

## Clinical guideline: management of seizures in the emergency room

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### Abstract

*This clinical guideline on epilepsy contains levels of evidence and recommendations based on the scientific method. Its primary function is to provide emergency medicine physicians a clear diagnostic approach when faced with a pediatric or adult patient with epileptic seizures (ES) or epilepsy. The objective is to unify criteria that will guarantee integral health care, based on adequate decision-making, benefiting the patient through the individualized analysis of proper anamnesis, physical examination, precise indication of laboratory, and image diagnostic tests that yield the pertinent clinical and pharmacological treatment for opportune interventions, avoiding complications, and whenever possible, the recurrence of the ES.*

**Key words:** Seizures. Epilepsy. Treatment in the emergency room.

### Introduction

Epilepsy is one of the diseases that affect the quality of life of patients the most, due to its neurological, psychological, and social implications. Epileptic seizures (ES) are a common cause of admittance to the emergency room (ER), and they are responsible for 1 million or 1% of all the ER consults. The annual cost of care, prehospital and within the ER, to treat ES is estimated

to be 1 billion dollars. Clinical guidelines attempt to direct and guarantee the assertiveness of medical attention to improve the diagnosis and treatment of this disease<sup>1-3</sup>.

Recommendations for scientific research were based on the selective location of keywords in PubMed-MEDLINE, The Cochrane Library, and other clinical practice guidelines, as well as recommendations by other scientific societies.

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**Questions addressed within this guideline**

1. What clinical data must be purposefully investigated during the anamnesis of a patient with ES in the ER?
2. Which laboratory tests must be performed in the ER on a patient with a first ES?
3. Under which conditions must electroencephalography be performed on a patient with ES in the ER?
4. Under which conditions must a neuroimaging test (CT or MRI) be performed on a patient with ES in the ER?
5. Under which conditions must anti-epileptic drugs be initiated on patients with a first ES in the ER?

ES: epileptic seizures; ER: emergency room; CT: computerized tomography; MRI: magnetic resonance imaging.

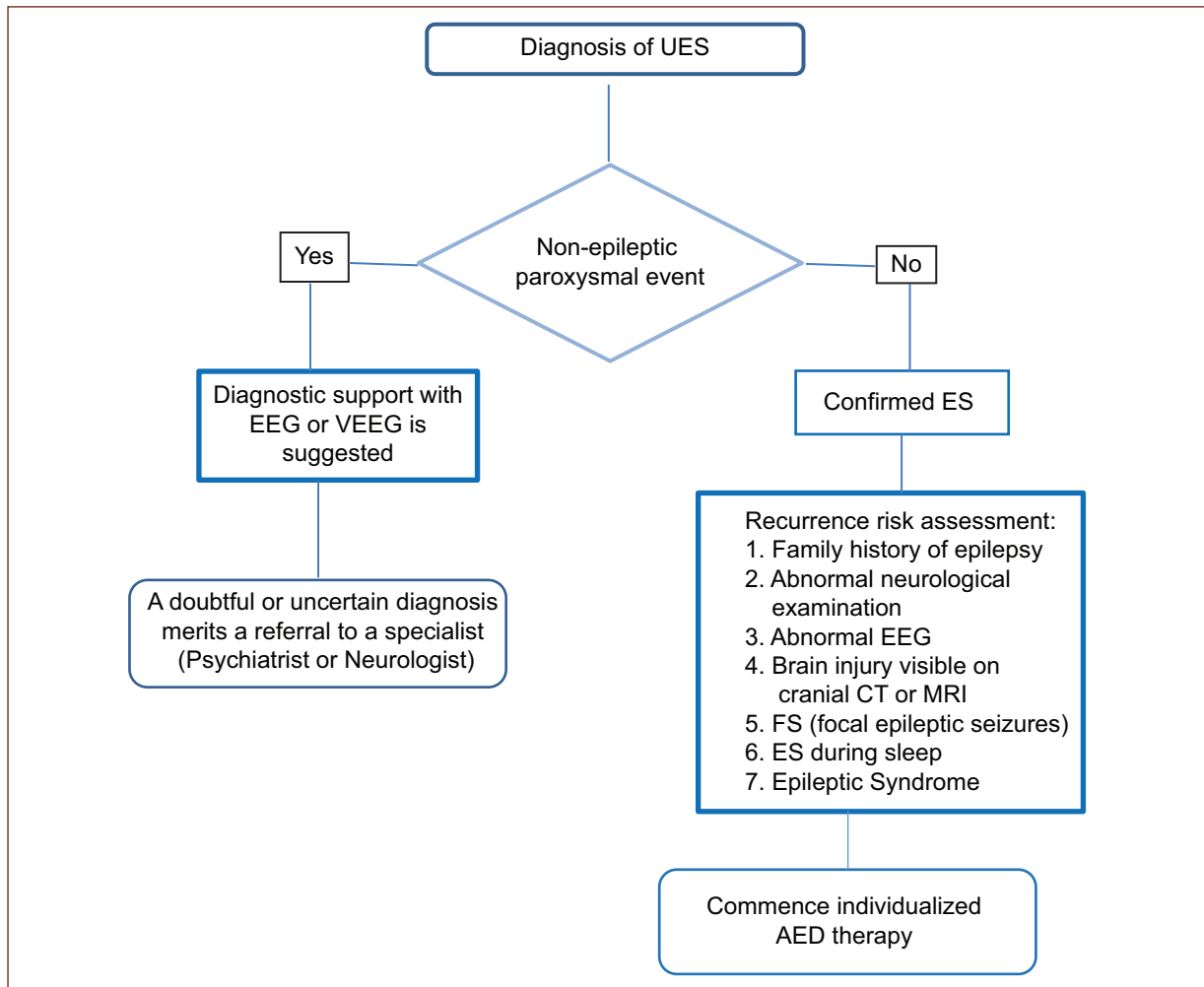
**What clinical data must be purposefully investigated during the anamnesis of a patient with ES in the ER?**

