

Approach to the patient with a possible seizure

American Association of Physician Assistants
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Thanks

- To the AAPA for inviting me, to you for attending
- The Epilepsy Foundation for the supporting the activity

Disclosures

- Epilepsy Foundation (consultant)
 - Epilepsy Learning Healthcare System
 - CDC funded ECHO on the Rare Epilepsies
- Partners Against Mortality in Epilepsy (PAME)
- Epilepsy Study Consortium (consultant)
- American Academy of Neurology- Child Neurology Quality Measures, Quality Informatics
- Consultant: Epilogue Clouds of Care, Biocodex, Neurelis, UCB

Why are you here? A poll

- Work in an Emergency Department
- Work in Primary care
- Work in a Neurology or Surgery practice
- Work in an Epilepsy Clinic
- Know someone with seizures/epilepsy
- Needed a place to sit for an hour
- Saw my picture

Outline

- Introductory stuff
- Types of possible seizure events
 - Questions
 - Evaluation of possible seizure events tests
- Seizures & Epilepsies
 - Basics
 - Types
 - Tests
 - Referral
- Services
 - Epilepsy Foundation
 - Epilepsy Association
 - Rare Epilepsies
- Q & A

Objectives

- Know the major causes of acute impairment of conscious and abnormal movements
- Know the appropriate testing to evaluate each of the major causes
- Understand the issues involved in the management of people with epilepsy (*seizures, syndromes, support*)

Provide you with a useful resource than you can refer to in the future

“A possible seizure...” Viewing thru different lenses

- Neurologist- is it a seizure or something else?
- Cardiologist- is it something with the heart or something else?
- Psychiatrist- is this psychiatric or “organic”?
- Generalist- all of the above

What symptoms are we talking about?

- **Uncontrolled, paroxysmal movements**
 - Comes and goes, seconds to a few minutes
- **Impaired awareness** (“out of it”), staring, behavior
- Other- sensory stuff, feelings
- Big and Little

Uncontrolled, paroxysmal movements

- Movement disorder (e.g. Parkinson's Disease, tic disorder)
- Restless leg syndrome
- Tremor (familial, drug induced)
- Myoclonus
- Functional neurological disorder
- *Seizure*

Impaired awareness

- Medical
 - Hypoxemia
 - Cardiac arrhythmia
 - Syncope
 - Metabolic (liver, kidney)
 - Electrolytes, glucose
- Neurological
 - Stroke
 - Sleep disorder
 - Migraine
 - Functional neurological disorder
 - *Seizure*

Provide you with a practical roadmap

Evaluation



Funky movements & awareness symptoms

**Seizures /Epilepsy
Types
Management
Support**

Approach

- What are the possible diagnoses?
- If a seizure, what type?
- If a seizure, is there a syndrome?
- Based on the above, what testing is needed
- Based on the above, what are the treatment options

How to figure it out

- Take a really good history
 - Consider age & development
- Do a focused physical examination
- Use common sense for testing and triage depending upon diagnosis & setting

The History



- What happened? Describe in as much detail as possible what you remember and what a **reporter** said.
- How long did it last?
- Was one side of the body affected more than the other?
- Did you get any feelings or sensations prior to the event?
- Were you weak on one side of the body or the other after the event?
- Did this ever happen before?
- Can you think of any triggers?
- Did you ever seek medical help for this? Was a diagnosis made?
- Video?

After the history, what to do... Physical Exam

- Uncontrolled movements
 - Brain (mentation, cranial nerves, motor, coordination, gait)- looking for a focal abnormality
 - Observation of movements (face, limbs), type (quick jerks, tremor)
- Impaired awareness
 - Heart
 - Blood pressure with orthostatics
 - Mentation
 - Pupils

After the history, what to do... Testing

- Based upon history & physical, consider
 - ECG
 - Electrolytes, glucose, BUN, Cr, AST, ALT, Others
 - Lumbar puncture if CNS infection suspected
- Local / national guidelines
- EEG- routine, awake & asleep with hyperventilation & photic stimulation, best ASAP, non-emergent
- Imaging
 - CT only if concerned about an acute intracranial process. Radiation is a concern among children
 - MRI (non-contrast) optimized for epilepsy pathology

