

# IRISH ASSOCIATION FOR EMERGENCY MEDICINE



IAEM Clinical Guideline

## Management of First Seizure in Adults in the Emergency Department

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### DISCLAIMER

IAEM recognises that patients, their situations, Emergency Departments and staff all vary. These guidelines cannot cover all clinical scenarios. The ultimate responsibility for the interpretation and application of these guidelines, the use of current information and a patient's overall care and wellbeing resides with the treating clinician.

## Revision History

Date	Version	Section	Summary of Changes	Author
July 2024	V1.0	All	Final version	CdeB, PB-M, AMcC

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## GLOSSARY OF TERMS

Status Epilepticus	Seizure that lasts longer than 5 minutes, or having more than 1 seizure within a 5 minutes period, without returning to a normal level of consciousness between episodes.
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## GLOSSARY OF ABBREVIATIONS

AEDs	Anti-epileptic Drugs
BSL	Blood Sugar Level
CNS	Central Nervous System
CRP	C-reactive Protein
CT	Computed Tomography
CXR	Chest X-ray
ECG	Electrocardiogram
ED	Emergency Department
EEG	Electroencephalogram
FBC	Full Blood Count
HIV	Human Immunodeficiency Virus
LFT	Liver Function Tests
MRI	Magnetic Resonance Imaging
TLoC	Transient Loss of Consciousness
U&E	Urea & Electrolytes

# Management of First Seizure in Adults in the Emergency Department

## INTRODUCTION

Seizures are defined as a sudden change in behaviour due to electrical hypersynchronisation of neuronal networks in the cerebral cortex. They are a common occurrence, affecting an estimated 8 to 10 percent of the population over a lifetime.<sup>1</sup> Seizures account for 1 to 2 percent of all Emergency Department (ED) attendances, with approximately one-quarter of these being first seizures.<sup>2</sup>

The primary goal in evaluating a patient's first seizure is to identify whether the seizure resulted from a treatable systemic process or an intrinsic dysfunction of the central nervous system (CNS). This will determine the likelihood that a patient will have additional seizures, and direct appropriate treatment of the underlying cause, if identified.

Seizures can be further classified into acute symptomatic seizures (provoked) and unprovoked seizures.<sup>3</sup> The former category represents seizures precipitated by a systemic process or brain insult/injury and may account for as much as 25 to 30 percent of first seizures. Acute symptomatic or 'provoked' seizures are associated with a lower risk of future epilepsy when compared to unprovoked seizures. Examples of acute symptomatic seizures include:

- Metabolic derangement/ toxicity
- Drug/ alcohol withdrawal
- Stroke
- CNS infection
- Head injury

Unprovoked seizures are classified in 1 of 2 broad categories: (1) a seizure of unknown aetiology, or (2) a seizure in relation to a demonstrated pre-existing brain lesion or progressive CNS disorder (so-called "remote symptomatic" seizure). If found to be caused by a pre-existing

lesion/disorder then such unprovoked seizures are also known as remote symptomatic seizures and are associated with a higher risk of developing future epilepsy.

Overall, the risk of recurrence is between 30% and 40%, with the highest risk being in the immediate six months and falling to <10% after two years. Recurrence is more likely if brain imaging and/or EEG are abnormal.

## PARAMETERS

<b>Target audience</b>	Emergency clinicians involved in the management of patients who present to EDs having suffered a suspected first seizure.
<b>Patient population</b>	Adults ( $\geq$ 16 years old) who present to the ED following a suspected solitary first generalised tonic-clonic seizure.
<b>Exclusion criteria</b>	Children ( $<$ 16 years). Patients with a known seizure disorder. Patients presenting following partial/ absence/ complex seizures. Patients who present in status epilepticus.

## AIMS

To provide an evidence-based guideline for the management of adult patients who present to the ED following a first seizure. This includes clinical assessment, appropriate investigations, use of anti-epileptic drugs (AEDs), disposition, fitness for discharge, follow-up and discharge advice.