Recommendation (Figures 1-3)	Level of recommendation
Identification of all possible triggering factors for the seizure: <ul style="list-style-type: none"> <li>– Fever, concomitant systemic infection or disease</li> <li>– History of previous neurological disease</li> <li>– Trauma</li> <li>– Ingestion of drugs or toxic substances</li> <li>– Recent vaccinations</li> <li>– Family history of ES</li> </ul>	D NICE, 2012 <sup>4</sup> R- Solari F, 2011 <sup>5</sup>
Medical personnel performing an initial examination on a patient in the ER must identify and interrogate: <ul style="list-style-type: none"> <li>– Alteration of the level of consciousness</li> <li>– Type and topography of altered motor activity</li> <li>– Sensory symptoms</li> <li>– Autonomic symptoms</li> <li>– Cognitive symptoms</li> <li>– Behavior during the preictal, ictal, and postictal periods</li> </ul>	D NICE, 2012 <sup>4</sup> R- SAdE, 2015 <sup>6</sup>
Additional information must be gathered for the diagnosis, including: <ul style="list-style-type: none"> <li>– Perinatal pathologies</li> <li>– Characteristics of psychomotor development timeline</li> <li>– Learning disabilities</li> <li>– Other neurological or psychiatric diseases</li> </ul>	3 NICE, 2012 <sup>4</sup> R- SAdE, 2015 <sup>6</sup>
A directed neurological examination is recommended in search of signs and symptoms of: <ul style="list-style-type: none"> <li>– Intracranial hypertension</li> <li>– Signs of meningeal irritation</li> <li>– Focal neurological deficit</li> <li>– Neurological emergency</li> </ul>	D NICE, 2012 <sup>4</sup> R- SAdE, 2015 <sup>6</sup>

ES: epileptic seizures; ER: emergency room.