Quick side trips to EEG and MRI



**Seizures /Epilepsy
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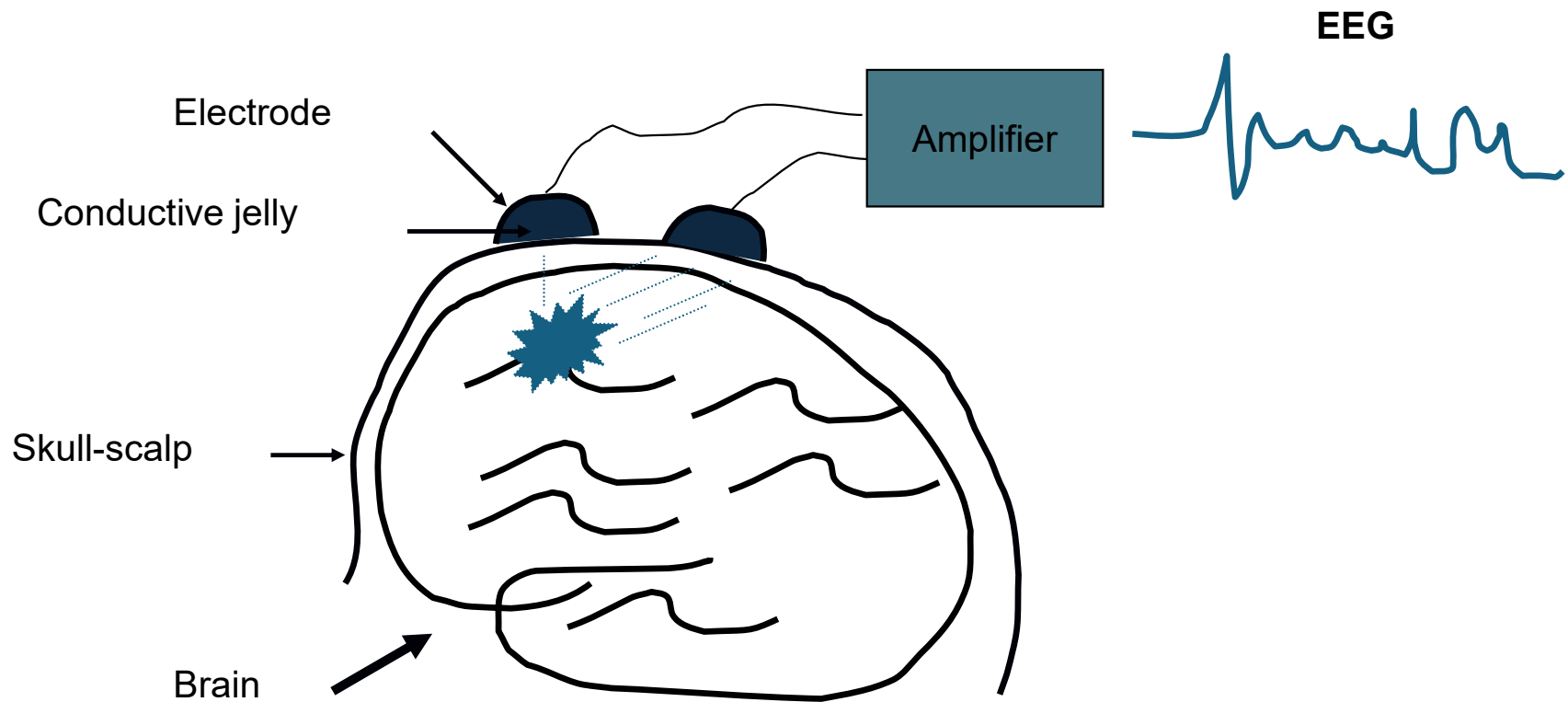
Seizures & Epilepsies (first, chronic; why it matters)

- Basics
- Types
- Tests (EEG, MRI, other)
- Management
- Referral

Why an EEG is useful

- Supporting a diagnosis of epilepsy
 - Ruling out non-epileptic event
 - Epilepsy syndrome
 - Prognosis
-
- Can be done as outpatient

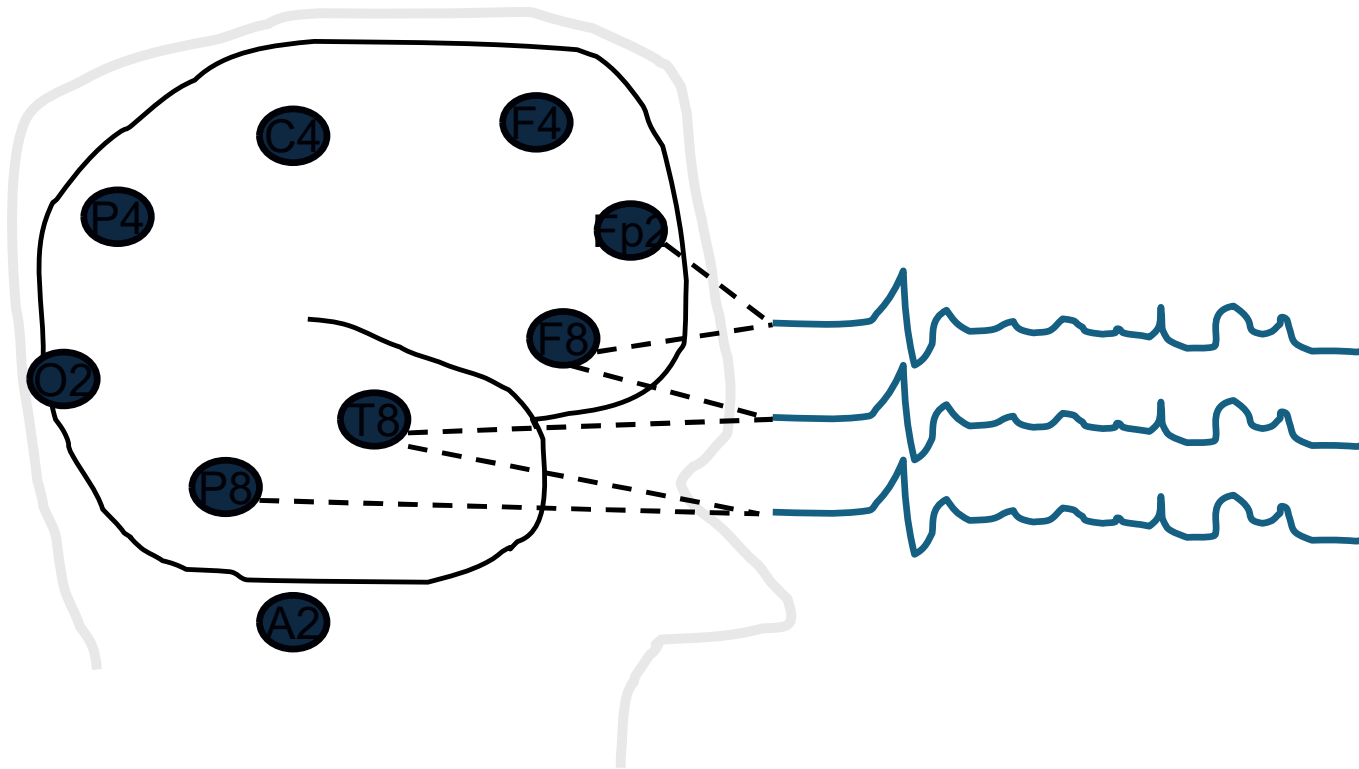
EEG Diagram



Naming of EEG Electrodes

- **Location over brain region**
 - F = frontal
 - C = central
 - P = parietal
 - T = temporal
 - O = occipital
- **Side of the brain**
 - Even numbers = right
 - Odd numbers = left
- **Other**
 - z = midline
 - p = polar (frontal)
 - A = ear

