# Epilepsy & seizures

SAPMEA – South Australian ECHO Program

Neurology ECHO Network

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# PANEL MEMBERS

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# Focus Topics

- What is epilepsy?
  - Definitions
  - Classification
- Diagnosis of epilepsy
  - History taking
  - Differentials
  - Red flags
  - When to order EEG
  - When to order imaging
- Management
  - When to refer to neurology services
  - Management tips for primary care
- Special considerations
  - Women with epilepsy*
  - Driving

*to be discussed in more detail Q&A after case presentation

# What is epilepsy?

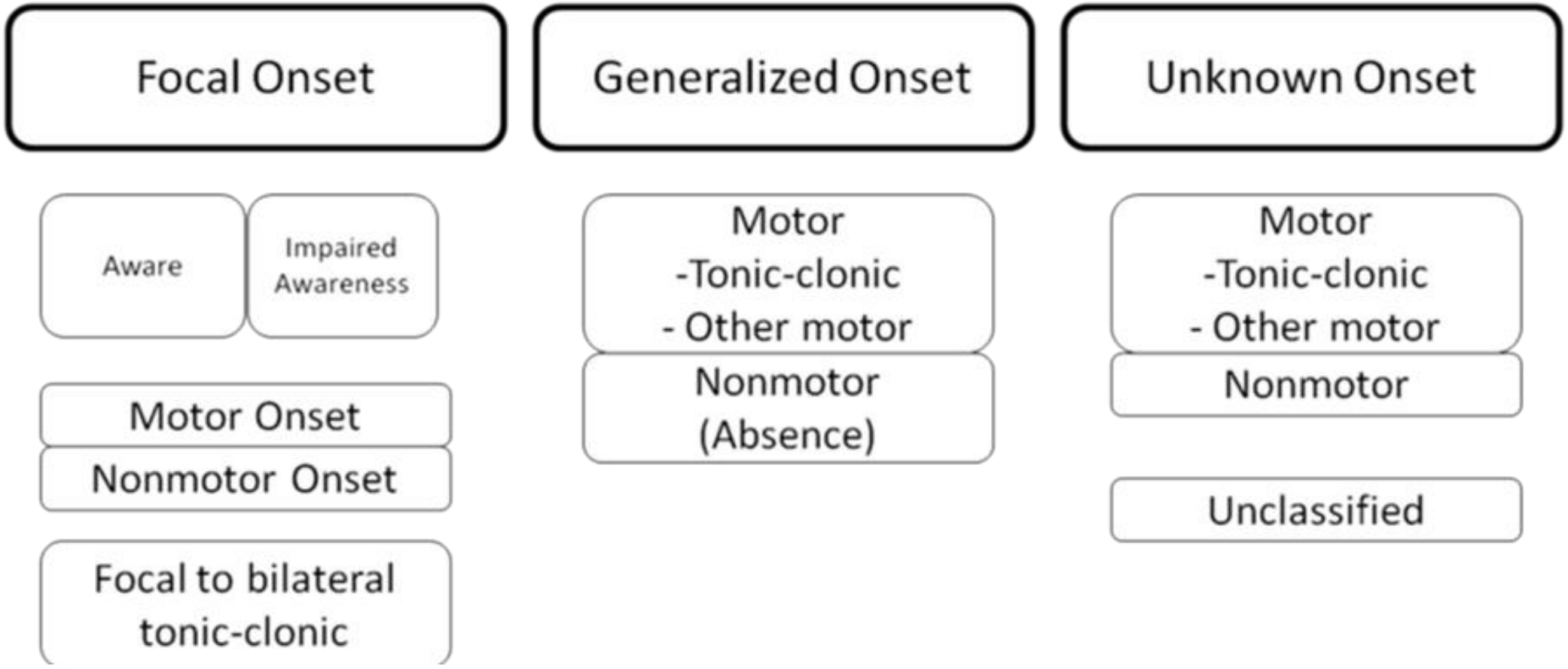
- **Epileptic seizure** is a transient signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain
- **Epilepsy** is the tendency towards unprovoked seizures
  - **Provoked** or **acute symptomatic seizures** are seizures precipitated by a medical illness, substance use or withdrawal or head trauma (e.g. severe hyponatraemia)
  - People with epilepsy may be more likely to have a seizure in the setting of alcohol use or sleep deprivation but this is not considered a provoked seizure as it would not have occurred without the underlying epilepsy
- **Non-epileptic seizures** are events which can appear similar to epileptic seizures but have no accompanying electrical discharge. They are also called **psychogenic** or **dissociative** seizures**.**
- **Status epilepticus** (SE) are abnormally prolonged seizures which can have long-term consequences (LTC), including neuronal death, neuronal injury and alteration of neuronal networks.
  - Tonic-clonic SE > 5 min *(LTC > 30 min)*
  - Focal SE with impaired awareness > 10 min *(LTC > 60min)*
  - Absence SE > 10-15 min *(LTC unknown)*