**Which laboratory tests must be performed in the ER on a patient with a first ES?**

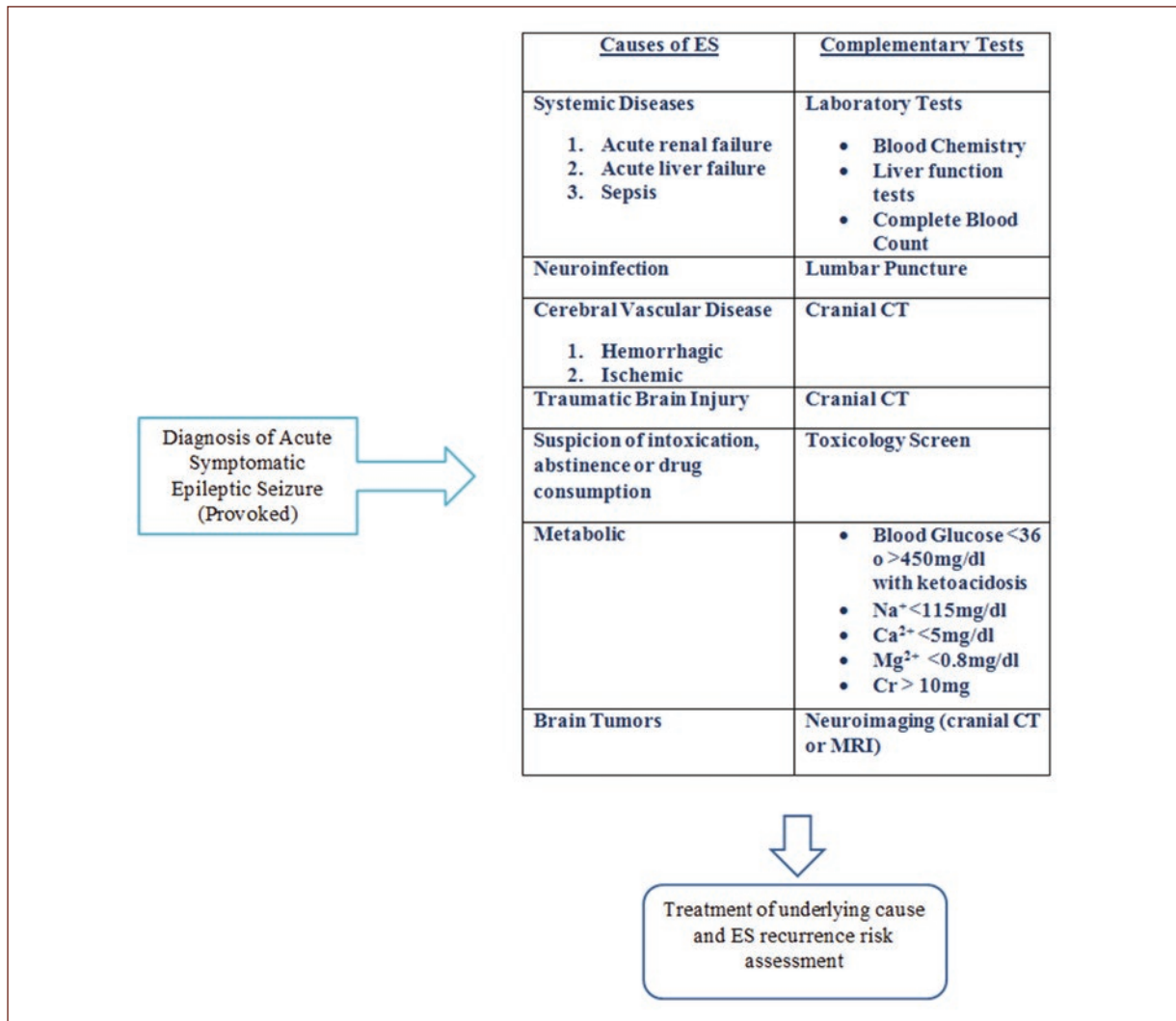
Recommendation	Level of recommendation
Laboratory tests on a patient that has complete recovery after a first ES are not considered necessary, unless there are specific findings that justify them	3 NICE, 2012 <sup>4</sup> R-SAdE, 2015 <sup>6</sup>
Laboratory tests recommended for patients with ES that present with dehydration due to vomiting or diarrhea and demonstrate a progressive or persistent deterioration of consciousness are: <ul style="list-style-type: none"> <li>– Complete blood count</li> <li>– Blood glucose, sodium, and electrolytes</li> <li>– Serum pregnancy (qualitative hCG) test</li> </ul>	D NICE, 2012 <sup>4</sup> R-SAdE, 2015 <sup>6</sup>