Electrode Montages- Bipolar



EEG- Types of abnormalities

- **Background-** the dominant frequency of the EEG awake, with eyes closed, relaxed
 - Too slow, too fast (like the idle of a car)
- **Epileptiform-** intermittent electrical discharges that indicate a predisposition to seizures (like the car making pings & pops)

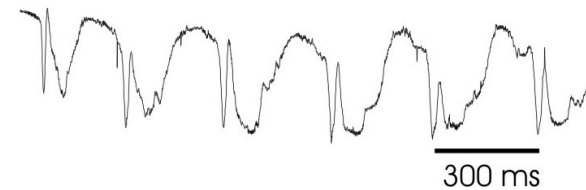
Types of Interictal Epileptiform Discharges

- Sharp waves



- Spikes

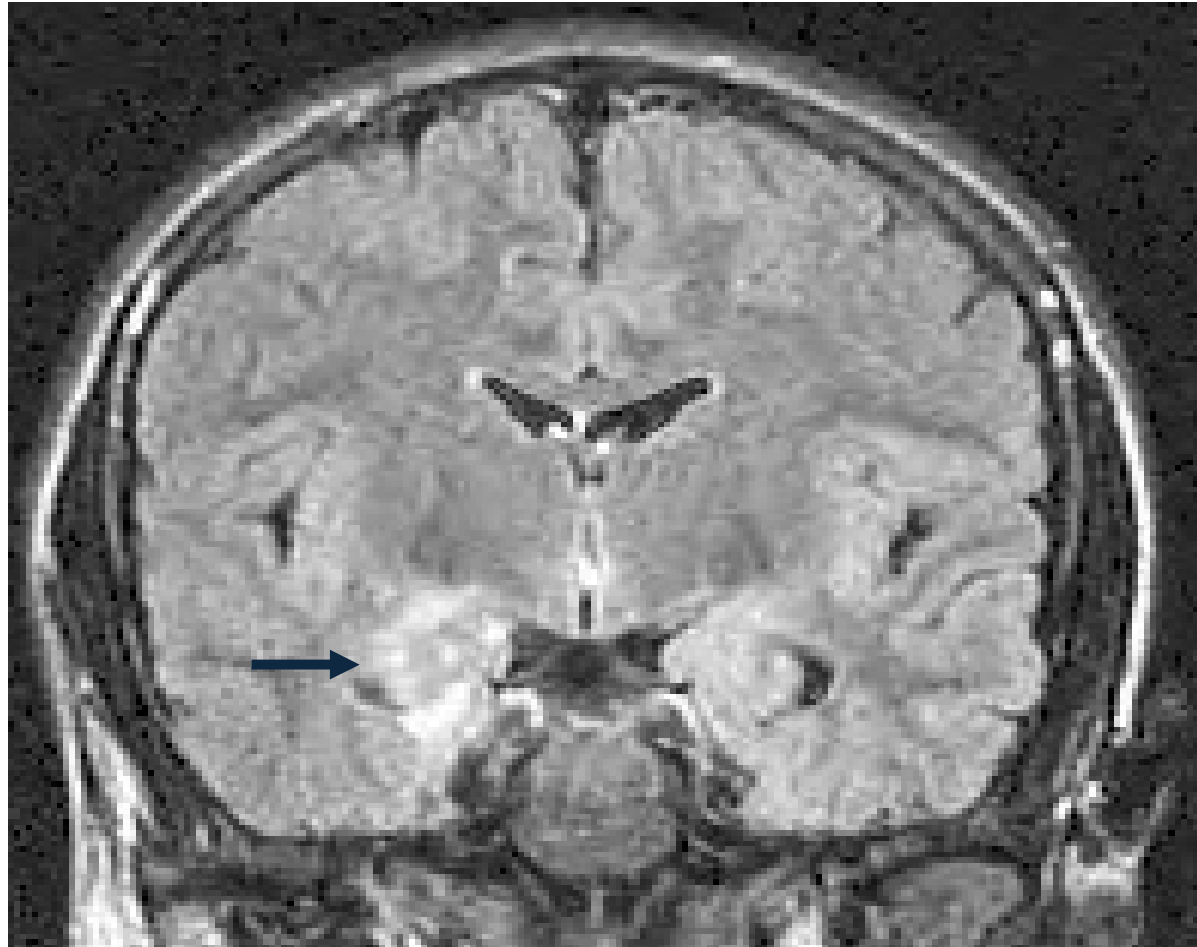
- Spike wave



Side trip: MRI

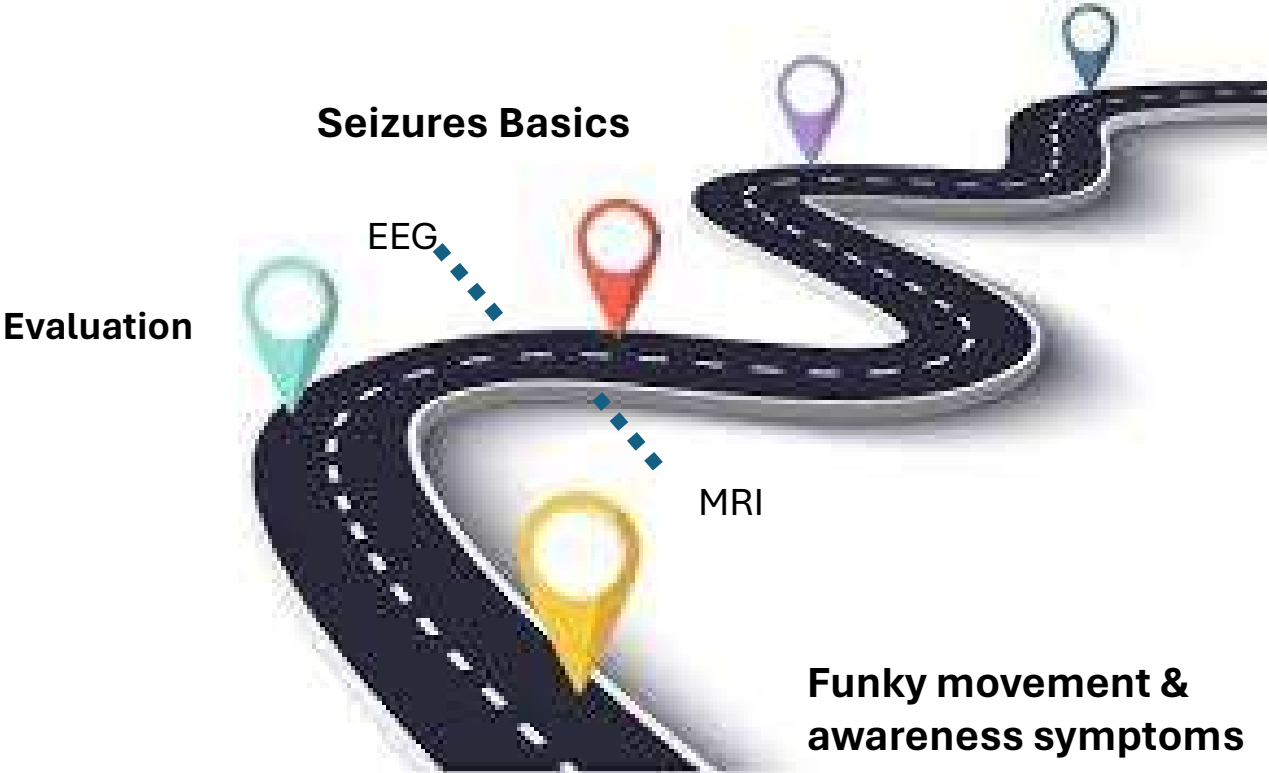
- Brain MRI is the imaging modality recommended for evaluation of seizures

