

## SEIZURES AND HEAD INJURIES

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## OBJECTIVES


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- o **Name three of the most common seizures, using latest terminology**
- o **List four of the most common causes of seizures**
- o **Discuss first aid measures for seizures**
- o **Describe the psychosocial impact of seizure disorders**

## Comprehensive Epilepsy Programs

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- o **RESEARCH**
- o **EDUCATION**
- o **SERVICES**



**Epilepsy Information Service**

**1-800-642-0500 (toll-free)**

## Calls From Outside the U.S.

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EPILEPSY INFORMATION SERVICE

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The medical information I have given you is as accurate and up to date as we can give. However, you should keep in mind that I am not a medical doctor. If you have requested this information because of your own medical condition or if it concerns anyone, what I have said should be discussed with a physician. Only a physician, for complete medical history of a person, can determine what is appropriate in that situation.

CATEGORIES: \_\_\_\_\_

TOPICS: \_\_\_\_\_

SEND:  YES  NO  BOTH

PREPARED: \_\_\_\_\_ FEDERAL: \_\_\_\_\_

RESPONSE: \_\_\_\_\_

"If I wished to show a student the difficulties of getting a truth from medical experience, I would give him the history of epilepsy to read"

Oliver Wendell Holmes

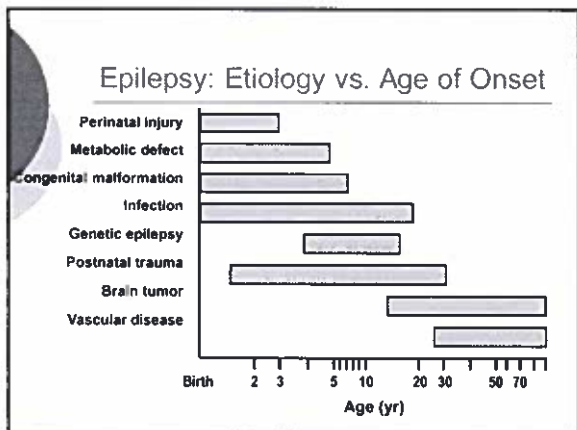
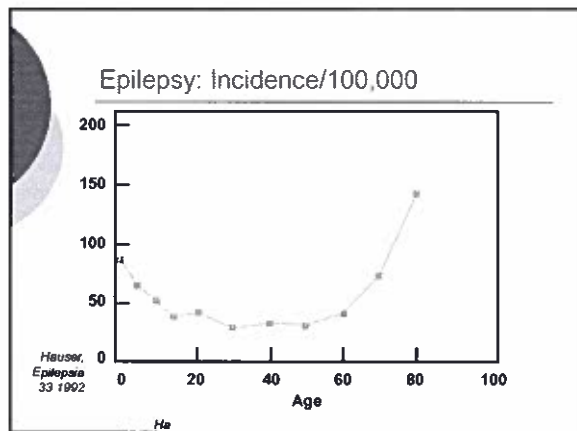
A SEIZURE

An epileptic seizure is a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain.

EPILEPSY

A person is considered to have epilepsy if they meet any of the following conditions:

- At least two unprovoked (or reflex) seizures occurring greater than 24 hours apart.
- One unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk (at least 60%) after two unprovoked seizures, occurring over the next 10 years.



BASIC STATISTICS

- 1 in 10 of us will have a single seizure
- 1 in 26 people have epilepsy
- Any one of us, at any age, for any number of reasons can develop epilepsy
- Older adults account for approximately 25% of new cases each year
- The incidence of seizures increases dramatically after age 60, by age 80 1 in 4 will have seizures
- In approximately 60-70% of cases of seizures the cause is unknown
- Approximately 50-60% respond to the first medicine, 15% to the second, with about 25-30% with intractable seizures
- Head injuries is one of the leading causes of seizures in adults

### Seizures and Head Injuries

- 1 in 10 people with TBI will develop seizures, usually in the first 2 years
- Only 9 percent will have a seizure while in the hospital
- Seizures can develop immediately, or months to years later
- Penetrating head injuries, such as gunshot has the highest likelihood of residual seizures

Ritter, A, Wagner, A, et al. 2016  
Englander, J, et. Al, 2014

### Seizures and Head Injuries

- Those with pre-existing conditions are at highest risk such as:
  - Cognitive issues
  - Emotional disorders
  - Memory problems
  - Attention deficits problems

