenings shortly after diagnosis with tools such as the PHQ-12 [2]. One study reported the average time from epilepsy diagnosis to suicide was 8.8 years, emphasizing the role of frequent monitoring and screening of psychiatric comorbidities as a routine part of epilepsy care [3]. Treatment of psychiatric comorbidities improves response to AEDs and surgical treatment and even improves tolerance of, and therefore adherence to, AEDs [14]. Additionally, it supported the need for improved PNES alternative diagnostic methods that has been highlighted by various epilepsy organizations. The bidirectionality of the relationship between depression and epilepsy warrants additional efforts to identify and target patients with untreated comorbid psychiatric conditions.

## 5. Conclusion

Epilepsy patients are known to have multiple psychiatric comorbidities, most commonly depression and anxiety. Comorbid psychiatric diagnoses contribute to poor outcome, especially if they are undiagnosed and therefore untreated. Psychiatric consultation during EMU admission helps to identify untreated depression and/or anxiety as well as PNES, conversion disorder with mixed symptoms, somatic symptom disorders and adjustment disorders related to epilepsy, which led to more targeted treatment recommendations.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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