**Figure 1.** Unprovoked Epileptic Seizure.

LP is recommended for any patient with a first ES and suspicion of CNS infection, subarachnoid hemorrhage determined by a non-diagnostic CT image, suspicion of HIV infection, or children under 6 months of age	D NICE, 2012 <sup>4</sup> R- SAde, 2015 <sup>6</sup>
A LP is not indicated on patients who show complete recovery of their neurological basal state after a first ES	R- SAde, 2015 <sup>6</sup>
To establish a differential diagnosis of non-epileptic paroxysmal events, individualization of cases is recommended when considering complementary tests	D NICE, 2012 <sup>4</sup> R-SAde, 2015 <sup>6</sup>
If substance abuse of psychoactive drugs or exposure to toxic substances is suspected, a toxicology screen is recommended	D NICE, 2012 <sup>4</sup> R- SAde, 2015 <sup>6</sup>
Complementary diagnostic tests after a new ES on patients with a known history of epilepsy are not necessary, unless there is suspicion of lack of pharmaceutical efficacy, intoxication, adherence to treatment, or change in seizure pattern	R-SAde, 2015 <sup>6</sup>

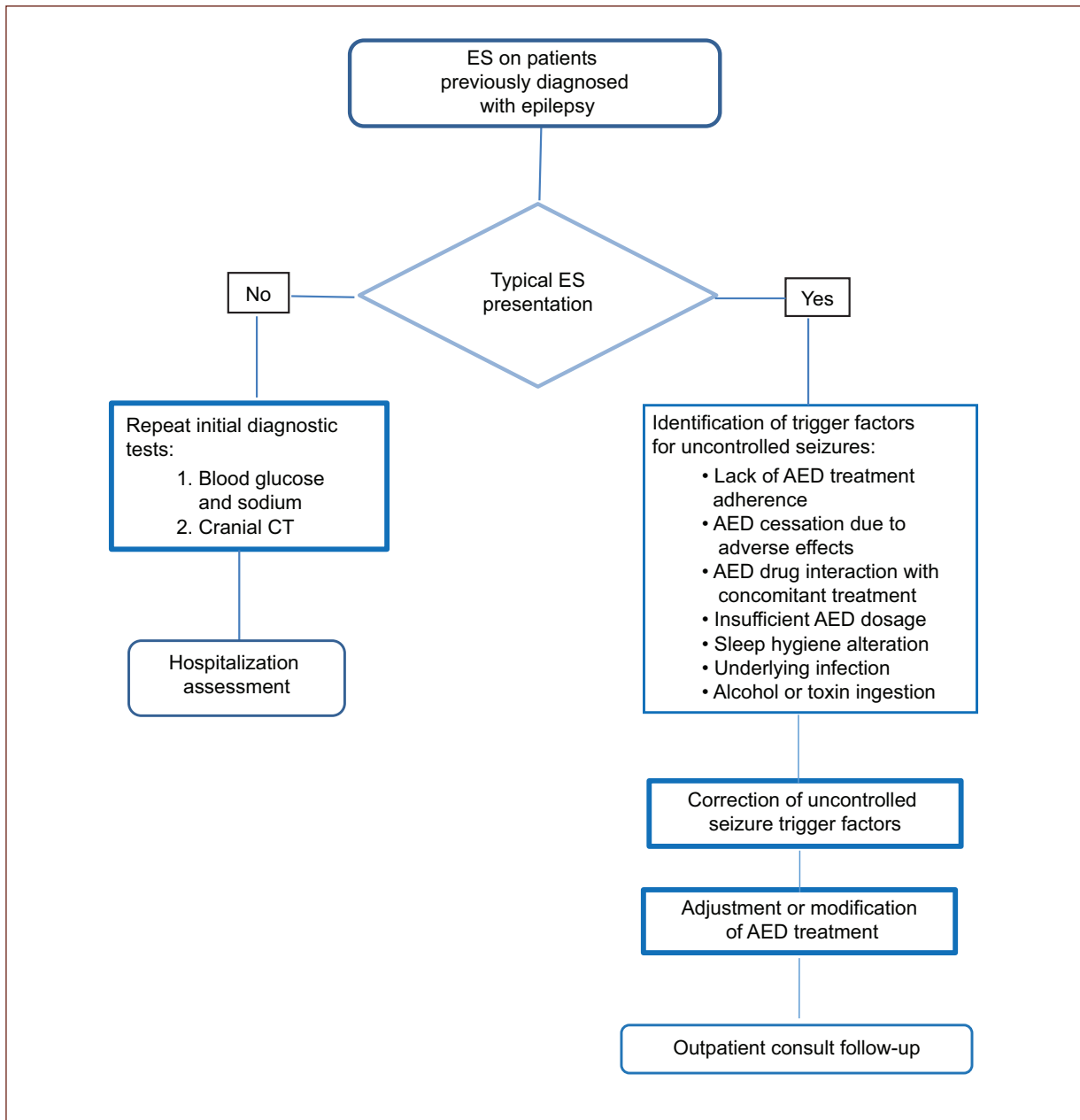
LP: lumbar puncture; ES: epileptic seizures; CNS: central nervous system; CT: computerized tomography.