*2014 Definition*

*Epilepsy is a disease characterized by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological, and social consequences of this condition.*

*(Robert S. Fisher MD PhD on 4/15/2014)*

# ILAE 2017 Classification of seizure types




*Fisher et al. Instruction manual for the ILAE 2017 operational classification of seizure types. Epilepsia*

# Diagnosis | History Taking

## What to ask

- Any preceding triggers?
- What was the patient doing when it happened?
- What was the patient's last memory, what did they experience?
- What exactly did the eyewitness see?
- What was the patient's first memory on coming round? Was there a period of confusion disorientation and amnesia?
- If recurrent, are the events stereotyped (all the same) or variable?

## What it means

- Falling stiffly followed by sustained rhythmic jerking of all limbs indicative of generalised tonic-clonic seizure
- Actual description of movements is most useful.
- Using seizure type to describe event (e.g. 'absence' or 'tonic-clonic') is often inaccurate.
- Differentiation from other causes of blackouts can be difficult
- Syncope features often mistaken for seizure: twitching and jerking, urinary incontinence common, bitten tip of tongue, vagueness and fatigue immediately post event
- Reliable detailed witness description is ideal
- Lateral tongue bite highly specific

# Diagnosis | Differentials

## Acute symptomatic/provoked seizures

- Metabolic derangement
  - Critical illness - hypoglycaemia, hypoxia, febrile illness, respiratory/renal/ liver failure
  - Substances - intoxications and poisonings, drug intoxication (e.g. methamphetamines), alcohol withdrawal
- Head injury
  - Post concussive seizure
  - Extradural or subdural haematoma
  - Raised ICP
- Cerebral infections
  - Bacterial meningitis, viral encephalitis
- Stroke
  - Acute cortical infarction (uncommon to cause Sz), subarachnoid or intracranial haemorrhage

## Other causes of transient neurological symptoms/blackout

- Cardiac syncope
  - Aortic stenosis, cardiomyopathy, brady- and tachyarrhythmias, bradycardia, heart block
- Non-cardiac syncope
  - Vasovagal syncope, postural hypotension
- Migraine aura
- Movement disorders
  - Tremor, tic
- Psychological and psychiatric
  - Dissociative seizures, hyperventilation, panic attacks
- Sleep disorders
  - Parasomnias, narcolepsy, cataplexy
- TIA/stroke
- Transient global amnesia

# Diagnosis | RED FLAGS

**If any of the following are present or suspected, refer the patient to the emergency department (via ambulance if necessary)**

- Any status epilepticus (convulsive or non-convulsive)
- First ever seizure
- Seizure with persistent focal neurological deficit
- Seizure associated with recent head trauma
- Seizure with persistent altered or worsening mental status in the post ictal period
- Seizure with persistent severe headache ≥1 hour duration
- Seizure with fever
- History of malignancy or immunosuppression

