Just the Facts – Epilepsy and Seizures

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Definitions

**Epilepsy** – a general term for a variety of neurological conditions characterized by recurrent unprovoked seizures

**Seizure** - a brief disturbance in the electrical activity of the brain that causes temporary changes in movement, awareness, feelings, behavior, or other bodily functions

Epilepsy = Seizure Disorder
Prevalence & Incidence

- about 1% of population has epilepsy
- nearly 4% will develop epilepsy at some point
- about 10% will have at least one seizure at some point
- increased prevalence among people with autism, TBI, CP, intellectual disability
- Incidence is highest among the very young and the very old
Causes

About 2/3 of cases have no known cause

Among the remaining 1/3, the following are possible causes:

- Traumatic brain injury
- Stroke
- Brain Tumor
- Alzheimer’s disease
- Prenatal or birth trauma
- Genetic factors
- Brain infections (e.g. encephalitis, meningitis)
- Developmental or congenital disabilities
- Poisoning (lead, drug or alcohol abuse)
Epilepsy Syndromes

Partial Epilepsies

Symptomatic or Cryptogenic
- Temporal lobe, frontal lobe, parietal lobe, & occipital lobe epilepsies
- others

Idiopathic
- Benign rolandic epilepsy (BCECTS), Childhood Epilepsy with Occipital Paroxysms (CEOP)
Epilepsy Syndromes (continued)

Generalized Epilepsies

Symptomatic, Cryptogenic, or Idiopathic
- Lennox-Gastaut syndrome, West syndrome
- others

Idiopathic
- Childhood absence epilepsy, juvenile absence epilepsy, juvenile myoclonic epilepsy
- others
Seizure Types

Generalized Seizures

► **Generalized Tonic-Clonic Seizure** – sudden fall, rigidity (tonic phase), muscle jerks (clonic phase); usually 1-2 minutes; postictal period

► **Absence Seizure** – most common in children; blank stare and unresponsiveness for 3-10 seconds; quick return to full alertness; may happen over 100 times a day

► **Atonic Seizure** – sudden loss of muscle tone causing a fall or head drop; if consciousness lost, it returns promptly; uncommon and usually seen in children
Seizure Types

Generalized Seizures (continued)

► **Tonic Seizure** – sudden or gradual stiffening causing fall if standing; <60 seconds; longer seizures have loss of consciousness and postictal confusion/fatigue; often occur during sleep

► **Myoclonic Seizure** – brief shock-like jerk of one or more muscle groups; may cause fall if severe

► **Clonic Seizure** – rhythmic jerking of a group of muscles (arms, neck, face); no postictal confusion/fatigue; rare and usually seen in children
Seizure Types

Partial Seizures

► Simple Partial Seizure – fully aware; 30 – 60 seconds

- **Motor** – jerking of part of body that may or may not spread
- **Sensory** – tingling/numbness; sensory hallucinations or distortions
- **Autonomic** – epigastric rising; goose bumps, heart rate increase
- **Psychic** – déjà vu, jamais vu, fear, happiness, depersonalization
Seizure Types

Partial Seizures (continued)

- **Complex Partial Seizure** – consciousness impaired; lasts 1-2 minutes
  - Unresponsiveness
  - Automatisms (lip smacking, picking at clothes, fumbling)
  - Wandering
  - Mumbling or nonsensical speech
  - Impaired memory after seizure
  - Postictal confusion, nausea, headache, fatigue
For Complex Partial Seizures

- Explain what’s happening to bystanders
- Speak to the person in a calm, reassuring manner
- Gently redirect or block from hazards
- Avoid grabbing or restraining (unless protecting from immediate harm)
- Help to reorient after seizure and stay with person until no longer confused
- Seek medical attention for seizure lasting 5 – 10 minutes or if seizure is followed by another without return to consciousness
Seizure First Aid

For Tonic-Clonic Seizures

► Check watch or clock
► Gently turn person on side to keep airway open
► Move any objects that may cause injury
► Protect head (with something soft or cradle with hands)
► Remove glasses & loosen any restrictive clothing
► Stay with person until fully recovered
Seizure First Aid

For Tonic-Clonic Seizures (continued)

► DO NOT restrain
► DO NOT put anything in the person’s mouth
► DO NOT give oral medications, food, or water until fully alert

Treat as a Medical Emergency if...