Normal CT, MRI- mesial temporal ganglioglioma



Let's go down the seizure / epilepsy path

A practical roadmap



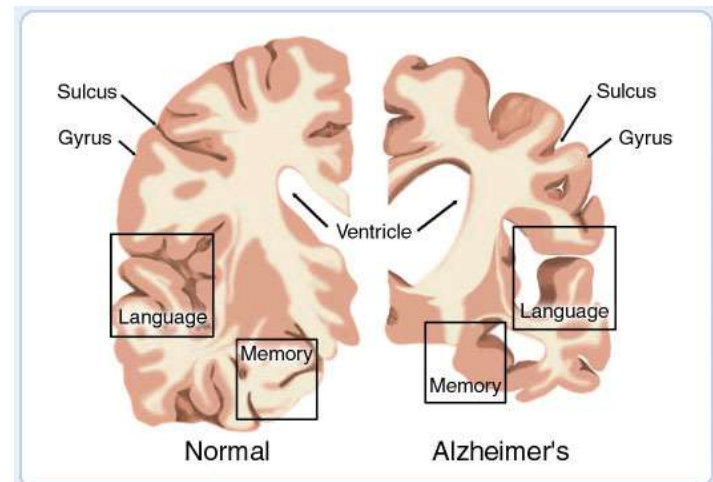
**Seizures /Epilepsy
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What is a seizure?

- **Seizure**- *abnormal, hypersynchronous discharge of cortical neurons*



Manifestation depends upon location



What is (an) Epilepsy (the epilepsies)?

- Two or more unprovoked seizures *or*
- An Epilepsy Syndrome with recurrent seizures
or
- Likelihood of a second seizure > 60%

Why recognition and treatment of seizures are so important

- 30% of people living with epilepsy are not seizure free despite the development of new treatments
- Serious injuries, difficult social relationships, school and employment issues and premature death are associated with uncontrolled seizures
- Comorbidities such as depression and anxiety are frequently undiagnosed & treatable
- Potentially curative treatments (medication, surgery, devices, diet) are underutilized due to inadequate access & referral to specialized care

How are seizures named (*a few ways*)

- By location of onset e.g temporal lobe seizures
- By the resulting manifestation e.g. motor seizures e.g. (tonic, clonic, myoclonic, atonic vs. non motor seizures , sensory seizures, cognitive seizures
- By the cause e.g ‘symptomatic seizures due to brain tumor, genetics
- By whether it starts in one part of the brain (partial, **focal**) or on both sides simultaneously (**generalized**) followed by
 - Focal motor, generalized tonic-clonic, absence

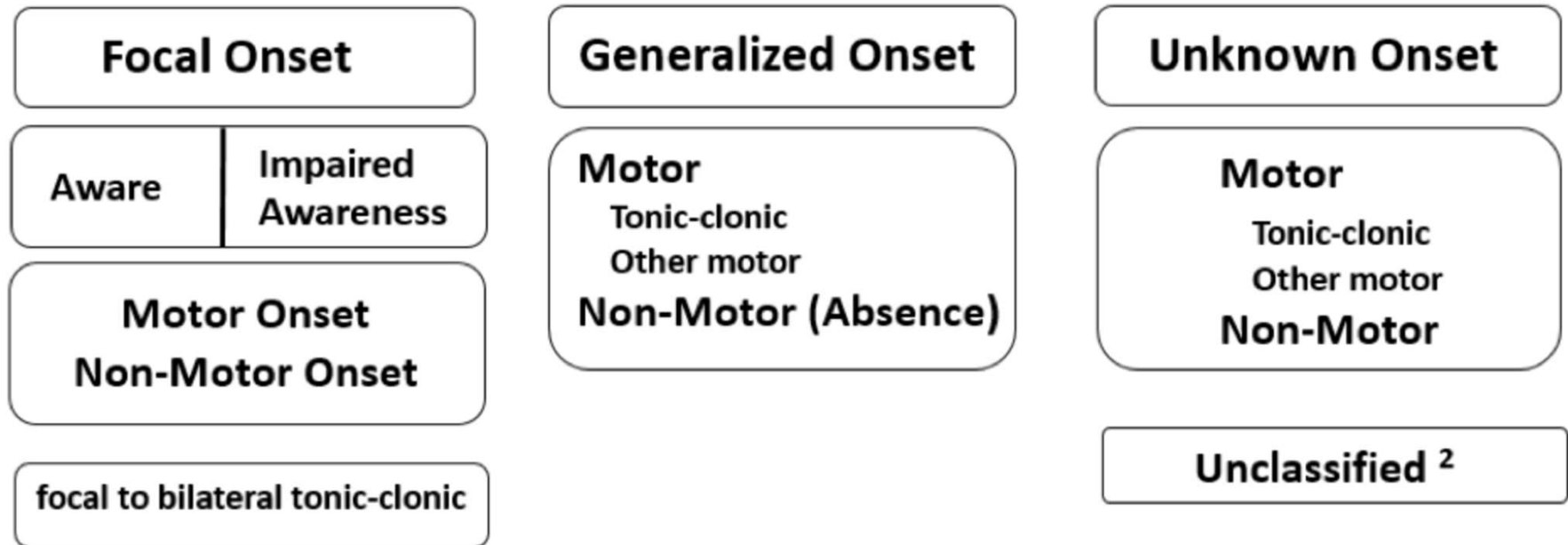
How to know if focal or generalized?