### Seizures and Head Injuries

- For those who have a seizure more than a week following the injury, 80 percent will go on to have seizures
- Half of those who develop seizures will have ongoing seizures for life
- Most will be controlled with medication or other treatments

### Conditions that mimic seizures

- Hyperventilation— anxiety, over breathing, perioral cyanosis, hand paresthesias, environmental trigger may be evident
- Migraine—Slow progression of neurological symptoms, basal migraine can have bizarre symptoms, blindness, stupor, confusion, headache may not be present
- Panic attack—abrupt onset with feeling of dread or fear, impending doom. Often autonomic symptoms, tachycardia, over breathing, sweating, nausea, etc. Usually lasts longer than an epileptic seizure (5-30 min), no loss of consciousness
- Psychogenic— often psychiatric history, eyes usually closed, fluttering eyelids,, motionless or out of phase thrashing of limbs, pelvic thrusting, urinary incontinence not common

### Conditions that mimic seizures

- Syncope— prodrome of wooziness, few muscle jerks, precipitating condition. usually identified
- Transient Global Amnesia --isolated amnesic syndrome, pro-longed duration,(hours), no alteration of consciousness, weakness or aphasia, memory gap during episode
- Transient Ischemic Attack—sudden onset without progression, variable symptoms related to location, weakness, loss of senses, aphasia predominant

### Common Precipitating Factors

- Missed medication
- Sleep Deprivation
- Hormonal changes
- Alcohol, recreational drugs, vaping, energy drinks
- Other drugs, drug interactions
- Stress
- Excessive Caffeine
- Nutrition deficiencies, low calcium, low magnesium, low blood sugar
- Specific stimuli

## SEIZURE BEHAVIORS OR CHARACTERISTICS

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Behaviors in a seizure are:

- Episodic
- Often sudden and unexpected
- Stereotypic
- Variable intensity

## International Classification of Seizures

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- I. Partial Seizures (seizures beginning locally) now referred to as "focal" seizures
- II. Generalized Seizures (bilaterally symmetrical and without local onset)
- III. Unclassified Epileptic Seizures
- IV. Status Epilepticus

## Types of Generalized Seizures

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- Absence (typical)
- Tonic-clonic
- Clonic-tonic-clonic
- Clonic
- Tonic
- Myoclonic
- Atonic

## Absence Seizures

("Petit Mal")

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- Childhood/adolescence onset
- Sudden onset, without aura
- Momentary loss of consciousness/staring spell
- Duration, 10-20 sec.
- Nonconvulsive
- Ictal EEG, 3 cps S&W (typical)
- Abrupt recovery postictally
- Amnesia for ictal event

## Tonic-Clonic Seizures\*

("Grand Mal"/"Convulsive")

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- Loss of consciousness
  - Ictus
    - Fall
    - Muscular rigidity (tonic)
    - Respiration inhibited (cyanosis)
    - Rhythmic jerking (clonic)
    - 1-5 min duration
    - Tongue biting/injury common
    - Bladder/bowel incontinence
  - Postictal Confusion
- \*Primary or secondarily generalized seizures

## Myoclonic Seizures

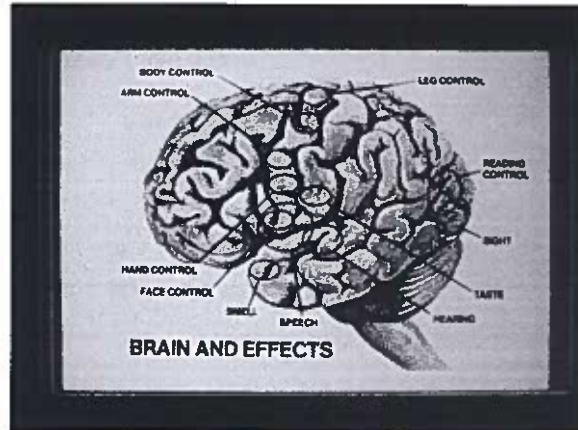
("Minor Motor")

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- Brief, shocklike muscle contractions
  - Head
  - Upper extremities
- Bilaterally symmetrical
- Consciousness preserved
- Precipitated by awakening or falling asleep
- May progress into clonic or clonic-tonic seizures

### Atonic Seizure

- Impaired consciousness
- Loss of muscle tone
- Head drop
- Fall
- Brief duration
- Injury common



### Simple Partial Seizures

(\*Focal Motor / Focal Sensory)

- Consciousness intact
- Signs/symptoms variable
  - Motor
  - Somatosensory
  - Autonomic
  - Psychic
- Focal EEG abnormality