► Seizure lasts for 5 minutes or more
► Seizure is followed by another without person regaining consciousness
► Person is seriously injured as a result of seizure
► Seizure takes place in water
► Person has diabetes or is pregnant
► Normal breathing/complexion doesn’t return once seizure is over
Treatments

- Medication
- Surgery
- VNS
- Ketogenic Diet
### Treatments: Medication

<table>
<thead>
<tr>
<th>Broad Spectrum AEDs (for Partial &amp; Generalized)</th>
<th>AEDs Used Primarily for Partial Epilepsy</th>
<th>Specialized AEDs</th>
</tr>
</thead>
</table>
| **Older**
  valproic acid
| **Newer**
  lamotrigine
  leviteracetam
  topiramate
  zonisamide
  rufinamide
  felbamate
| **Older**
  carbamazepine
  phenytoin
| vigabatrin
  *(infantile spasms)*
| **Newer**
  oxcarbazepine
  lacosamide
  pregabalin
  gabapentin
  tiagabine
| ACTH
  *(infantile spasms)*
| ethosuximide
  *(absence only)*
| phenobarbital
  *(neonatal & febrile seizures)*
| benzodiazepines
Medication Side Effects

**Side effects common to all AEDs:** drowsiness, unsteadiness, dizziness, blurry vision, stomach upset, memory/thinking problems, headaches, reduced resistance to colds

**Weight Gain** – valproic acid, carbamazepine, pregabalin, gabapentin, clobazam

**Weight Loss** – topiramate, zonisamide, felbamate

**Cosmetic Problems** (e.g. gum overgrowth, hairiness, hair loss, skin problems) – phenytoin, valproic acid

**Bone Loss** – carbamazepine, phenytoin, valproic acid, phenobarbital, topiramate

**Low Blood Sodium** – oxcarbazepine, carbamazepine

**Depression or Irritability** – lacosamide, levetiracetam, phenobarbital, benzodiazepines

**Sleep Disturbance** – benzodiazepines, phenobarbital, carbamazepine, phenytoin, valproic acid, levetiracetam, lamotrigine
Medication Side Effects

Warning signs of potentially serious side effects:

- Prolonged fever
- Rash
- Very sore throat
- Mouth ulcers
- Easy bruising
- Pinpoint bleeding
- Weakness
- Extreme fatigue
- Swollen glands
- Lack of appetite
- Increased seizures

Warning signs of toxicity:

- Lethargy
- Dizziness
- Slurred speech
- Balance problems
- Coordination problems
- Shakiness
- Confusion
- Double vision
- Stomach upset

*Be vigilant for toxicity in older adults*
When To Consider Other Options

► An epileptologist should be seen, and other treatment options should be explored if...

...patient has tried 2 first-line medications (and one drug combination) and is still having seizures and/or significant side effects
Epilepsy Surgery

What makes a good surgical candidate?

- Failure of 2 or more medication trials
- Partial epilepsy
- A single well-defined seizure focus
- Temporal lobe focus (associated with the best outcomes)

There may still be surgical options if you don’t meet these criteria (but lower likelihood of seizure freedom)
Epilepsy Surgery

Surgery Types and Outcomes (curative)

► **Temporal Lobectomy:** (most common type) 60 - 90% are free of seizures that impair consciousness

► **Frontal Lobectomy:** 30 – 60% are free of seizures that impair consciousness

► **Hemispherectomy:** only considered if half of brain to be disconnected is already functioning poorly; 75% seizure-free or nearly seizure-free
Epilepsy Surgery

Surgery Types and Outcomes (palliative)

