Approach to the patient with a possible seizure

American Association of Physician Assistants
Houston, Texas

May 22, 2024

Jeffrey Buchhalter MD, PhD, FAAN, FAES
Phoenix, Arizona

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 Neurosurgery 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 (FND)
- *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

Seizures /Epilepsy
Types
Management
Support

Funky movements & awareness symptoms

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, Toxicology, 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

Evaluation

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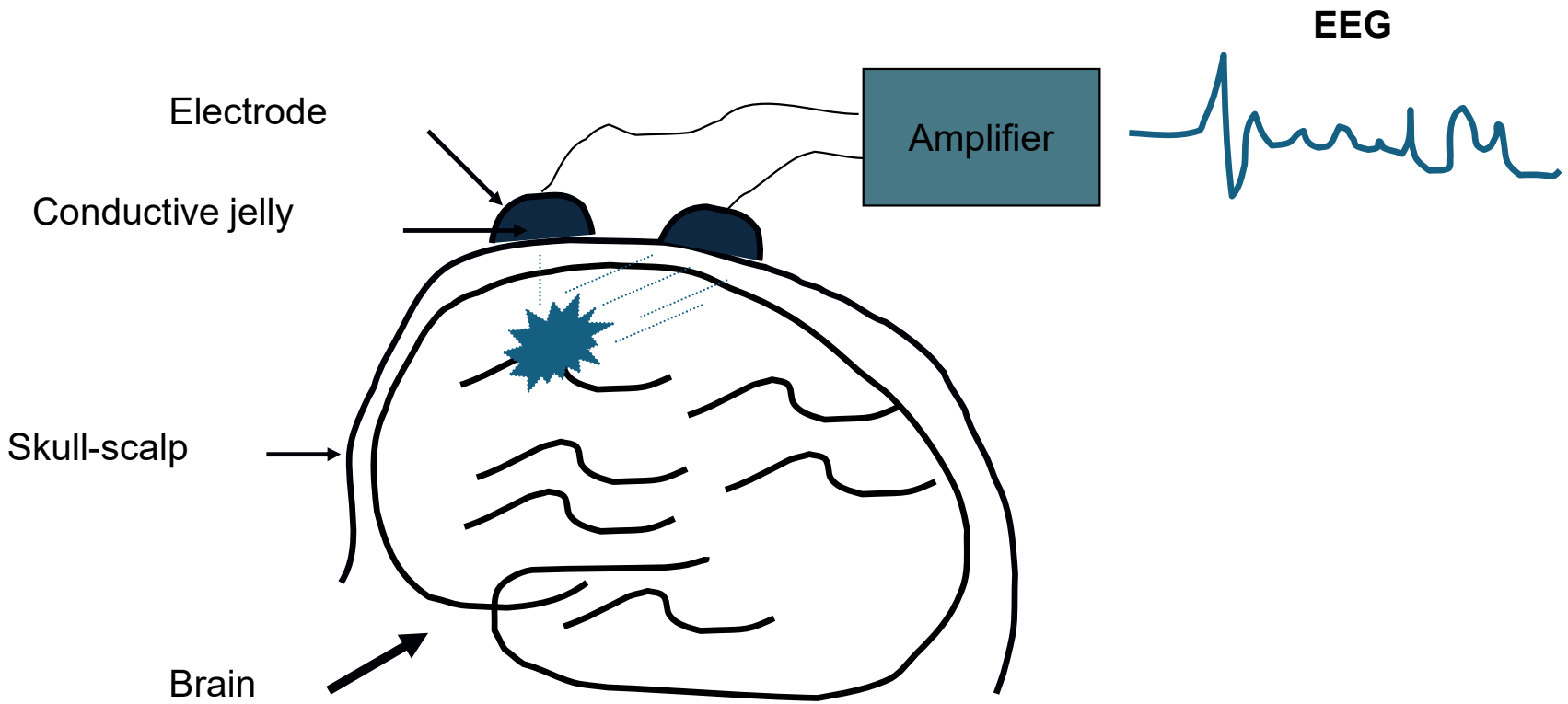
Why an EEG is useful

- Supporting a diagnosis of epilepsy
- Ruling out non-epileptic event
- Epilepsy syndrome
- Prognosis

