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First-time Seizure and New-onset Epilepsy—
Stirred not shaken

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- **First-time Seizure and New-onset Epilepsy**
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New-onset Seizure: Objectives

- Discuss general approach to evaluation and treatment of new-onset seizure
  - Review terminology in seizures/epilepsy
  - Understand classification of seizures and epilepsy by onset, etiology, syndrome
- Discuss management approach, process, and resources at Children's National Health System

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Definitions

- A seizure
  - Sudden, transient signs/symptoms due to abnormal excessive or hypersynchronous electrical discharges of neurons (the event)

- Epilepsy
  - Enduring predisposition to generate epileptic seizures (the tendency for recurrence)
    - At least 2 unprovoked seizures > 24 hours apart
    - Consistent with particular epilepsy syndrome
    - One seizure and ≥ 60% risk of recurrence within 10 years

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Definitions

- Status epilepticus
  - Seizure lasting ≥ 30 minutes OR
  - A series of seizures lasting ≥ 30 minutes without full consciousness regained between OR
  - Seizure >5 minutes (practical definition)
- Medically-refractory epilepsy
  - Seizures unresponsive to 2 or 3 antiseizure medications

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Impact of Seizures/Epilepsy

- Risk of having a **seizure** by age 20: > 4%
- Risk of **epilepsy** by age 20: > 1%
- Risk of **epilepsy** by age 74: 3%
- Peak occurrence in childhood and over 65
- Approx 1/3 epilepsy patients do not respond to 2 or 3 antiseizure medications (Kwan P, Brodie M 2000)
  - 47% seizure-free on 1st AED
  - 14% seizure-free on 2nd or 3rd AED
  - 3% seizure-free on 2 drugs

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Classification of Seizures
by Onset

- Generalized onset
  - GTC
  - Absence
  - Myoclonic
  - Tonic
  - Atonic
- Partial/Focal Onset
  - Simple partial
  - Complex partial
  - Secondarily generalized

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Seizure Semiology (Focal Seizures)

- Temporal lobe—abdominal aura, psychic aura, olfactory aura, distal motor or oral automatisms, post-ictal nose wipe (ipsilateral)
- Frontal lobe—nocturnal, shorter than temporal, tonic (fencing—supplementary sensorimotor cortex contralat to extended arm), versive (forced turning), hypermotor (orbital/mesial, but also temp, insular)
- Occipital—visual hallucinations (Brodmann 17/18), emesis, autonomic
- Parietal—focal tingling/numbness (sensory cortex)
- Insular—gustatory aura, autonomic
- Gelastic—hypothalamic hamartoma

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Classification of Seizures

by Syndromes

- Cluster of symptoms, signs, EEG findings, which is consistent, implies diagnosis, treatment, prognosis

- Epileptic encephalopathies ("catastrophic") vs. Self-limited/pharmacoresponsive ("benign," "idiopathic/genetic")

  - Infantile spasms
  - Lennox-Gastaut syndrome
  - Genetic eg Dravet syndrome
  - Structural eg TS, diffuse migrational disorders
  - Childhood absence
  - Benign rolandic
  - Juvenile myoclonic

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First Question—Was it a Seizure?

- Loss of tone or consciousness
  - Abnormal heart rhythm
  - Vasovagal syncope
  - Attention deficit disorder
- Disorders of breathing
  - Breathholding spells
  - Hyperventilation
- Other medical conditions
  - Hypoglycemia
  - Gastroesophageal reflux

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More in Differential Diagnosis

- Movements
  - Benign sleep myoclonus
  - Dystonia/poor motor control or hyperreflexia
  - Tics
- Nonepileptic seizures ("Pseudoseizures")
- Sleep disorder (parasomnias)
  - Night terrors
  - Sleep walking
- Behavioral or Self-stimulation

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Evaluation of First Seizure

- History—Is it a seizure? What type? Cause?
- Exam—Remote or acute symptomatic cause?
- Bloodwork—infection, electrolytes
- Lumbar puncture ?
- Head CT vs brain MRI
  - Hsieh DT et al 2010 (prospective, 0-24 months)
    - 57% brain MRIs abnl (16% of all MRIs had dysgenesis, more in 1-6 mos)
    - 35% head CTs abnormal (9% of all CTs required acute mgmt)
  - Singh RK et al 2010 (prospective, status epilepticus)
    - Acute symptomatic=CNS infection; Remote symptomatic=dysgenesis
    - CT—acute vascular lesions and acute edema
    - MRI—subtle abnormalities, dysplasia, MTS (remote)
- EEG—postictal vs 2 weeks after

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First Unprovoked Seizure

- Predict recurrence risk
  - Idiopathic/cryptogenic: 30 to 50% by 2 years
    - EEG for prognosis and findings of epilepsy syndrome
      - if abnormal, ~50% recurrence risk
  - Remote symptomatic: >50%
    - If focal onset, abnormal exam, abnormal development, focal EEG abnormality → MRI
  - Not different if status epilepticus
  - Seizure remission no different if AED initiated after 1st or 2nd seizure

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"Treatment" after First Seizure

- Reassurance
- Safety
  - No unsupervised baths or swimming alone
  - Biking with helmet, and on sidewalk
  - Baby monitor
  - Discuss SUDEP
- Counseling
  - Appearance of seizures (e.g. complex partial)
  - First aid during seizure
- Rescue med if prolonged seizure

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Drugs which *may* lower seizure threshold

http://www.epilepsy.com/information/professionals/resource-library/tables/drugs-may-lower-seizure-threshold

- Antihistamines (diphenhydramine)
- Stimulants (more theoretical than in reality)
- Pseudoephedrine
- Bupropion
- Meperidine

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New-Onset Seizure: Take Home Points

- Goals of the approach to new-onset seizure
  - Rule out/address acute symptomatic cause (especially infants)
  - Determine likelihood of recurrence (i.e. epilepsy)
    - Features consistent with an epilepsy syndrome?
    - EEG findings
    - MRI abnormalities
  - Provide education
    - Safety precautions
    - Management of future seizures ("seizure first aid")
    - Seizure action plan for school
    - RE: the child's risk of epilepsy

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New-Onset Seizure: Take Home Points

- Initiate process as inpatient or outpatient?
  - parental anxiety
  - education can be provided in ED or PCP office ?
  - access to scheduling systems
  - ease of follow up (proximity, socioeconomic factors)

- Systems at Children's National
  - Update your info if not receiving notification of admissions
  - Phone call after discharge (Epilepsy NP)
  - Follow up visit with Neurology within 6 weeks of discharge
  - MRI high resolution with thin slices (nonurgent, sedation/anesthesia if needed)

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Helpful References

- www.epilepsy.com (Epilepsy Foundation of America)
- www.health.nih.gov
- www.talkaboutit.org

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Outpatient Contact Numbers

- Current access approx 3 days
  - 1-888-884-BEAR (2327)
  - May need to drive for soonest appointment (but parking easier than at hospital)
- ROC appointment lines
  - Children's National Health System: 202-476-3611
  - Montgomery County Regional Outpatient Center (Rockville): 301-765-5400
  - Laurel Regional Outpatient Center: 240-568-7000
  - Frederick Regional Outpatient Center: 301-682-6661
  - Annapolis Regional Outpatient Center: 410-266-6582
- Urgent headache/concussion appointments
  - 202-476-HEAD

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