# Diagnosis | When to order EEG

## What it tells you

- Usefulness of EEG impacted by time since event, medications, patient ability to follow instructions
- Always an adjunct to clinical diagnosis and must be interpreted in the clinical context
- What might it tell you?
  - Tendency to epilepsy +/- classification of specific syndrome +/- localize seizure focus
  - Confirm diagnosis if event occurs during recording (seizure, dissociative event/sleep disorder)
- What won't it tell you?
  - Can have normal EEG in epilepsy
  - **An EEG cannot rule out epilepsy**

## When to refer for EEG

- **Evaluation following first presentation of seizure**
- **Evaluation of spells of altered consciousness highly suspicious of seizures**
- To enable epilepsy classification in patients with recurrent seizures/epilepsy *(when not previously done)*
- Consideration of drug withdrawal in known idiopathic/genetic generalised epilepsy
- Diagnosis and management of convulsive and non-convulsive status epilepticus *(inpatient)*
- Acute onset confusion/altered consciousness/delirium of unknown aetiology *(inpatient)*
- First presentation psychosis *(esp. if atypical features)*

# Diagnosis | When to order imaging

**When to order imaging**

- In all first seizure patients
  - Except if confirmed genetic generalised epilepsy on clinical and EEG
- Consider if change in seizures or new red flag features in patient with known epilepsy

**What to order**

- CT brain
  - Readily available and inexpensive
  - Not very sensitive, ionising radiation
  - Excludes large structural causes (such as brain tumour, haemorrhage)
- MRI brain – Epilepsy protocol with coronal views
  - Gold standard for seizure imaging
  - Able to detect subtle structural changes (cortical malformations, hippocampal volume loss)
  - Difficult to access in primary care/expensive

# Management | When to refer to neurology services

- Strongly suspected new onset seizure disorder where the event is witnessed and/or there are features highly suggestive of seizure
- Known epilepsy requiring ongoing shared management of refractory epilepsy
- Known epilepsy in the setting of planned or current pregnancy
- Patients with previous seizure requiring **commercial** driving licence
- Patients with known epilepsy wishing to withdraw anticonvulsant medication
- *Patients with recent hospital admission for new onset seizures where **specific** epilepsy outpatient follow-up is required for **ongoing diagnostic and/or management issues***
- *Consideration of epilepsy surgery or vagal nerve stimulator insertion*
- *Video EEG monitoring for diagnostic uncertainty or seizure classification*

# Exclusion criteria for public neurology services

**Due to extensive waiting times and the limited role of specialist neurologists in assessment and management of these disorders, referrals for these issues are not accepted to the public neurology outpatients clinics in South Australia**

- Seizures occurring in the setting of drug intoxication or withdrawal (incl. alcohol withdrawal)
- Acute symptomatic seizures i.e. occurring in the setting of severe systemic illness, severe metabolic disturbance or concussion
- Unconscious collapse where no available collateral history or no features to strongly suggest seizure disorder
- Convulsive syncope
- Assessment primarily for the purposes of private drivers' licence renewal (this can be done using the Assessing Fitness to Drive guidelines by the patient's treating doctor, including their general practitioner)
- Well controlled epilepsy without active clinical management issues
- Seizures where diagnosis and investigations already complete +/- therapy commenced
- Seizures occurring in the setting of advanced dementia