- Can be done as outpatient

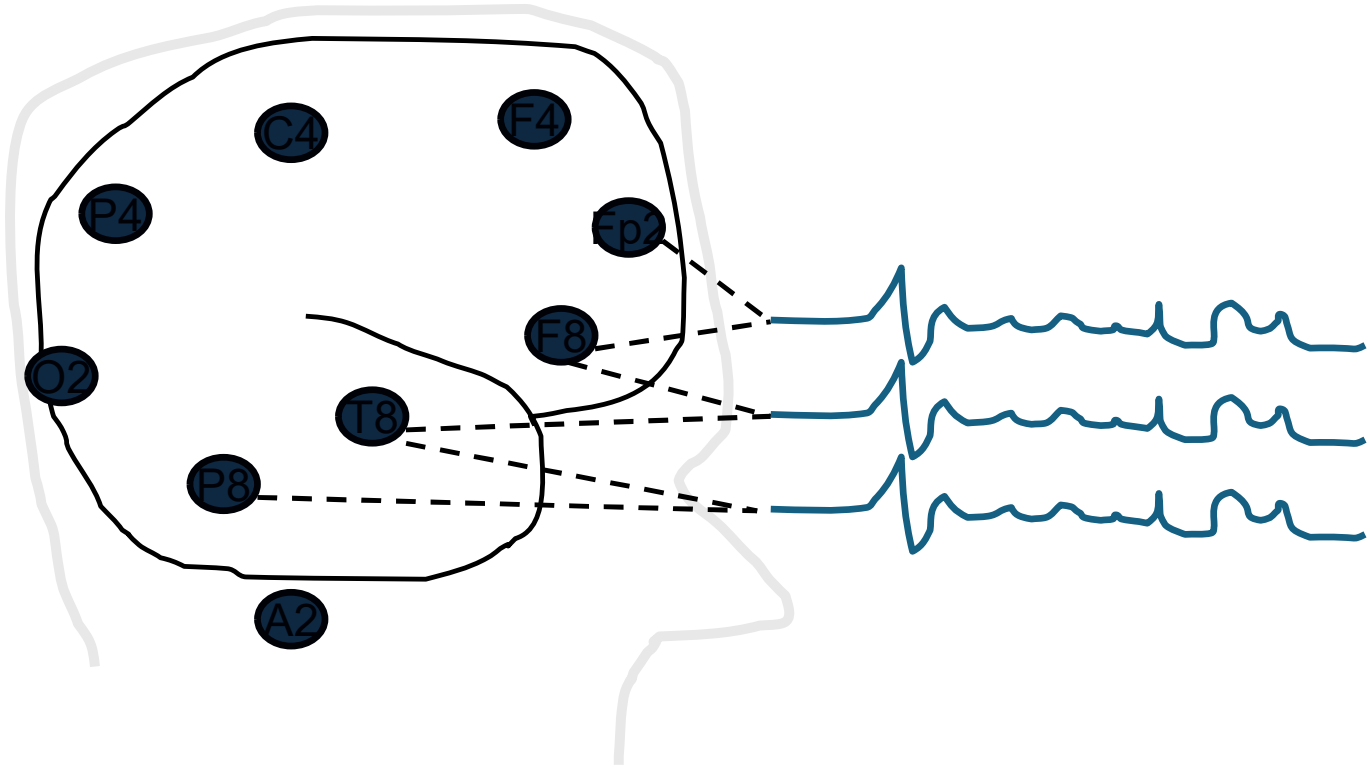
EEG Diagram


EEG
Amplifier
Electrode
Conductive jelly
Skull-scalp
Brain

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

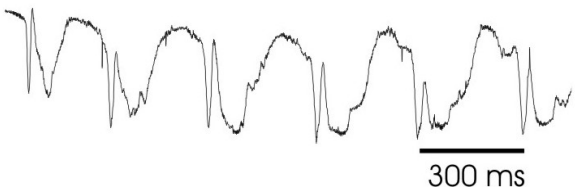
- **Background-** the dominant frequency of the EEG awake, with eyes closed, relaxed
  - Too slow, too fast (like the idle of a car)
- **Epileptiform-** intermittent electrical discharges that indicate a predisposition to seizures (like the car making pings & pops)