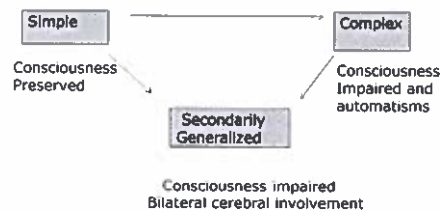
### Complex Partial Seizure Features

(\*Temporal Lobe Sz / Psychomotor Sz / focal with impaired consciousness)

- Impaired consciousness
- Ictus duration, 1 min.
- Blank stare
- Simple Automatisms
- Reactive Automatisms
- Amnesia for ictal event
- Focal EEG abnormality

### FOCAL SEIZURE

Focal Sx



### Non-epileptic Seizures

30-50% of patients admitted to Epilepsy Monitoring Units have non-epileptic seizures

**Make No Assumptions!**

### RISKS WITH SEIZURES

- Seizures can result in injury or adverse events
- Seizure emergencies, though rare, can be life threatening
- Seizures and seizure emergencies are unpredictable and episodic—a rapid response to appropriate treatment is crucial

The form includes sections for:
 

- 1. Patient Information:** Name, Date of Birth, Gender, Race, Ethnicity, Religion, Address, Phone, Email.
- 2. Seizure History:** Date of onset, Frequency, Duration, Description, Triggers, Last seizure date, Last seizure location, Last seizure duration, Last seizure description.
- 3. Seizure Action Plan:** Instructions for what to do during a seizure, including staying calm, protecting the person, and when to call for help.
- 4. Emergency Instructions:** Instructions for what to do if a seizure occurs while the person is in school or at work.
- 5. Signature and Date:** Space for the patient or caregiver to sign and date the form.

### FIRST AID

- Do not give anything by mouth until back to normal
- Most seizures are not emergencies
- Basic first aid depends on whether:
  - Change in awareness or consciousness
  - Altered awareness
  - Loss of consciousness

### TONIC CLONIC SEIZURES

- Protect from harm, cushion and protect head, remove harmful objects
- Ensure airway is unobstructed
- Turn person on side, head in neutral position
- Observe, time events, do not put anything in mouth, do not restrain
- Remain with person until fully conscious, follow Seizure Action plan

### First aid

- VNS MAGNET –MAY BE USED AT ANY TIME DURING A SEIZURE
- RESCUE MEDICATION MAY BE PRESCRIBED AFTER A SPECIFIC NUMBER OF SEIZURES, LENGTH, OR CHANGE IN PATTERN
- ALWAYS REFER TO THE PERSON’S SEIZURE ACTION PLAN FOR WHAT TO USE AND WHEN TO INTERVENE

### SIMPLE PARTIAL SEIZURE/focal seizure without loss of consciousness

- STAY CALM
- TIME SEIZURE
- REASSURE STUDENT THAT HE/SHE SAFE
- EXPLAIN TO OTHERS IF NECESSARY
- PROTECT STUDENT’S PRIVACY

#### ALTERED AWARENESS: Complex Partial Seizure/Focal with impaired consciousness

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- Speak softly and calmly
- Guide away from harmful objects
- Allow for wandering
- If event lasts beyond routine or another seizure begins follow emergency protocol
- Do not restrain or grab
- Do not shout or expect verbal instructions to be obeyed

#### Tonic Clonic Seizure in Wheelchair

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- Do not remove from wheelchair unless absolutely necessary
- Secure wheelchair to prevent movement
- Fasten seatbelt loosely to prevent fall
- Protect and support head
- Ensure breathing is unobstructed. Allow secretions to flow, pad wheelchair to prevent injury
- Follow relevant first aid protocol

#### TONIC CLONIC SEIZURE IN WATER

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- Place person on back and support head so head, mouth and nose are always above the water
- Remove from the water as soon as possible
- If person not breathing, begin rescue breathing
- Always transport the person to the ER, even if fully recovered

#### SEIZURES AND HEAD INJURIES

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- Listen for breathing at the mouth. Extend the person's neck if breathing is difficult. If the person isn't breathing, start CPR. Seal your lips over the person's mouth and breathe two quick breaths. Continue breathing every 5 seconds unless the person starts breathing on his or her own. Call 911.
- If this is the first seizure after a TBI, call the person's doctor for advice.
- If the seizure doesn't stop after 3 minutes, call 911.
- Start CPR if there is no pulse. Call 911.