# Management Tips for Primary Care | Starting anti-seizure medication

- Should I start an ASM?
  - Better to wait for definite diagnosis rather than commence unnecessary therapy
  - ASM usually not commenced after first seizure
  - Joint decision to commence long term therapy between clinician and patient
- How do I choose an ASM?
  - Aim is seizure freedom with no side effects
  - Factors:
    - Seizure type/epilepsy syndrome (if unsure chose something that is effective in both focal and generalised – e.g. valproate, levetiracetam, lamotrigine)
    - Other meds (check drug-drug interactions incl. additive side effects)
    - Patient age and sex and comorbidities (obesity, cognition, renal function, substance use)
- Will the ASM work?
  - Careful counselling/adherence monitoring (missed doses can result in seizures)
  - 1/3 of patients have drug refractory epilepsy

| First line | Second line |
|---|---|
| **Focal (partial) seizures** | |
| carbamazepine | lamotrigine, clobazam, gabapentin, lacosamide, levetiracetam, oxcarbazepine, phenobarbital, phenytoin, pregabalin, tiagabine, topiramate, valproate, zonisamide |
| **Generalised tonic-clonic seizures** | |
| valproate | carbamazepine[1], clobazam, lamotrigine, levetiracetam, oxcarbazepine[1], phenobarbital, phenytoin[1], topiramate |
| **Absence seizures** | |
| ethosuximide[2], valproate | clobazam, clonazepam, lamotrigine |
| **Myoclonic seizures** | |
| valproate | clobazam, clonazepam, levetiracetam, phenobarbital |
| **Infantile spasms** | |
| prednisolone, tetracosactide | vigabatrin[3], clonazepam, valproate |

[1] do not use if juvenile myoclonic epilepsy is suspected (often presents with a tonic-clonic seizure) as it may be ineffective or worsen seizures

[2] does not prevent generalised tonic-clonic seizures which often coexist in juvenile absence epilepsy

[3] use only if no safer alternative

# Management Tips for Primary Care | Starting anti-seizure medication

- Risks
  - Approximately 30% get adverse effects from ASM
  - Some have serious mood side effects (suicidality/depression) (e.g. LEV)
  - Hypersensitivity reactions highest in first 2 months (e.g. CBZ, LTG)
- Strategies
  - Aim for monotherapy
  - Start low, go slow
- Drug monitoring
  - Check trough level (blood prior to next dose)
  - Useful for assessing adherence, toxicity, guiding dose adjustment, checking drug-drug interactions (e.g. LTG/VPA)
  - Range is a recommendation only
  - Drugs where levels often helpful if poor control/suspected side effects – carbamazepine, lamotrigine, phenytoin, phenobarbitone, oxcarbazepine
  - Drugs where levels only useful to indicate whether patient taking medication or not – valproate, levetiracetam

# Management Tips for Primary Care | Seizures in known epilepsy

**In patients with a known diagnosis of epilepsy who have a single breakthrough seizure without complication and with full recovery, hospital presentation may not be necessary. Consider:**

- Review adherence and consider drug levels if non-adherence suspected
- Optimise current drug therapy/consider increasing dose if already on medication
  - Contact neurology registrar in relevant LHN to discuss clinical concerns and obtain dosing advice
- Consider whether drug-drug interactions or new medication lowering seizure threshold (e.g. SSRI, TCA) could have contributed to change in seizure control
- Treat any intercurrent infections and co-morbidities
- Address any lifestyle issues (e.g. adequate sleep, stress, alcohol, recreational drugs)
- Consider need to suspend driving licence as per Austroads Fitness to Drive Guidelines