Types of Interictal Epileptiform Discharges

- Sharp waves

- Spikes

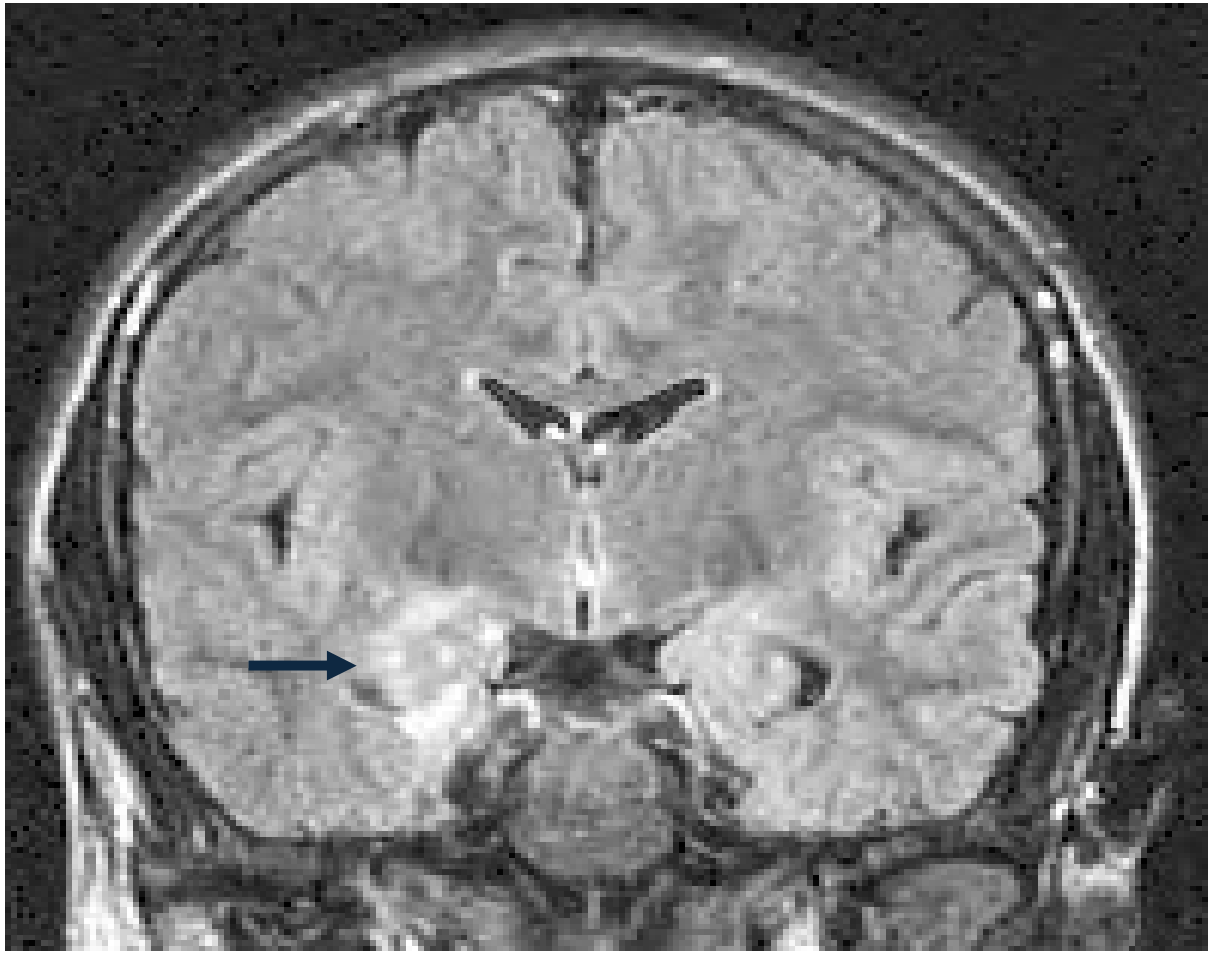
- Spike wave



Side trip: MRI

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

Normal CT, MRI- mesial temporal ganglioglioma

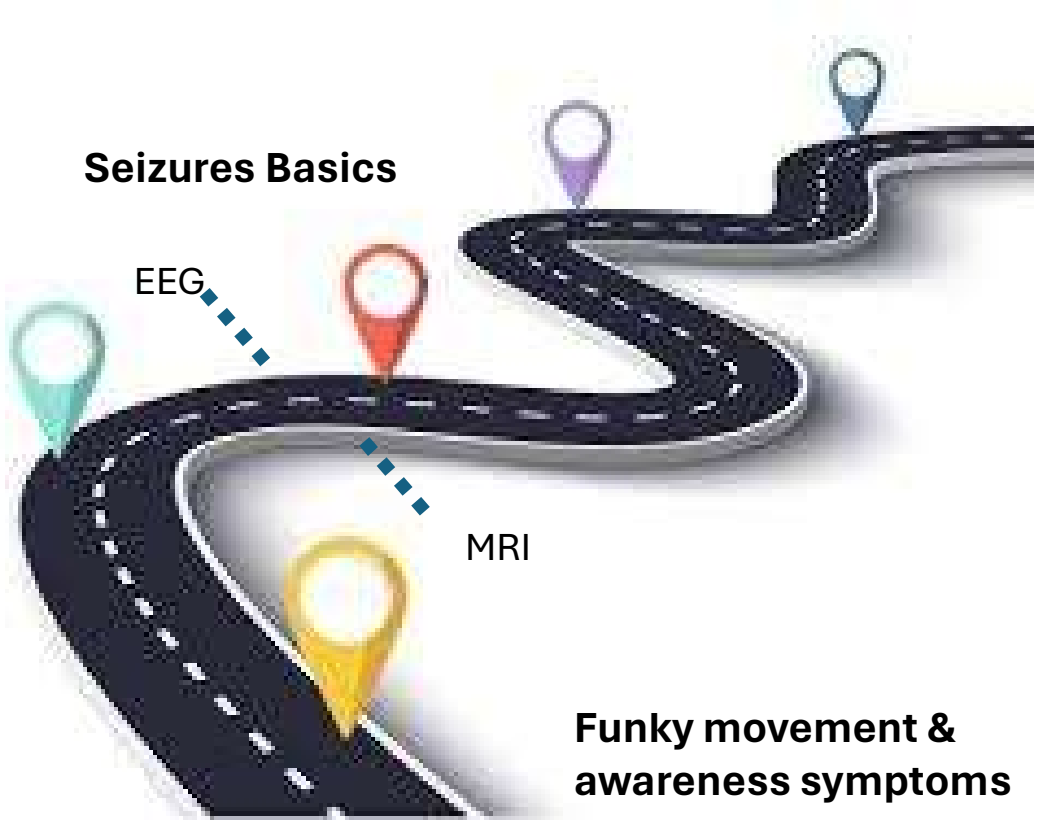


Let’s go down the seizure / epilepsy path

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

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

A practical roadmap

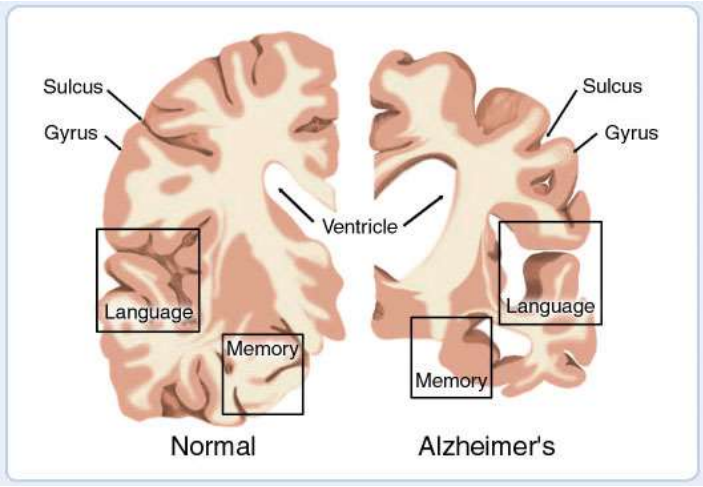


Seizures /Epilepsy
Types
Management
Support

What is a seizure?

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

Manifestation depends upon location



Movement

Sensations

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?

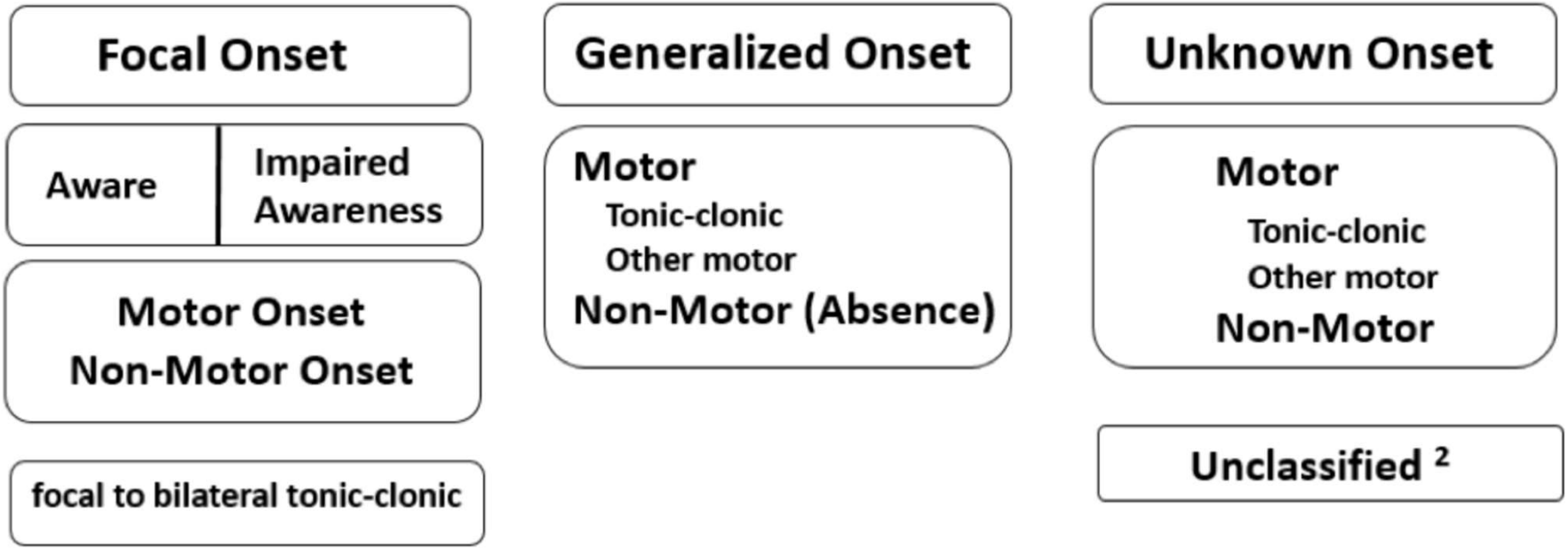
- History- “my left arm tingles before I lose consciousness”
- Physical- a hemiparesis would suggest a lesion in the contralateral motor cortex
- EEG- may show focal or generalized epileptiform abnormalities
- MRI- may show a lesion consistent with a focal onset