## HISTORY

It is essential that a thorough history of the event is taken in order to determine the likelihood that the episode was in fact a seizure rather than a transient loss of consciousness (TLoC) of another unknown aetiology.

A detailed narrative description of the event should be recorded and it is strongly recommended that a collateral history be obtained in situations where the event was witnessed by a bystander. A collateral history can be considered the most important 'test' when evaluating patients with suspected seizures.

The National Institute for Health and Care Excellence (NICE) list the following features as strongly suggestive of seizure activity:

- A bitten tongue
- Head-turning to one side during TLoC
- No memory of abnormal behaviour that was witnessed before, during or after TLoC by someone else
- Unusual posturing
- Prolonged limb-jerking (note that brief seizure-like activity can often occur during uncomplicated faints but this activity is usually not violent)
- Confusion following the event (post-ictal period)
- Prodromal déjà vu, or jamais vu (the experience of being unfamiliar with a person or situation that is actually very familiar)

It is important to elicit in the history any potential risk factors for epilepsy or possible seizure triggers ([table 1](#)).



Table 1: Risk factors and seizure triggers

Risk Factors	Seizure Triggers
Alcohol	Alcohol/Dependency
Febrile seizures	Sleep deprivation
Brain infection	Stress
Stroke	Street and other drugs
Tumour	Missed medications
Family history	Travel
Head injury	Menstruation
Learning disability and other	Pregnancy and other

The episode may be less likely to have been a seizure if any of the following features are present:

- Prodromal symptoms that on other occasions have been abolished by sitting or lying down
- Sweating before the episode
- Prolonged standing that appeared to precipitate the TLoC

Similarly, an episode may be more likely to have been a non-epileptic seizure if the following features are present:

- Rhythmic rather than clonic movements; fluctuating course; slow or very gradual onset or termination; ictal crying
- No injury despite violence of seizure
- Retained consciousness with generalised activity
- Psychological stress

This guideline does not address in detail the broader variety of seizure subtypes including partial/focal/complex or absence, as often such events can easily mimic other conditions and also may occur multiple times before medical care is sought.

## EXAMINATION

Patients should be assessed by following an 'ABCDE' approach as standard. It is essential that a full and comprehensive neurological examination is undertaken to include a cranial nerve, cerebellar and peripheral nerve exam. Glasgow coma score and pupillary examination should be noted, at defined intervals if neuro-observations are indicated.

Fundoscopy should be performed if there is a suspicion of raised intracranial pressure as papilloedema may be found.

Finally as patients who have had seizures may suffer injuries as a result of the violent movements, a comprehensive trauma assessment with complete **primary and secondary survey** must be undertaken. Posterior shoulder dislocations for example are a recognised consequence of seizures.

Any patient with a new neurological deficit must be referred for admission and inpatient investigations.

## INVESTIGATIONS

### Lab investigations and bedside tests

Routine blood testing should be performed on all patients presenting with a suspected first seizure. Mandatory blood tests should be ordered, to include:

- Full blood count
- Point of care glucose level
- Venous blood gas including serum lactate
- Renal profile
- Creatine kinase
- Liver function tests
- Calcium
- Magnesium
- C-reactive protein (CRP)
- Serum bHCG
- Serum alcohol level (if clinically indicated)

All patients should have an electrocardiograph (ECG) done and particular care should be taken to ensure that the QTc is normal.

Chest x-ray (CXR), lumbar puncture (LP) and toxicology testing may be done if clinically indicated e.g., if there is any suspicion of precipitating respiratory or CNS infection but are unnecessary on a routine basis.

## Neuroimaging

NICE recommends that neuroimaging should be performed in patients where the suspected diagnosis is an intracranial lesion and also if any of the following situations apply:

- New focal neurological deficit
- Persistent altered mental status
- Fever
- Persistent headache
- Focal or partial onset seizure
- History of acute head injury
- Malignancy
- Immunocompromise
- Human immunodeficiency virus (HIV) infection
- Alcohol dependency
- Anticoagulation/ bleeding diathesis

However in the absence of reliable access to deferred early outpatient neuroimaging all patients should have imaging during their attendance in the ED. While magnetic resonance (MRI) with coronal views (epilepsy protocol) is the modality of choice, computed tomography (CT) should be utilised in the acute setting.