- History- “my left arm tingles before I lose consciousness”
- Physical- a hemiparesis would suggest a lesion in the contralateral motor cortex
- EEG- may show focal or generalized epileptiform abnormalities
- MRI- may show a lesion consistent with a focal onset

Why is the naming of seizures important?

- Anti-seizure medications (ASMs) traditionally developed against one seizure type or the other. No longer called anti-epileptic drugs (AEDs)
- So it determines therapy

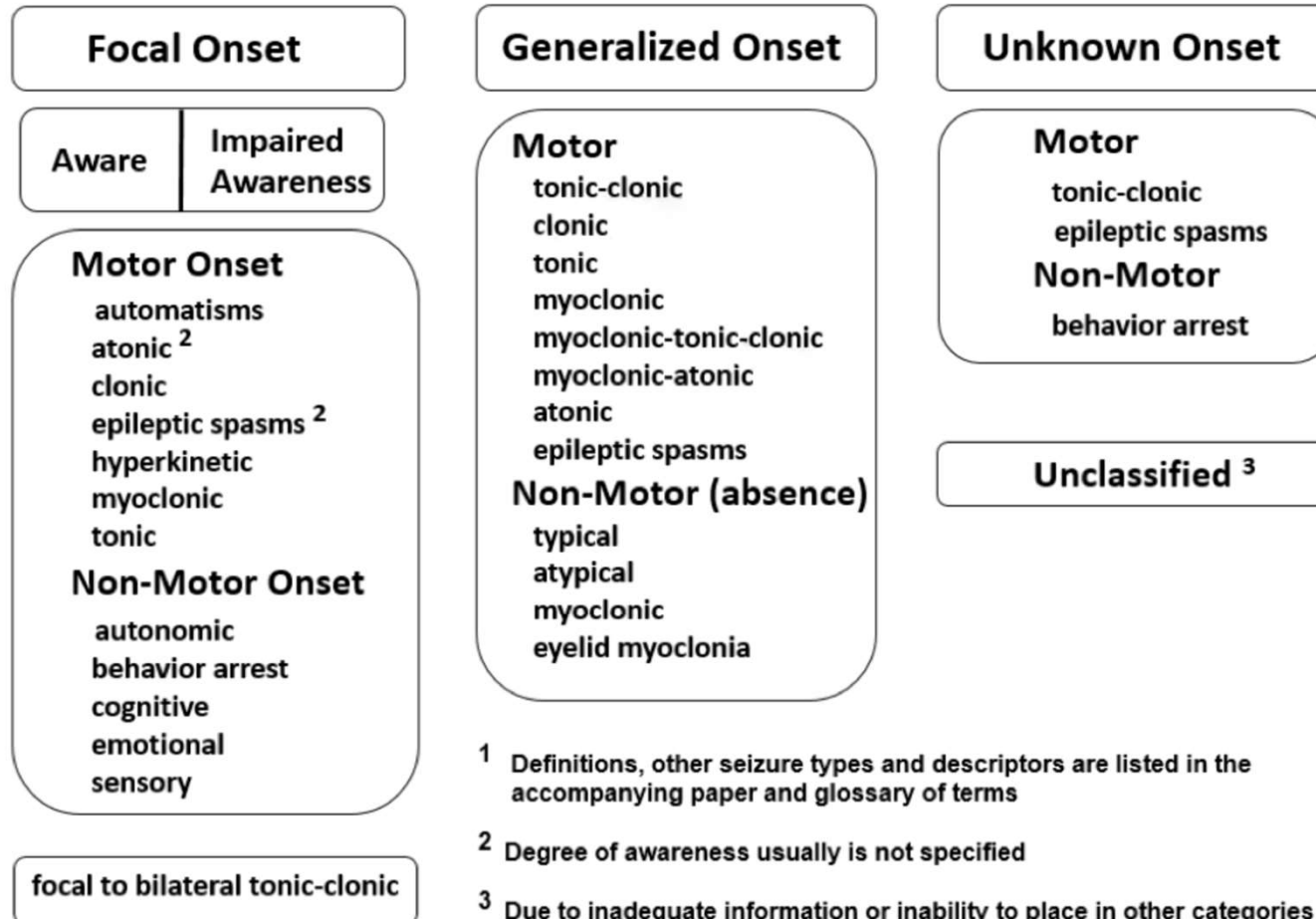
ILAE 2017 Classification of Seizure Types Basic Version ¹



¹ Definitions, other seizure types and descriptors are listed in the accompanying paper & glossary of terms

² Due to inadequate information or inability to place in other categories

ILAE 2017 Classification of Seizure Types Expanded Version ¹



¹ Definitions, other seizure types and descriptors are listed in the accompanying paper and glossary of terms