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 medication therapy

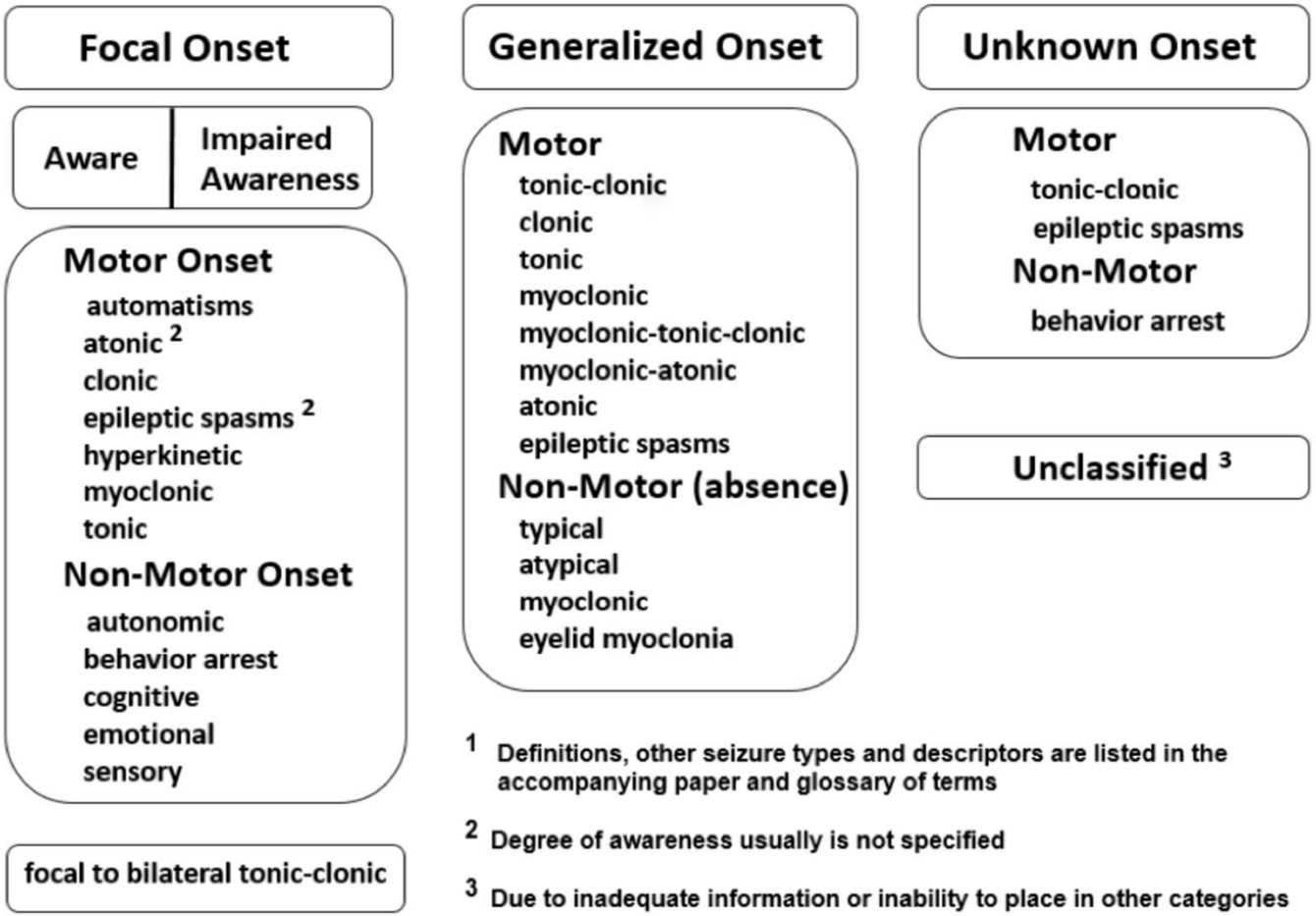
ILAE 2017 Classification of Seizure Types Basic Version [1]



[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?