It is our recommendation that all patients suspected of having had a first seizure should have a CT brain performed in the ED to identify underlying gross pathology (if MRI is not available or is contraindicated). Clinicians should also be aware of available imaging resources and the limitations of these tests. For example, if a space occupying lesion is suspected then a non-contrast CT may be inadequate and more advanced imaging with contrast may be required.

## Electroencephalogram (EEG)

Patients may need an EEG as part of further work up organised by the admitting team or as per a local clinical pathway with follow up with results in the neurology clinic.

As per NICE guidelines:

'If the person's history and examination suggests an epileptic seizure, and a diagnosis of epilepsy is suspected, consider a routine EEG to support diagnosis and provide information about seizure type or epilepsy syndrome. EEGs should not be done to exclude a diagnosis of epilepsy.'

## TREATMENT

All patients should be treated in the usual manner, analgesia if required, management of injuries etc. AEDs should not be routinely prescribed in the ED following a first seizure except after consultation with or review of the patient by a neurologist /epilepsy specialist.

## DISPOSITION

It is recognized that practice differs between clinical sites with regards to admission and discharge of patients who present with a suspected first seizure. Patients who have had a single generalised seizure episode from which they have fully recovered, and have normal investigations may be considered safe for discharge with specific patient advice, a discharge letter and timely follow-up arranged in either the acute medical unit or neurology outpatient (OPD) depending on local policy.

Patients with poor social circumstances such as alcohol dependency or homelessness, or those without adequate supervision on discharge should be considered for admission.

## Safe Discharge Checklist

Have the following medical causes been considered and excluded?

Tumour	Encephalitis/meningitis/brain abscess
Stroke	Cerebral vein thrombosis
Subarachnoid haemorrhage	Pregnancy/toxaemia (Eclampsia)
Cerebral haemorrhage	Metabolic (e.g. Diabetic Ketoacidosis)
Trauma	Intoxication/alcohol