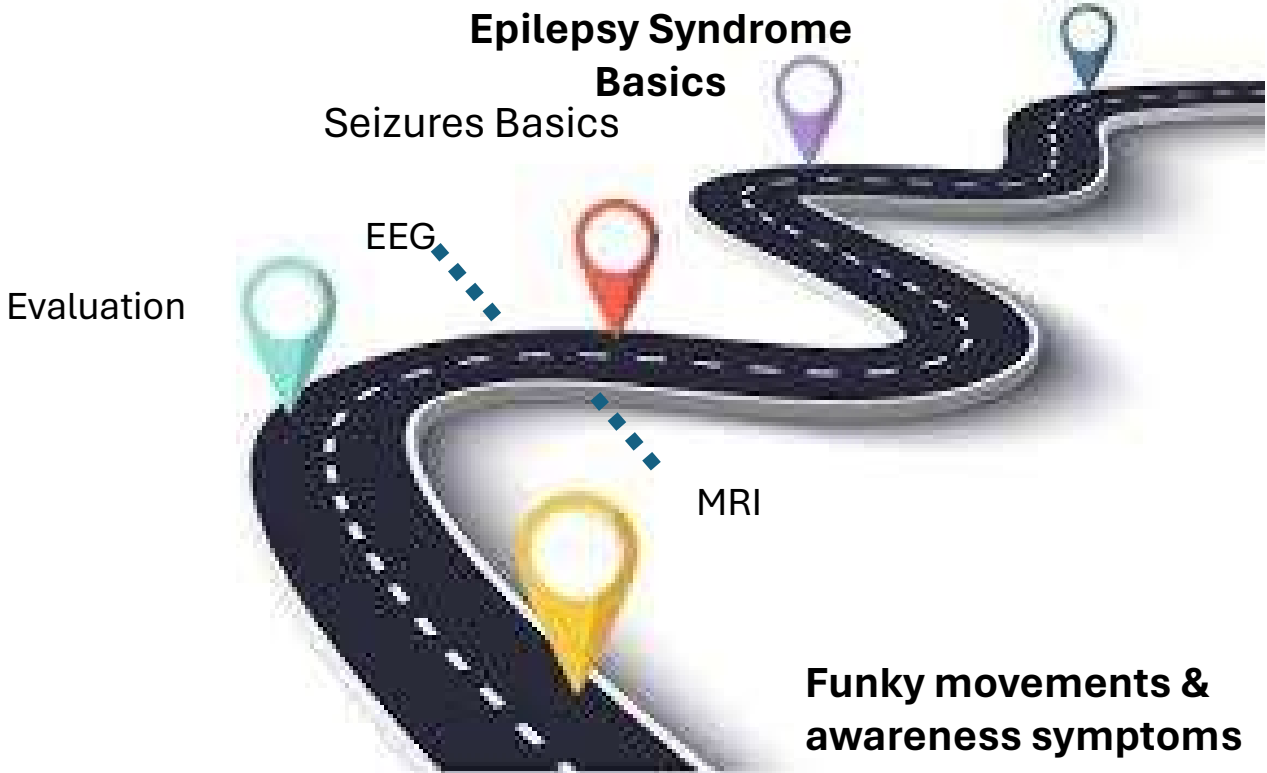
² Degree of awareness usually is not specified

³ Due to inadequate information or inability to place in other categories

Common Seizure Questions

- What caused the seizure?
- Will there be more seizures?
- Does my child or I need to take medication?
- Which medication? What risks?
- Can additional seizure types occur?
- Will my child or I grow out the seizures?
- Will my child or I be intellectually normal?

A practical roadmap



**Seizures /Epilepsy
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Epilepsy Syndrome Terminology

- **An Epilepsy Syndrome is a constellation of historical, clinical and laboratory features that defines an epilepsy population with regard to treatment and prognosis**
- **Epilepsy Syndrome features**
 - Seizure type(s)
 - EEG
 - Neurological examination
 - Developmental history
 - Family history
 - Neuroimaging
 - Genetic testing

Common Epilepsy Syndromes*

- Epileptic (Infantile) spasms
- Lennox-Gastaut
- Benign central-temporal epilepsy
- Childhood absence epilepsy
- Juvenile myoclonic epilepsy

* See Syndrome slide for current names

Co-morbidities

Seizure types*

Focal

Generalized

Unknown

Etiology

Structural

Genetic

Infectious

Metabolic

Immune

Unknown

Epilepsy types

Focal

Generalized

Combined
Generalized
& Focal

Unknown

Epilepsy Syndromes



Generalized epilepsy syndromes

- Idiopathic generalized epilepsies (IGEs)
 - Juvenile myoclonic epilepsy (JME)
 - Juvenile absence epilepsy (JAE)
- Epilepsy with generalized tonic-clonic seizures alone (GTCA)

Focal epilepsy syndromes

- Self-limited
 - Childhood occipital visual epilepsy (COVE)
 - Photosensitive occipital lobe epilepsy (POLE)
- Familial mesial temporal lobe epilepsy (FMTLE)
- Epilepsy with auditory features (EAF)

• Mesial temporal lobe epilepsy with hippocampal sclerosis (MTLE-HS)

• Sleep related hypermotor (hyperkinetic) epilepsy (SHE)

• Familial focal epilepsy with variable foci (FFEVF)

Epilepsy syndromes with developmental and/or epileptic encephalopathy, or with progressive neurological deterioration