#### Death in Epilepsy

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- People may die during a seizure or due to complications from a seizure or status epilepticus
- The most common form of death related to seizures is SUDEP, sudden unexplained death in epilepsy (sudden death in absence of obvious cause)

#### TIPS FOR EPILEPSY

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Keep you or your child's medical summary with you, very helpful for emergency room visits, or when traveling. Keep extra copies for handing out. Saves time, prevents mistakes.

Keep a notebook with all seizure related information, names, tele. etc.



### TIPS FOR PARENTS OF CHILDREN WITH EPILEPSY

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- TEACH SELF MANAGEMENT SKILLS EARLY

### TIPS FOR PARENTS

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- In as much as possible, encourage normal activities
- Decisions have to balance the need to encourage the child's self development that will realize his eventual full potential
- Restrictions, when necessary, should be tempered by common sense.
- Medical personnel should be facilitators and help families to be creative in individualizing limitations to needs.

### FOR ADULTS

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- WebEase --a web-based self-management program for adults with epilepsy.
- With WebEase, people with epilepsy set goals and create a plan to improve or maintain their skills. WebEase helps you with taking your medications as prescribed, managing your stress, and getting a good night's sleep.

### TREATMENT

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### Types of Surgery

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- Temporal lobectomy
- Extra temporal resections
- Corpus callosotomy
- Stereotaxic procedures
- Hemispherectomy
- Responsive neurostimulation (Neuropace)

### DIETARY TREATMENT

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- KETOGENIC
- LOW GLYCEMIC
- MODIFIED ADKINS



MEDICATION

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## Primary treatment for people with epilepsy

### Seizure Control

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- 60% achieve remission in first years
- 15% achieve partial control
- 25% intractable seizures

Begley, Annegers  
(1998)

### History of Anticonvulsant Drugs

Year Marketed in the USA	Generic Name	Trade Name
1953	Phensuximide	Milontin
1954	Primidone	Mysoline
1957	Methsuximide	Celontin
1957	Ethotoin	Peganone
1960	Ethosuximide	Zarontin
1968	Diazepam	Valium
1974	Carbamazepine	Tegretol
1975	Clonazepam	Klonopin

### History of Anticonvulsant Drugs

Year Marketed in USA	Generic Name	Trade Name
1978	Sodium Valporate	Depakene
1993	Felbatol	Felbamate
1994	Gabapentin	Neurontin
1994	Lamotrigine	Lamictal
1995	Topiramate	Topamax
1996	Carbamazepine	Tegretol XR

1997	tiagabine	Gabatril
1999	levetiracetam	Keppra
2000	oxcarbazepine	Trileptal
2000	Zonisamide	Zonegran
2008	lacosamide	Vimpat
2010	Clobazam	Onfi
2011	exogabine	Potiga discontinued

2012	perampanel	Fycopma
2013	Eslicarbazepine Oxycarbamazine	Aptiom Quidexy, Oxtellar xr
2015	Levetiracetam Lamotrigine	Roweepra Subvenite
2016	brivaracetam	Briviact
2017	cannabidiol	Epidiolex
2018	Stiripentol Clobazam	Diacomit Sympazam
2019	Cenobamate	Xcopri
2020	fenfluramine	Finetepla (Dravet syndrome)

### New Formulations and Drug Delivery Systems

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Carbatrol  
Tegretol XR  
Cerebyx (fosphenytoin)  
Depacon (IV Valproate)  
IV levetiracetam  
Diastat (Valium rectal gel)  
IV carbamazepine

### New Rescue Drugs

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2019 Nayzilam (midazolam) nasal spray for 12 yrs and older  
2020 Valtoco (diazepam) nasal spray for 6 yrs and older

Previously only option was rectal Diastat

### Goals of Treatment

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1. No Seizures
2. No drug-related side effects
3. No idiosyncratic reactions
4. Monotherapy
5. Rehabilitation and social adjustment

### PSYCHOSOCIAL ISSUES IN EPILEPSY

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### IMPACT OF EPILEPSY

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**"The Impact of having epilepsy or having a child with epilepsy can be significant medically, socially, psychologically, and financially. It upsets the equilibrium of the family system, affecting everyone in some way."**

Appolone C, Gibson P, Dreifuss F (1983)

Epilepsy  
Information  
Service



1-800-642-0500 (toll-free)

### HOW FOUND OUT

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- **PHYSICIAN REFERRAL**
- **PATIENT REFERRAL**
- **INTERNET**
- **OTHER PROFESSIONALS**