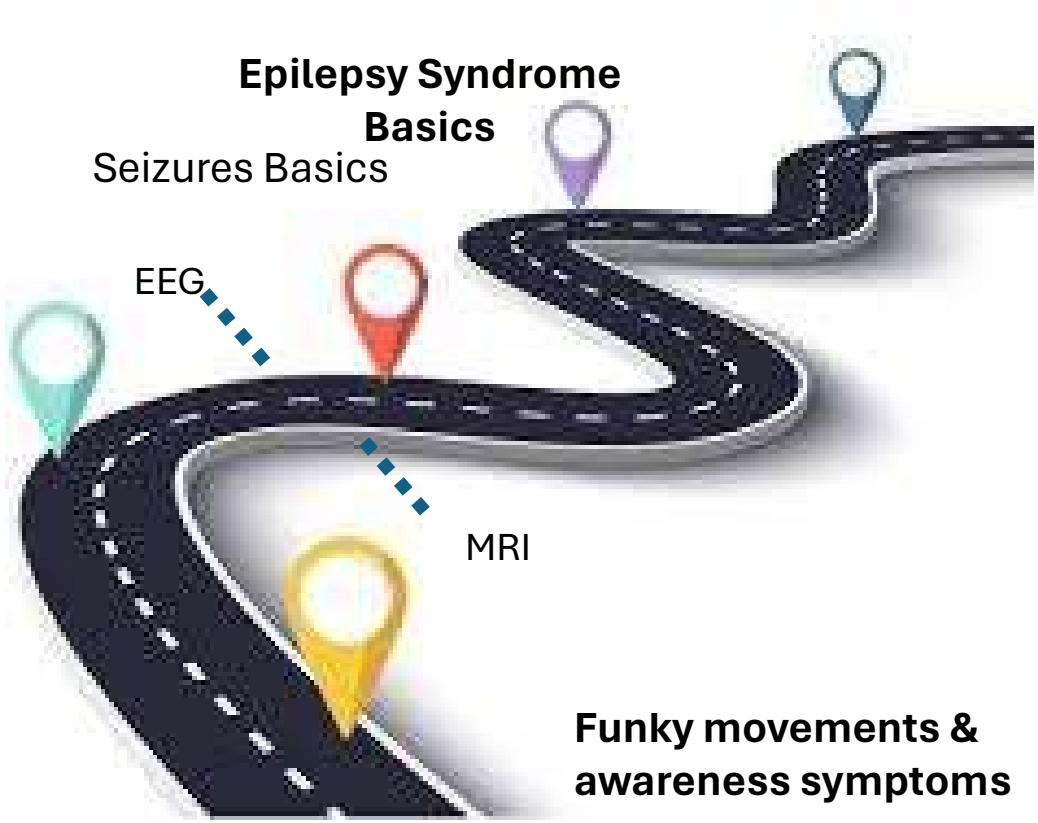
What is (an) Epilepsy (the epilepsies)?

- Two or more unprovoked seizures *or*
- An Epilepsy Syndrome with recurrent seizures