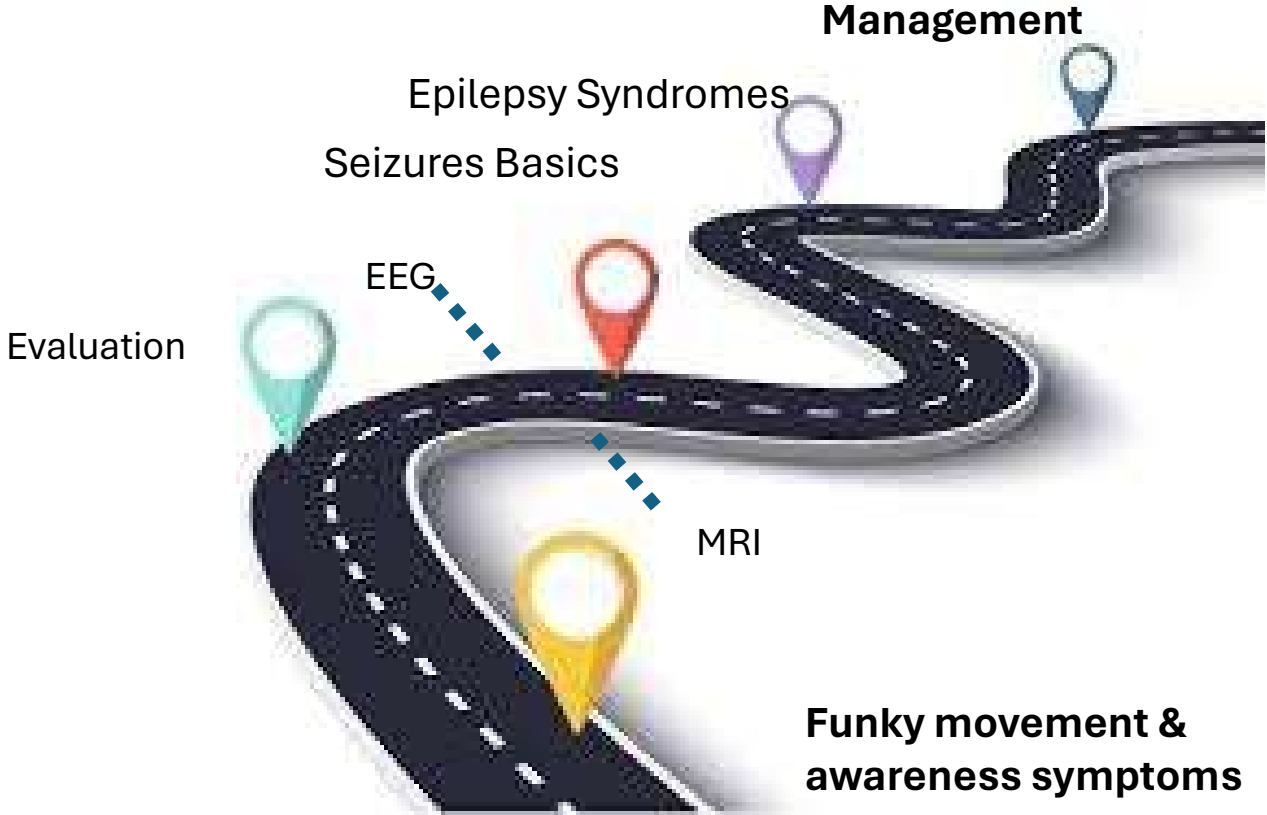
- Febrile-infection related epilepsy syndrome (FIRES)
- Rasmussen syndrome (RS)

Combined generalized and focal epilepsy syndromes

- Epilepsy with reading induced seizures (EwRIS)

- Progressive myoclonus epilepsies (PME)

A practical roadmap



**Seizures /Epilepsy
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Treatment Considerations

- Potential risks of additional seizures
- Likelihood of seizure recurrence
- Likelihood of multiple recurrences
- Risk factors for recurrence
- Efficacy of treatment for prevention of recurrences
- Which drug
- Adverse effects

Treatment Considerations

- **Potential risks of additional seizures**
 - Likelihood of seizure recurrence
 - Likelihood of multiple recurrences
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 - Efficacy of treatment for prevention of recurrences
 - Which drug
 - Adverse effects

Potential Risks of Second Seizure

- Predispose to further seizures (Do seizures beget seizures?)
- Brain damage
- Physical injury
- Psychosocial
- Death (SUDEP)

Treatment Considerations

- Potential risk of additional seizures
- **Likelihood of seizure recurrence**
- Likelihood of multiple recurrences
- Risk factors for recurrence
- Efficacy of treatment for prevention of recurrences
- Which drug
- Adverse effects

What is the Likelihood of a Second Seizure? (Recurrence)

- Epilepsy Syndromes
- First unprovoked seizure literature

Current treatment options

- No treatment
- Anti-seizure medications (>20)
- Surgery
- Dietary
- Devices
 - Vagus nerve
 - Responsive nerve stimulator
 - Deep brain stimulator

Treatment resources (American Association of Psychiatric Pharmacists)

American Academy of Neurology

- [Antiepileptic drug selection for people with HIV/AIDS](#) [📄] (2012; reaffirmed 2021)
- [Antiseizure Medication Withdrawal in Seizure-Free Patients: Practice Advisory Update Summary](#) [🔗] (2021)
- [Practice guideline update summary: Efficacy and tolerability of the new antiepileptic drugs I: Treatment of new-onset epilepsy](#) [🔗] (2018; reaffirmed 2021)
- [Practice guideline update summary: Efficacy and tolerability of the new antiepileptic drugs II: Treatment-resistant epilepsy](#) [🔗] (2018; reaffirmed 2021)
- [Evidence-based guideline: Management of an unprovoked first seizure in adults](#) [📄] (2015)
- [Systematic Review: Efficacy and Safety of Medical Marijuana in Selected Neurologic Disorders](#) [📄] (2014)
- [Clinical perspectives on medical marijuana \(cannabis\) for neurologic disorders](#) [🔗] (2015)
- [Practice parameter: Treatment of the child with a first unprovoked seizure](#) [🔗] (2003; reaffirmed 2021)
- [The use of Felbamate in the treatment of patients with intractable epilepsy](#) [🔗] (1999; reaffirmed in 2022)

American Epilepsy Society

- [Treatment of refractory convulsive status epilepticus](#) [🔗] (2020)
- [Evidence-based guideline: Treatment of convulsive status epilepticus in children and adults](#) [🔗] (2016)

International League Against Epilepsy (ILAE)

- [Barriers to generic antiseizure medication use: results of a global survey by the International League Against Epilepsy Generic Substitution Task Force](#) [🔗] (2022)
- [FDA safety warning on the cardiac effects of lamotrigine: an advisory from the Ad Hoc ILAE/AES Task Force](#) [🔗] (2021)
- [Management of epilepsy in pregnancy: A report from the International League Against Epilepsy Task Force on Women and Pregnancy](#) [📄] (2019)
- [Updated ILAE evidence review of antiepileptic drug efficacy and effectiveness as initial monotherapy for epileptic seizures and syndromes](#) [🔗] (2013)
- [Antiepileptic drugs and suicidality: An expert consensus statement](#) [🔗] (2013)
- [Antiepileptic drugs – Best practice guidelines for therapeutic drug monitoring](#) [🔗] (2008)

National Institute for Health and Care Excellence (NICE)

- [Epilepsies in Children Young People and Adults](#) [🔗] (2022)

Neurocritical Care Society

- [Guidelines for the evaluation and management of status epilepticus](#) [📄] (2012)

<https://aapp.org/guideline/external/seizure>

Why Refer to a Neurologist or Comprehensive Epilepsy Center?