- **Corpus Callosotomy** – approach to reducing tonic, atonic, and tonic-clonic seizures; typically 60-90% reduction of these seizure types

- **Multiple Subpial Transection** – approach to reducing seizures when focus is located in area that controls important functions; not enough data to report reliably on outcomes
Epilepsy Surgery: Risks & Benefits

Potential Risks

► Complications during or shortly after surgery – brain swelling, bleeding/stroke (1%), allergic reactions, infection, hydrocephalus, death (very rare)

► Functional deficits – problems with memory, language, or movement; depression; visual field loss

Potential Benefits

► Fewer or less severe seizures

► Reduction or elimination of medication (and side effects)

► Improved mood or cognitive function
Vagus Nerve Stimulation

- Pacemaker-like device implanted under skin on chest wall
- Leads connect to vagus nerve in neck
- Device is programmed to periodically stimulate the brain via the vagus nerve
- Magnet can be used to activate or turn off the device
Vagus Nerve Stimulation

- For children and adults who are not surgical candidates and for whom medication is not working
- Can be useful for partial (including multifocal) and generalized epilepsies
- Palliative treatment – very unlikely to result in seizure freedom
- 30 – 50% are responders (reduction in seizures of 50% or more); response often improves over time
Vagus Nerve Stimulation

Risks

► **Side effects** – hoarseness of voice during stimulation, tingling in the throat, breathing problems during sleep or with exertion, cough, gastrointestinal complaints (*most are mild and/or temporary*)

► **Surgical complications** – pain at incision, infection, damage to vagus nerve, temporary vocal cord paralysis, device malfunction

Potential Benefits

► Reduction in seizures
► Added sense of control (with use of magnet)
► Reduction in medication (and side effects)
► Improved mood, cognitive function, and/or quality of life
Ketogenic Diet

- High-fat, low-carb, low-protein diet done under strict supervision of a physician and dietician
- All ingredients must be weighed and measured, and every morsel of food must be eaten
- Diet started in hospital (sometimes with 24 hours of fasting)
- Body burns fat instead of carbohydrates, producing ketones
- Common foods are butter, heavy cream, mayo, oils
- Must be very careful not to get extra carbohydrates (intentionally or accidentally)
- Seizure medications usually continued during diet (at lower doses)
Ketogenic Diet

- Over 50% respond (reduction in seizures of 50% or more); 10 – 15% become seizure-free

- Side effects – kidney stones, high cholesterol, weight gain, dehydration, constipation, slowed growth, bone fractures, nausea/vomiting, hypoglycemia, lethargy

- If seizure-free for 2 years, may be slowly weaned off diet

- Modified Atkins Diet and Low-Glycemic Index Diet are alternatives that may be more palatable (but less evidence of effectiveness)
Complementary & Experimental Treatments

► A number of experimental treatments are in clinical trials or animal studies
  
  ▪ If nothing else has worked or if patient has no insurance, consider clinical trials

► Complementary therapies offer some promise, but little information on effectiveness and safety
  
  ▪ Complementary therapy is a reasonable option if patient and neurologist agree that the therapy...
    
    ▶ is safe (i.e. won’t increase seizures or worsen health)
    ▶ could be effective based on evidence
    ▶ has a credible mechanism of action
    ▶ is not overly expensive
Risks Associated With Epilepsy

- Seizure-related Injuries
- Status Epilepticus (prolonged or consecutive seizures)
- Long-term Effects of Medications (bone loss, obesity, reproductive disorders, etc.)
- Suicide
- SUDEP (sudden unexplained death in epilepsy)
Impact on Daily Life

► Memory & Thinking Problems
► Depression & Anxiety
► Social Isolation
► Family Issues
► Transportation Difficulties
► Unemployment and Underemployment
► Difficulties at School
► Financial Difficulties
  ▪ lack of insurance
  ▪ SSI/SSDI
Epilepsy Foundation of Michigan

Programs & Services

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