# Special Considerations | Women with epilepsy

## Why does it matter?

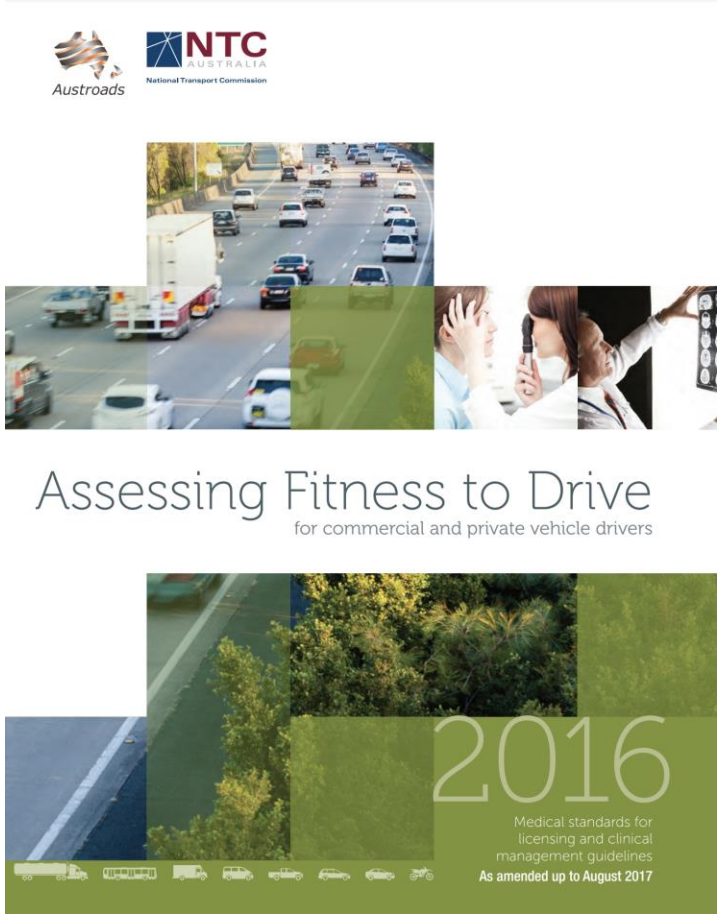
- Disease and drugs require consideration in:
  - Fertility
  - Contraception
  - Menstrual cycle
  - Conception
  - Pregnancy
  - Post partum
  - Menopause

## What do I need to know in primary care?

- Folate should be prescribed for all women with epilepsy of child bearing age taking anti-seizure medications
- Some anti-seizure medications reduce the efficacy of systemic hormonal contraception so consider alternatives (e.g. Mirena)
- Careful counselling required with family planning – risk of teratogenicity vs. risk of seizure in pregnancy (pregnancy planning is indication for referral to specialist neurology services)
- Valproate has **high teratogenic** and neurocognitive risks and should be avoided in child bearing women if possible and careful counselling and monitoring is required if used
- Close dose monitoring and adjustment required in pregnancy (altered pharmacokinetics)
- Breastfeeding safe on ASM
- Risk of seizures in post-partum period – safety of baby, sleep deprivation

# Special Considerations | Driving

- Australian Assessing Fitness to Drive Guidelines https://austroads.com.au/publications/assessing-fitness-to-drive/ap-g56
  - *Part B: Medical standards > 6. Neurological conditions > 6.2 Seizures and epilepsy*
- Different standards for **private** and c**ommercial** licensing
- The responsibility for issuing, renewing, suspending, refusing or cancelling or reinstating a person's driver licence (including a conditional licence) lies ultimately with the driver licensing authority.



# Special Considerations | Driving

- The driver is legally obliged to advise their driver licensing authority of any long-term or permanent injury or illness that may affect their safe driving ability incl. seizures
- Additional mandatory reporting in SA (not same interstate)
- Neurologist review is not required for private licensing, only for commercial

- Default standard
  - 12 months for private
  - 10 years for commercial
- Exceptions well defined
  - First seizures
  - Epilepsy treated for the first time
  - Seizure in previously well-controlled epilepsy
  - Acute symptomatic seizures
- **Guidelines are evidence based and generally a neurologist will not advise any exemption from the recommended periods of seizure freedom**

# Resources | Useful Websites

**Provide education, support and information online and face to face in the community**

- Epilepsy Centre South Australia: https://epilepsycentre.org.au/
- Epilepsy Action Australia: https://www.epilepsy.org.au/
- Australian FND network: https://fndaustralia.com.au/resources/

**International sites**

- Epilepsy Foundation America: https://www.epilepsy.com/
- Epilepsy Canada: http://www.epilepsy.ca/
- Epilepsy Action UK: https://www.epilepsy.org.uk/