Talk Like a Neurologist:
Seizure Types

1. Partial Seizures
   - Simple Partial
   - Complex Partial

2. Generalized Seizures
   - Clonic
   - Tonic
   - Tonic-Clonic
   - Absence
   - Myoclonic
   - Atonic
Which of the following medications treats primary generalized seizures?

A. Phenytoin  
B. Valproic Acid  
C. Carbamazepine  
D. Oxcarbazepine  
E. Gabapentin

Focal vs. Generalized Onset - The Key Distinction

• Make the Distinction  
  – History, physical exam, EEG and Video EEG Tele  
• Distinct Etiologies  
  – Focal lesion in brain vs. usually none  
• Distinct Work-up  
  – Extensive search for underlying lesion vs. none  
• Distinct Treatments  
  – Different drugs  
  – Different surgical options
Non-Epileptic Spells

• Diagnosis of Exclusion
  – Comprise 20% of epilepsy clinic new patients
• Only established via Video EEG Telemetry
  – Complex partial seizure similar by history
• More common in those with true epilepsy
• Patients not “faking”
• Comprehensive approach with neuropsychology is a must for treatment
  – Recent data supports CBT

Non-Epileptic Spells: Clues to Diagnosis

• Seizures refractory to multiple AEDs
• Clinical clues not 100% but useful
  – 1. Ictal eye closure
  – 2. Bilateral movements with preserved consciousness
  – 3. Pelvic thrusting
Non-Epileptic Spells

“Teddy Bear Sign” in video EEG telemetry unit:
5.2% sensitive and 99.3% specific

Long term outcome: 164 patients with diagnosed non-epileptic spells followed for 1-10 years
– 71.2% still had spells and 56.4% on disability

Seizure Management in the ED

• ABCs
• O₂, position on side, suction
• Prevent patient from injuring self
• Ativan, thiamine, D50
• Determine: Was this event a seizure?
  – Consider: syncope, migraine, TIA, movement disorders, etc… (many more in kids)

1st seizure or known epilepsy?
Seizure Management in the ED: Single First Seizure

- Careful history of the spell: before (including recent events), during, after
- Determine all meds patient is on
- Family History
- Pregnancy, Birth, and Development history especially in young
- Careful neuro exam looking for focal signs

Seizure Management in the ED: Single First Seizure

- Work-up for provokers
  - Head trauma?
  - Utox, EtOH history and possible level
  - CBC, Lytes, Ca/Mg/Phos, BUN/Cr, LFTs, +/- ABG
  - CT (usually with contrast)
  - Low threshold to LP
- Needs outpatient work up including: EEG, MRI
Seizure Management in the ED: Should We Treat a First Seizure?

• “Provoked”: Do not treat
• Data for recurrence if 1st seizure not provoked
  – 26-71% 2 year recurrence
  – Many models: Non-evidenced based rule of thumb involving neuro exam, EEG and MRI

• Sudden unexpected death in epilepsy (SUDEP) (1.21/1000 patient years)

Can they Drive?

• If the patient has had an seizure with AMS, should not be driving a car for 3-6 months
  – Unless provoked and that factor has been removed
• State reporting laws to the DMV differ
  – California law (5 other states)
    • Includes syncope!
Seizure Management in the ED: Known Epilepsy

- Determine AEDs including doses
- Send levels of AEDs
  - Valproate, Phenytoin, Phenobarb, Carbamaz.
  - Lack of compliance is common trigger
- Work-up for provokers
  - Infection (CXR, urine, ?LP, ?blood ex), Utox
  - CBC, Lytes, BUN/Cr, Ca/Mg/Phos, LFTs, +/- ABG
- Best to curbside neuro regarding any medication changes to current regimen

Quick Cases: Seizures in ED

45 yo male with recent +PPD won’t stop seizing
Order IV B6 to treat pyridoxine-deficient seizures secondary to INH

55 yo female on bone marrow transplant service given amphotericin
Check Ca/Mg/Phos and replete low Mg

Most new seizures over 40 in urban areas
EtOH withdrawal seizures: treatment with benzos and NOT AEDs
Case #1

• A 67F is hospitalized with a community-acquired pneumonia. On Day#3 she is feeling much better awaiting discharge when her nurse finds her unresponsive with rhythmic shaking of all limbs.
• PMHx: COPD
• Meds: Ceftriaxone, NKDA
• SH: 100pk yr hx tobacco, no hx EtOH
• FH: No neurologic disease

Case #1

• You are called to the bedside and after 3 minutes, these movements have not stopped. Options for your next course of action are….
   A. Continue to wait for the spell to subside
   B. Administer IV Diazepam
   C. Administer IV Lorazepam
   D. Administer IV Fosphenytoin
Status Epilepticus