### STATISTICS

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- **4 TO 1...WOMEN TO MEN RATIO**
- **TYPICAL CALLER IS 24-35 YR OLD WHITE FEMALE**
- **RETURN RATE OF QUESTIONNAIRE**
- **RANGE 39%-59%, AVG. 48%**

### STAGES OF ADJUSTMENT

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SHOCK/DISBELIEF  
DENIAL  
BARGAINING  
FEAR  
ANGER

### STAGES OF ADJUSTMENT (CONT.)

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- **GUILT**
- **DEPRESSION/MOURNING**
- **IDENTITY READJUSTMENT**
- **ACCEPTANCE**

Elisabeth Kubler-Ross  
On Death and Dying (1969)

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CHRONIC SORROW  
POST TRAUMATIC STRESS  
SYNDROME

### SOCIAL ISSUES

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**The "predicament"  
of epilepsy**

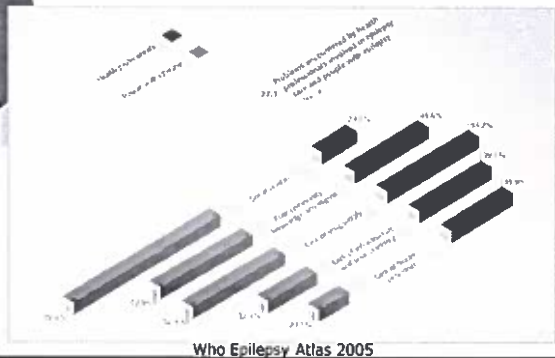
**"How any given predicament is being experienced depends on the personal history of the person. This personal history that is different from the history of the disorder becomes a crucial aspect of diagnosis."**

Taylor, DC. The Components of Sickness: disease, illness and predicaments. Lancet 1979;ii:1008-1010

### KEY SOCIAL ISSUES

- QUALITY OF LIFE
- ECONOMIC
- EDUCATION
- DRIVING
- EMPLOYMENT
- LEGAL
- DATING/MARRIAGE
- DEPENDENCY/INDEPENDENT LIVING
- FEAR INJURY/ DEATH
- Stigma

What are the 5 major problems encountered by health professionals in epilepsy in the country?



### FACTORS AFFECTING QUALITY OF LIFE

- **Presence and extent of abnormality in brain and its location, other handicapping conditions**
- **Type, frequency, intensity, and length of the seizures**
- **AED side-effects -- appearance, functions/emotions/behavior**
- **age of onset**

### FACTORS AFFECTING QUALITY OF LIFE

- **Stability of the family/parenting styles**
- **Perception of the disorder**
- **Community environment**

"Many of the psychosocial problems of epilepsy may result not from the epilepsy itself, but from the underlying cerebral pathology associated with the epilepsy."

Britten, et al, 1984

Beran and Flannagan, 1987

### UNPREDICTABILITY

"My life between seizures is like walking on a series of trapdoors, anyone of which may open any moment and throw you to the ground"

Susan Usiskind

### COSTS OF EPILEPSY

- Total health plan paid cost per member per year (PMPY) was \$11,232 for the epilepsy group and \$3,026 for the controls ( $p < 0.001$ ).

Willner, et al. Epilepsy & Behavior, Volume 25, Issue 3, November 2012, 412-416

### Key Cause of Poverty

- In 2007, medical problems contributed to 62.1 percent of all bankruptcies. (Neurological costs highest) Three-quarters of the people with a medically-related bankruptcy had health insurance

Himmelstein D, et al, online publication, June 2009, American Medical Journal

### ECONOMIC COSTS

#### Epilepsy Medication Fund

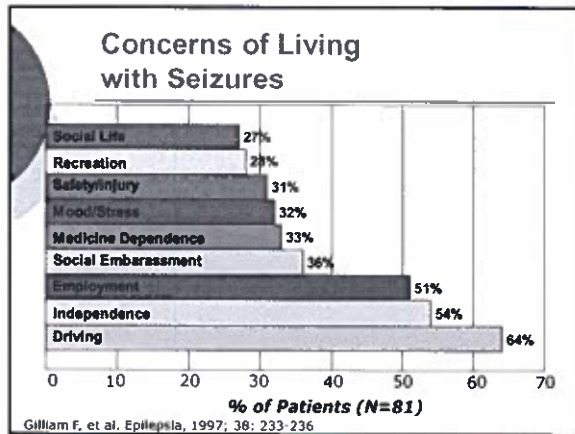
Last year medicine costs ranged from \$68--\$3,100 a person a month  
Many now unable to afford their co-pays.