## Discharge advice

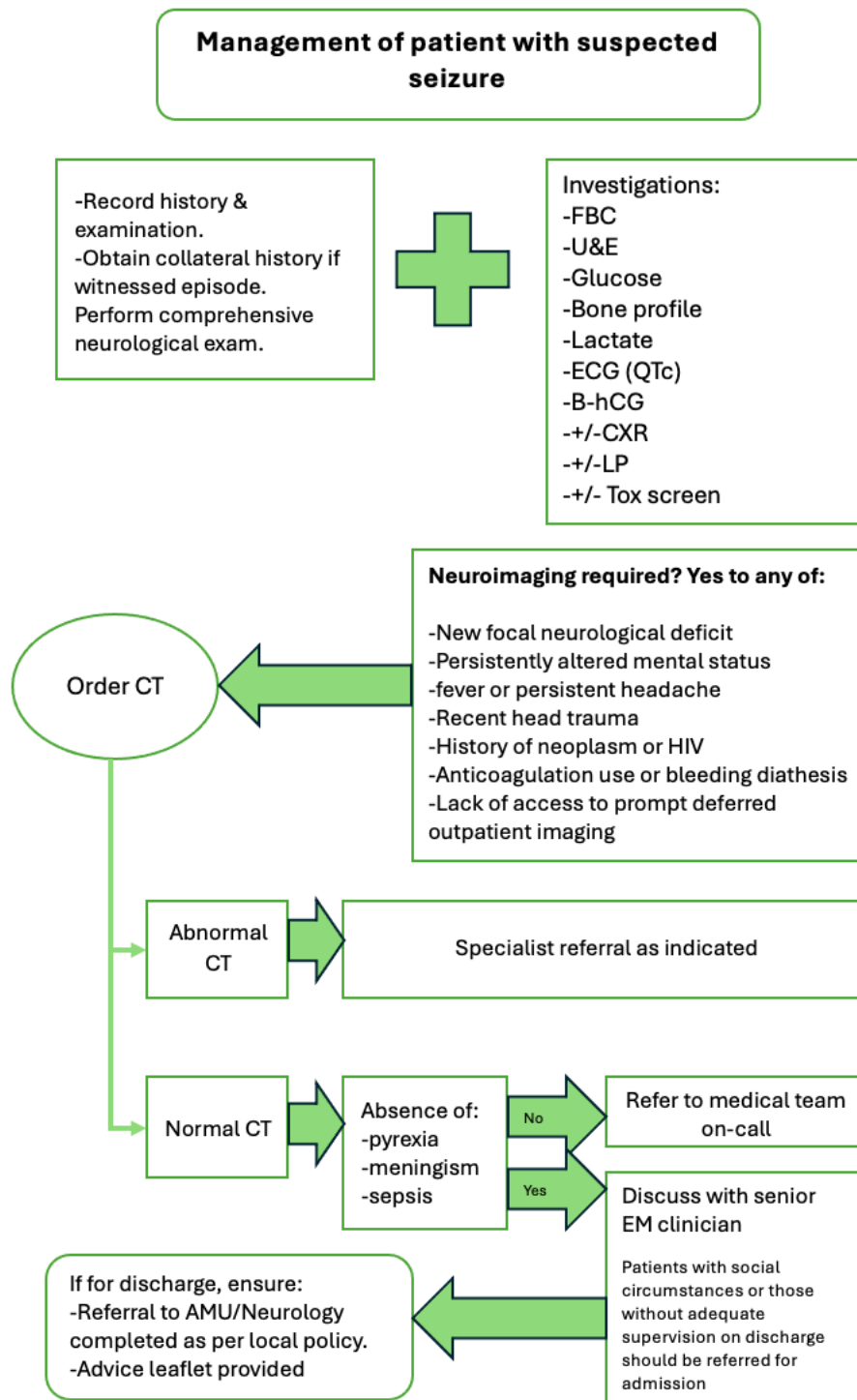
All patients who are being discharged from the ED following a suspected first seizure should be provided with both verbal and written advice regarding lifestyle changes, seizure first aid and driving (see advice leaflet in appendix). Safety advice should be given to accompanying next of kin.

Be a **TEAM** player ([www.epilepsy.ie](http://www.epilepsy.ie))

1. Take care to protect the person – do not put anything in the mouth.
2. Ensure you stay with them.
3. Allow the seizure to run its course.
4. **M**ove the person onto their side (recovery position).

**Call an ambulance for any seizure lasting longer than 5 minutes**

Figure 1: First seizure management algorithm



## FOLLOW-UP

All patients should be referred urgently to a neurologist to be seen within 2 weeks for further investigation, with MRI and EEG ideally being performed within 6 weeks of referral. All EDs should establish local pathways to ensure streamlined direct referral and timely specialist follow-up for such patients.

## APPENDIX

- [Appendix 1: First seizure patient information leaflet](#)



## REFERENCES

- Annegers, J. F., Hauser, W. A., Lee, J. R. and Rocca, W. A. (1995) 'Incidence of acute symptomatic seizures in Rochester, Minnesota, 1935-1984', *Epilepsia*, 36(4), pp. 327-33.
- Huff, J. S., Morris, D. L., Kothari, R. U. and Gibbs, M. A. (2001) 'Emergency department management of patients with seizures: a multicenter study', *Acad Emerg Med*, 8(6), pp. 622-8.
- Beghi, E., Carpio, A., Forsgren, L., Hesdorffer, D. C., Malmgren, K., Sander, J. W., Tomson, T. and Hauser, W. A. (2010) 'Recommendation for a definition of acute symptomatic seizure', *Epilepsia*, 51(4), pp. 671-5.