  or

- Likelihood of a second seizure > 60%

A practical roadmap



Epilepsy Syndrome Basics

Seizures Basics

EEG

Evaluation

MRI

Funky movements & awareness symptoms

Seizures /Epilepsy
Types
Management
Support

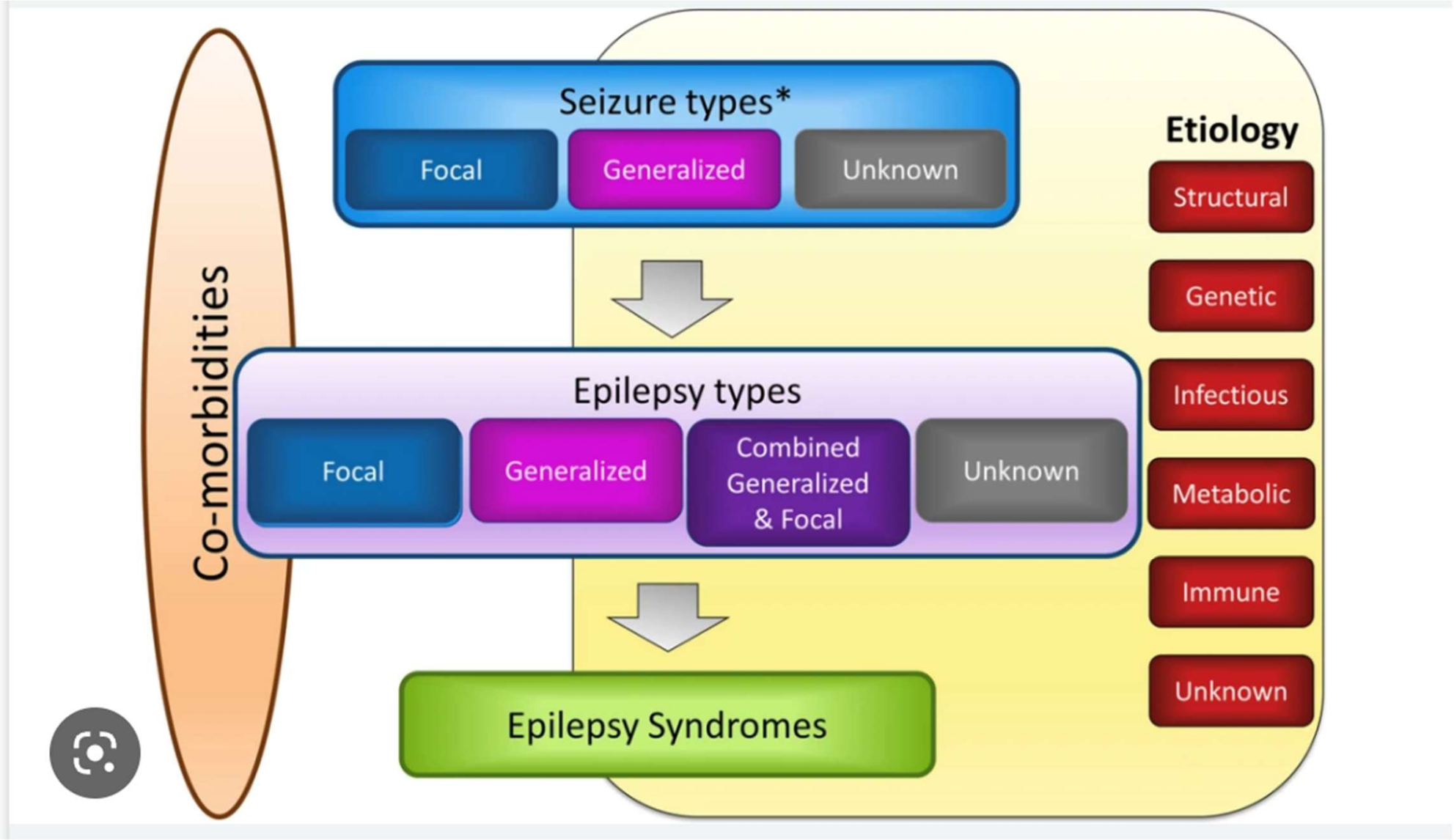
Epilepsy Syndrome Terminology

- **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

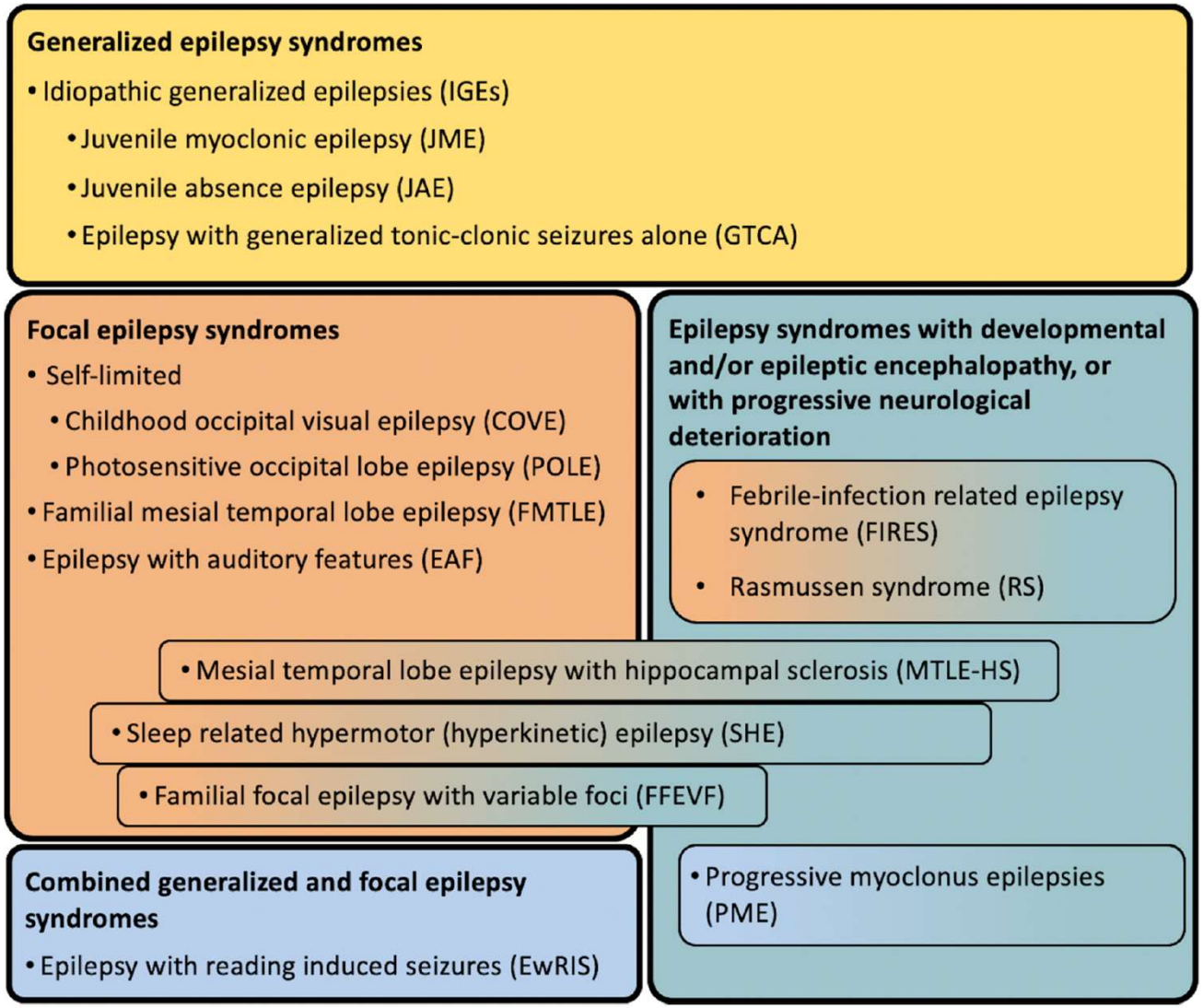
Common Epilepsy Syndromes*

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

* See Syndrome slide for current names

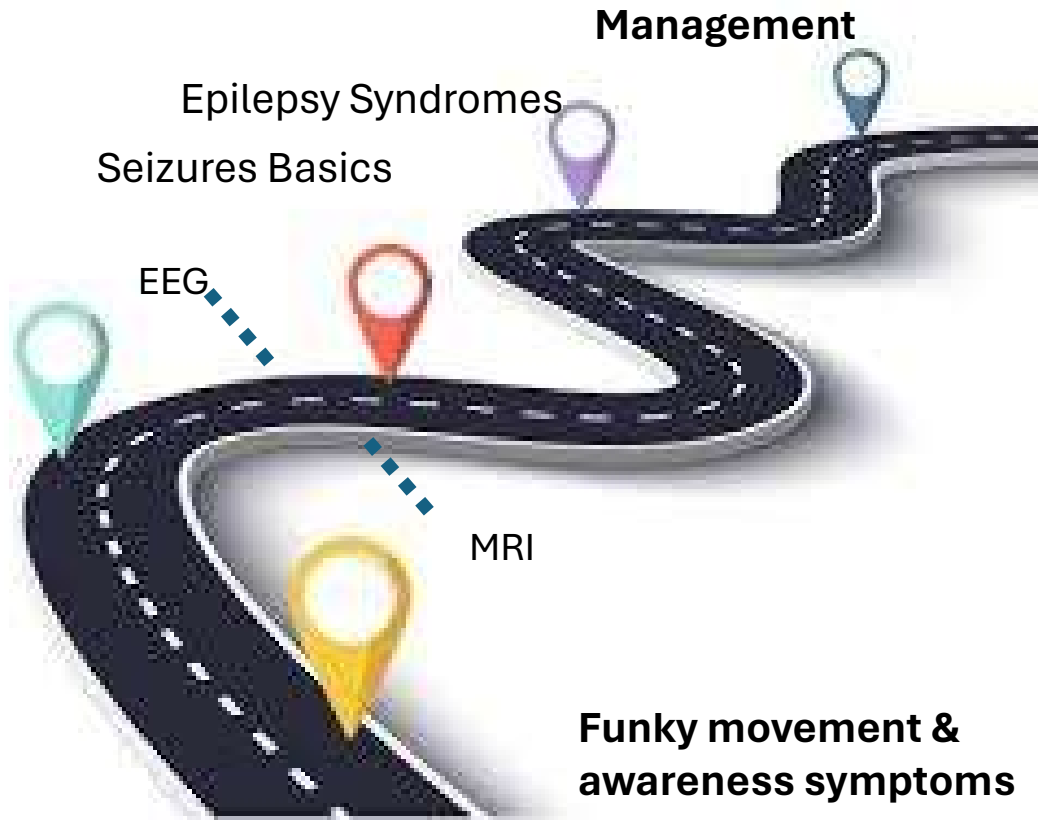

Seizure types*
Focal
Generalized
Unknown
Etiology
Structural
Genetic
Infectious
Metabolic
Immune
Unknown
Co-morbidities
Epilepsy types
Focal
Generalized
Combined Generalized & Focal
Unknown
Epilepsy Syndromes