- Limited time to assess
- Unclear if a seizure occurred
- Uncertain as to risk of recurrence
- Confirmation of counseling provided
- Explanation/follow-up of abnormal testing
- Initiation of therapy
- Continue management
- Discuss risk of discontinuing therapy

Where to Refer

- **Best- closest to home**
- “All politics is local” Tip O”Neil (Dem-MA)

A practical roadmap



Community Services

Epilepsy Foundation (of America)

The screenshot shows the homepage of the Epilepsy Foundation. At the top, there is a navigation menu with links for "Understanding Epilepsy", "Living With Epilepsy", "About Us", "Get Involved", and "News & Stories". A search bar is located on the right side of the menu. The main header features a large image of hands clasped together, with the text "It's Time to Take Action Together" and a sub-headline "Your life-changing gift helps us educate, advocate, and find cures." Below this is a "Donate Today!" button. The main content area is divided into three columns, each with a small image and a title: "What Is Epilepsy?", "Brain Injury & Seizures", and "Learn Seizure First Aid". Each column has a short paragraph of text below the title.

Epilepsy.com

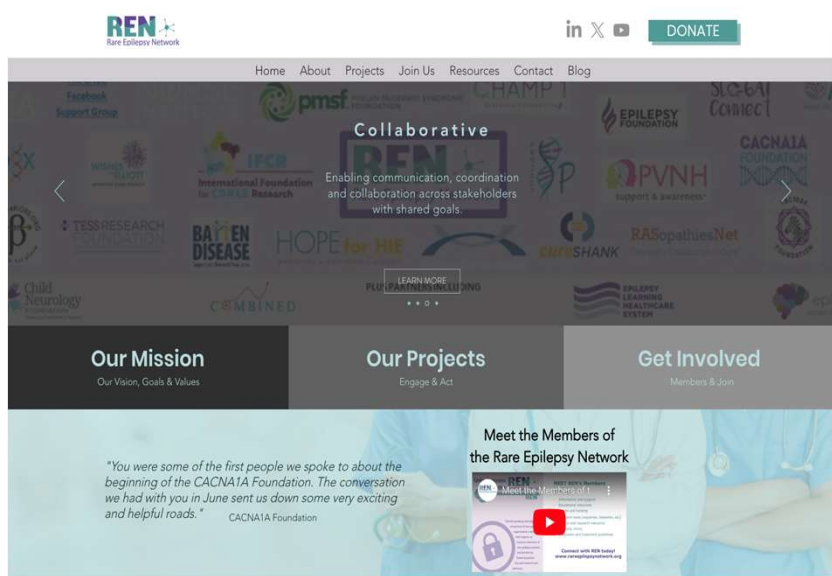
Epilepsy Association

The screenshot shows the homepage of the Epilepsy Association. At the top, there is a navigation menu with links for "Home", "About", "Services", "Sponsors", "Events", "Donate", "Scholarship", "Blog", and "Contact". A "Donate Now!" button is located on the right side of the menu. The main header features a large image of a brain with neural connections, with the text "NEW NAME - NEW LOOK" and a sub-headline "THE EPILEPSY ASSOCIATION OF CENTRAL FLORIDA IS NOW THE EPILEPSY ASSOCIATION! WHY THE NAME CHANGE?" Below this is a "Read More >" button. The main content area is divided into two columns. The left column has a title "Welcome to The Epilepsy Association" and a paragraph of text. The right column has a small image of an office interior.

epilepsyassociation.com/

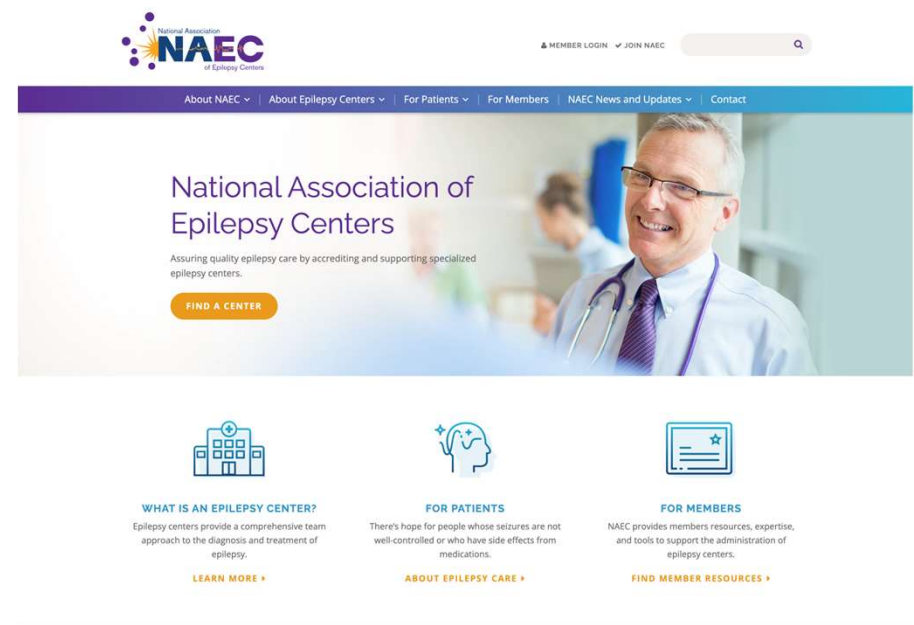
Community Services

Rare Epilepsy Network



rareepilepsynetwork.org/

National Association of Epilepsy Centers



www.naec-epilepsy.org/

**Thank you for your presence &
attention!**



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