- Incidence: 100,000 to 150,000 per year nationally
- Causes 55,000 deaths per year nationally
- 12 to 30 percent of epilepsy first presents as status epilepticus
- Generalized convulsive status most dangerous

Status Epilepticus Algorithm: Real World

1. Lorazepam 2mg IV q2 minutes up to 6mg
2. Fosphenytoin 18-20mg/kg (Dilantin Equivalents) IV
2a. Fosphenytoin additional 10mg/kg or Phenobarbital
3. General Anesthesia with continuous EEG
   a. IV Midazolam gtt
   b. IV Propofol gtt
Status Epilepticus: New Advances

- Change in definition and time window
- IV Depakote (Depacon): 15mg/kg as bridge to Depakote therapy, alternative to IV DPH
- Out of hospital benzos in field effective
- Tailored Therapy?
- Decrease incidence in epileptics with prescribed “Status Rescue Meds”
A healthy 36M with a hx of seizures on Dilantin 300mg/d comes to your office for routine care. He has had no seizures and has a normal exam. A phenytoin level is 36 (10-20).

Your next course of action is…

A. Check an albumin level and renal function
B. Reduce the Dilantin dose
C. Make no changes to the Dilantin dose
D. Switch to carbamazepine
E. Admit to the hospital for dialysis

Monotherapy for Seizures

• 70 percent of epilepsy can be managed with monotherapy, most on first drug tried
• Concept of Maximal Tolerated Dose (MTD)
• Rarely check levels
  – Assess compliance
  – Steady state level
  – Not practically available with newer AEDs

New Drugs: Clinical Pearls

• IV formulations: VPA, DPH, PHB, LVT
• Levels to Monitor: VPA, DPH, CBZ, PHB
• Lamotrigine (Lamictal)
  – Rash (1/1000) progressing to Stevens-Johnson
• Levetiracetam (Keppra)
  – No drug interactions (useful on HAART), but NOT a first line agent
• Topiramate (Topamax)
  – Well tolerated: weight loss and cognitive side effects

New Drugs: Clinical Pearls

• Oxcarbazepine (Trileptal)
  – Tegretol pro-drug, hyponatremia
• Felbamate (Felbatol)
  – Aplastic Anemia with required registry
• Pregabalin (Lyrica)
  – Useful for neuropathic pain
• Gabapentin (Neurontin)
  – Not a great AED
Women and Epilepsy

• Some medications less tolerated by women
  Example: Depakote causes hirsutism, weight gain and often coarsening of facial features so relatively contraindicated in growing young women and girls
• Catamenial epilepsy
  – Brief AED pulses
  – Other agents: Diamox
  – Menstruation control

Women and Epilepsy: OCPs

• Pregnancy must be planned due to neural tube defect risk on AEDs
• Many AEDs decrease levels of OCPs and therefore higher OCP dosing (40mcg estrogen) recommended for efficacy
  – Always recommend double contraception
• AEDs can lead to reproductive dysfunction and PCOS, especially with VPA and CBZ
Which of the following drugs is not associated with teratogenic effects?

A. Valproic Acid
B. Phenytoin
C. Lamotrigine
D. Carbamazepine
E. Phenobarbital

Women and Epilepsy: Pregnancy

- Once pregnancy achieved: balance risk of AED exposure with risk of in utero seizures
- Most AEDs have increased clearance in pregnancy and women should be followed closely by neuro/high risk OB
- Vitamin K supplementation in last 4 weeks
Women and Epilepsy: Pregnancy

- Folic acid to decrease neural tube defects (NTDs) in women on AEDs
  - NTD risk doubles from 2-3% to 4-6%
  - Folate deficiency implicated in NTDs
  - 1-4mg/day regardless of AED PRIOR to conception
  - Prenatal diagnostic ultrasound
- “AED syndrome”
  - Microcephaly, low set ears, short neck, transverse palmar crease, skeletal abnormalities

Women and Epilepsy: Osteoporosis

- Increased risk of fracture due to trauma from seizures and increased falls
- Independent decrease in bone density in patients on many AEDs
  - Decreased serum Vitamin D levels
- Supplementation with Vitamin D, consider earlier and more frequent evaluation of bone mineral density (DEXA, etc…)
Other Epilepsy Treatments

• Vagal Nerve Stimulator (VNS)

• Diet

Other Epilepsy Treatments

• Epilepsy Surgery
  – Temporal lobectomy, focal resections, callosotomy, functional hemispherectomy
  – Randomized trial successful but underpowered

• Refer to tertiary center for consideration of surgery any patient who remains uncontrolled despite adequate doses of AEDs