ILAE
Epilepsy
Syndromes



Riney, Epilepsia, 2022
DOI: 10.1111/epi.17240

A practical roadmap



Seizures /Epile
Types
Managemen
Support

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

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  - Risk factors for recurrence
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  - 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 Adultst (2022)

Neurocritical Care Society

- Guidelines for the evaluation and management of status epilepticus (2012)

https://aapp.org/guideline/external/seisure

Why Refer to a Neurologist or Comprehensive Epilepsy Center?

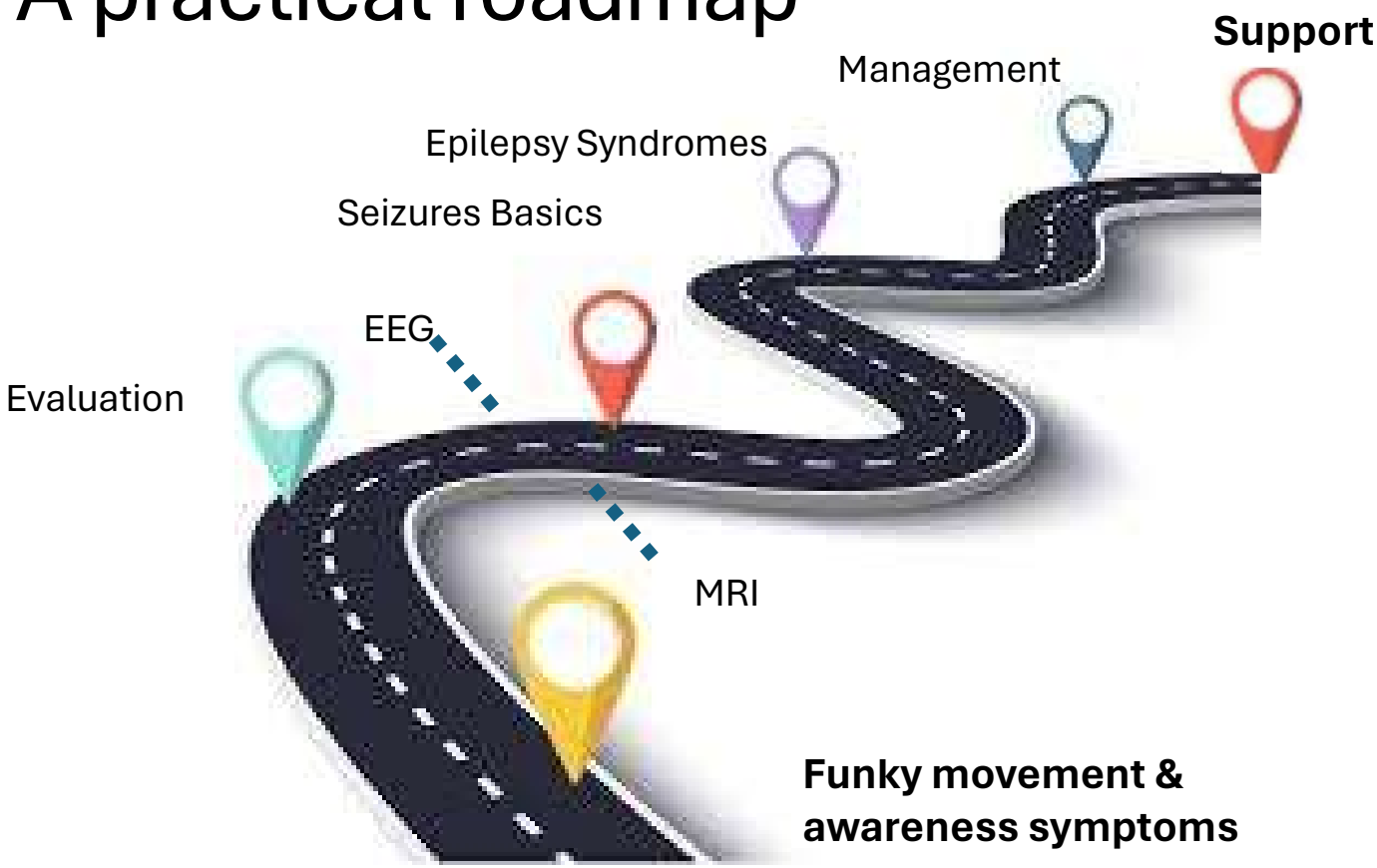
- Limited time to assess
- Unclear if a seizure occurred
- Uncertain as to risk of recurrence
- Confirmation of counseling provided
- Explanation/follow-up of abnormal testing
- Initiation of therapy
- Continue management
- Discuss risk of discontinuing therapy