**Figure 2.** Acute symptomatic epileptic seizure (provoked).

**Under which conditions must electroencephalography be performed on a patient with ES in the ER?**

<b>Recommendation</b>	<b>Level of recommendation</b>
There is no evidence that an emergency EEG has any implication on immediate therapy; therefore, there are few indications such as: – Suspicion of subtle or non-convulsive status epilepticus – Comatose state of unknown origin – Suspicion of herpetic encephalitis	IV SAde, 2015 <sup>6</sup>
A routine EEG in the ER is not recommended for previously healthy patients (pediatric or adult) that present a first ES and have returned to their basal state	R-SAde, 2015 <sup>6</sup>
An EEG is a useful diagnostic test in stabilized patients in the ER to: – Support the diagnosis of epilepsy – Determine the type of epilepsy and epileptic syndrome, in concordance with clinical findings and ictal activity – Asses the risk of seizure recurrence – Support therapeutic decisions	2+ SIGN, 2015 <sup>7</sup> 3 NICE, 2012 <sup>4</sup> R- SAde, 2015 <sup>6</sup>



**Figure 3.** Epileptic seizure on patients previously diagnosed with epilepsy.

**Under which conditions must a neuroimaging test (CT or MRI) be performed on a patient with ES in the ER?**

Recommendation	Level of recommendation
A cranial CT must be performed on all emergency cases; however, it does not substitute a programmed cranial MRI	B SAdE, 2015 <sup>6</sup>
An emergency cranial CT may be considered for previously healthy patients (pediatric or adult) if a programmed MRI cannot be performed within the following 3 days	R-SAdE, 2015 <sup>6</sup>

<p>Neuroimaging tests (cranial CT or MRI, the latter being the first choice) are recommended for patients who present a first ES under the following circumstances:</p> <ul style="list-style-type: none"> <li>– Focal seizures</li> <li>– Focal neurological deficit</li> <li>– Persistent alteration in the level of consciousness</li> <li>– Recent traumatic brain injury</li> <li>– Cancer</li> <li>– Suspicion of HIV infection/immunosuppression</li> <li>– Hemorrhagic diathesis</li> <li>– Children under 2 years of age</li> <li>– Persistent cephalgia (headache)</li> <li>– Meningeal signs</li> <li>– Signs of intracranial hypertension</li> </ul>	<p>B SAdE, 2015<sup>6</sup> C NICE, 2012<sup>4</sup> R-Ghofrani M, 2013<sup>8</sup> R-Aprahamian N, 2014<sup>9</sup> R-Michoulas AS, 2011<sup>10</sup></p>
<p>Neuroimaging tests are not useful under the following circumstances:</p> <ul style="list-style-type: none"> <li>– Febrile seizures</li> <li>– Focal impaired awareness seizures</li> <li>– ES with a proven metabolic origin</li> </ul>	<p>R-SAdE, 2015<sup>6</sup></p>

CT: computerized tomography; MRI: magnetic resonance imaging.