Where to Refer

- **Best- closest to home**

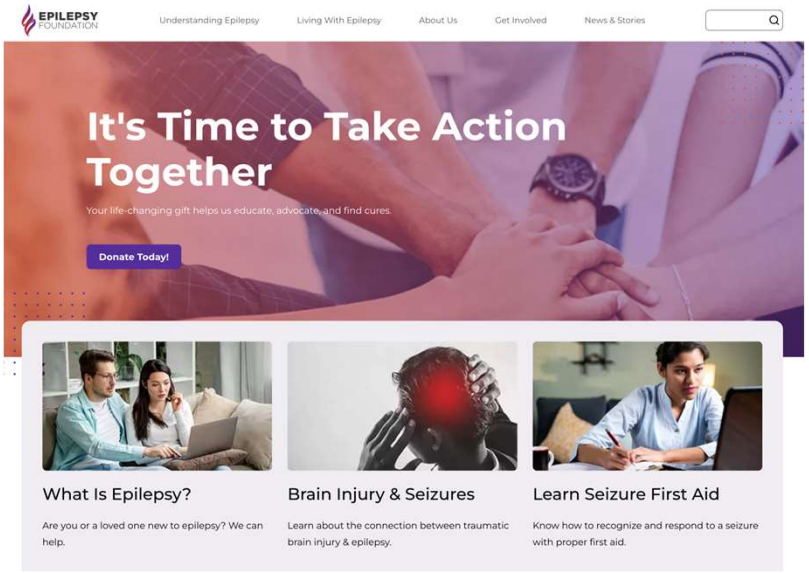
- “All politics is local” ….. Tip O”Neil (Dem-MA)

A practical roadmap



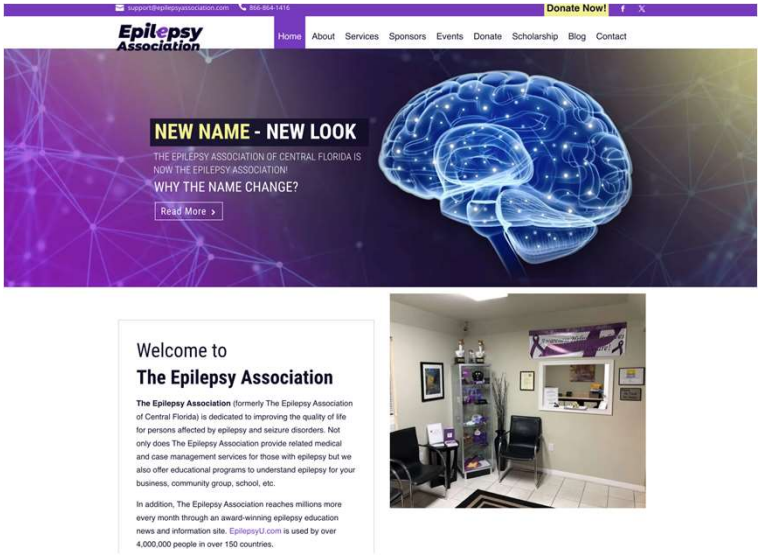
Community Services

Epilepsy Foundation (of America)



Epilepsy.com

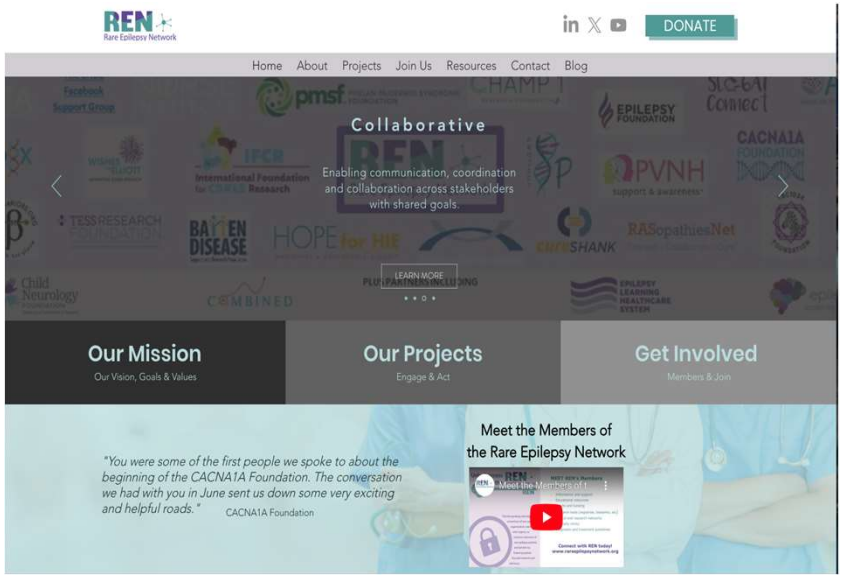
Epilepsy Association



epilepsyassociation.com/

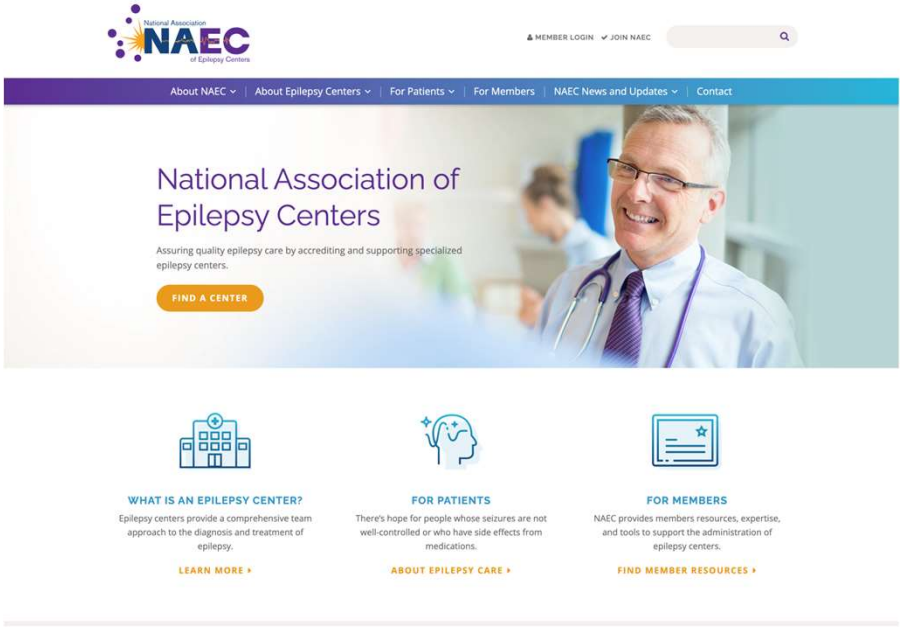
Community Services

Rare Epilepsy Network



rareepilepsynetwork.org/

National Association of Epilepsy Centers



www.naec-epilepsy.org/

Thank you for your presence & attention!

Buchhalterj@gmail.com