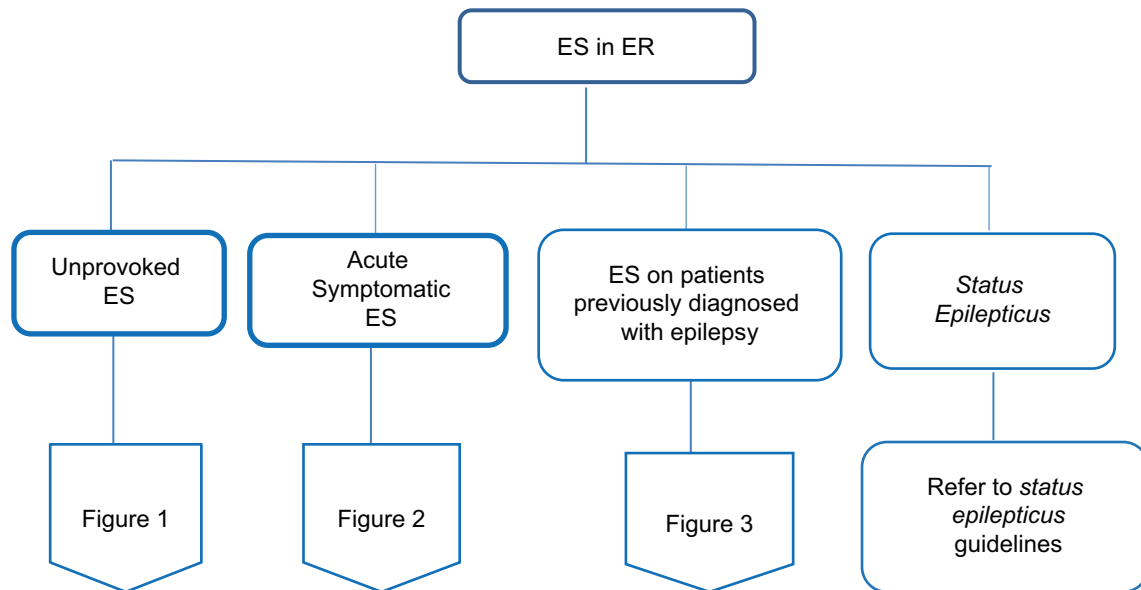
## Under which conditions must anti-epileptic drugs be initiated on patients with a first ES in the ER?

Recommendation	Level de recommendation
<p>Before initiating treatment with AED on a patient with a first ES, it is recommended to consider:</p> <ul style="list-style-type: none"> <li>– The probability of recurrence</li> <li>– The drugs efficacy and toxicity</li> </ul>	<p>C NICE, 2012<sup>4</sup> R-Bergey G, 2016<sup>11</sup></p>
<p>Treatment with AED after a first ES must be individualized and assessed by a qualified professional</p>	<p>A NICE, 2012<sup>4</sup> R- Leone MA, 2016<sup>12</sup> C NICE, 2012<sup>4</sup> R-Bergey G, 2016<sup>11</sup></p>
<p>It is recommended that AED treatment be initiated on patients with one or more of the following risk factors:</p> <ul style="list-style-type: none"> <li>– History of previous brain injury with remote symptomatic seizures</li> <li>– Focal ES</li> <li>– ES during sleep</li> <li>– Family history of ES</li> <li>– Abnormal neurological examination</li> <li>– Psychomotor delay</li> <li>– Status epilepticus</li> <li>– Abnormal EEG</li> <li>– Neuroimaging abnormalities</li> </ul>	<p>C NICE, 2012<sup>4</sup> R-Michoulas AS, 2011<sup>10</sup> R-Bergey G, 2016<sup>11</sup> R-Ghofrani M, 2013<sup>8</sup> R-Krumholz A, 2015<sup>13</sup></p>
<p>During the initiation of AED treatment, it is recommended to consider the risk of seizure aggravation:</p> <ul style="list-style-type: none"> <li>– Phenytoin aggravates absence and myoclonic seizures</li> <li>– Carbamazepine and oxcarbamazepine exacerbate absence, myoclonic, and atonic seizures</li> </ul>	<p>D NICE, 2012<sup>4</sup> R-SAdE, 2015<sup>6</sup></p>

AED: anti-epileptic drug; EEG: electroencephalography.

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**Algorithm: Management of ES in the ER**



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