### DRIVING

**INTRACTABLE SEIZURES PROHIBIT DRIVING.** The inability to drive can have serious implications for the patient's quality of life.

### Driving Restrictions





### EMPLOYMENT

UNCONTROLLED SEIZURES CAN HAVE A DEVASTATING EFFECT ON EMPLOYMENT. A COMMUNITY BASED STUDY OF EDUCATED ADULTS WITH EPILEPSY FOUND THAT 25% WERE UNEMPLOYED AND CLAIMED THIS TO BE DIRECT RESULT OF THEIR EPILEPSY EMPLOYMENT.

Fisher R, Vickrey B, Gibson P, et al. 2000

### EDUCATION

CHILDREN WITH INTRACTABLE EPILEPSY ARE AT SPECIAL RISK OF LEARNING DIFFICULTIES

NATIONWIDE SURVEY FOUND 54% OF RESPONDENTS STILL IN SCHOOL REPORTED EPILEPSY HAD NEGATIVE EFFECT ON ACADEMIC PERFORMANCE

Fisher RS, Vickrey BG, Gibson PA, Hermann B, Penovich P. *Epilepsy Research*, 41(1), August 2000; 53-61

### School Issues

60% Children with epilepsy have normal IQ

- Increased rates of learning and behavior problems
- Underachieve in school
- Higher rates of school drop out

prior to epilepsy onset

- **Cognitive/Academic Problems**  
26% received had academic problems at school prior to seizure onset (compared to 4% of controls)
- **Psychiatric Complications**  
45% experienced an Axis I disorder prior to first recognized seizure  
35.1% sought mental health assistance prior to seizure onset (counselor, psychiatrist, psychologist)

Hermann et al, 2008

### EARLY INTERVENTION IS CRUCIAL

Early referral to an early intervention program, developmental disability programs, and other such community resources should be a priority

Significantly impaired children should be referred for SSI, children with Dravet Syndrome, Angelman's, and Batten's are on the "Compassionate allowance" list. Social Security is interested in providing benefits quickly to applicants whose medical conditions are so serious that their conditions obviously meet disability standards.

Almost every child with epilepsy should have an IEP. IEP assistance is available through organizations such as E.C.A.C. (Exceptional Children's Assistance Center), in N.C., or [www.ed.gov/parents/needs/speced/iepguide/](http://www.ed.gov/parents/needs/speced/iepguide/)

Refer to epilepsy camps

Refer teens at age 15 to the Division of Vocational Rehabilitation (may assist with college tuition) UCB offers 40 college scholarships of \$5,000

**Top concerns of patients or parents**

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**FEAR OF INJURY OR DEATH**

**INJURY AS A RESULT OF EPILEPSY**

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- Patients with > 1 seizure in prior 12 months (N=344).
  - Type and Nature of Injury No. of Patients
    - Head Injury (N=297)\* 70
      - Stitches 15
      - Hospital Observation 23
      - Fracture/Hematoma 3
    - Burn/Scald (N=302) 48
      - Simple Dressing 42
      - Skin Graft 1

\* Number of patients responding  
Buck D, et al. *Epilepsia*, 1997; 439-44

**Injury as a Result of Epilepsy**

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- Type and Nature of Injury No. of Patients
  - Dental Injury (N=290) 28
    - Loss of Teeth 22
    - Major Dental Surgery 6
  - Other Fracture (N=278) 16
  - Seizure while bathing/swimming (N=313) 44
    - At Home 38
- 65% Reported No Injuries

**SAFETY ADMONITIONS**

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- Driving
- Bathing, swimming
- Avoidance of burns
- Alcohol, street drugs
- Exercise, sports
- Heights
- Other medications
- Those patients with frequent or severe seizures are prone to injury. Amount of restriction of activities should be tailored to the seizure type and frequency.

**VIOLENCE TO THOSE WITH EPILEPSY AND DEVELOPMENTAL DISABILITIES**

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People with developmental disabilities, including epilepsy, experience a heightened risk of becoming victims of violence and abuse, one study found that "90% of women with developmental disabilities are sexually assaulted in their lifetime - not in South Africa or another country where sexual assaults are among the highest in the world, but in the United States in 1991."

Sobsey D, Doe I, Patterns of Sexual Abuse and Assault. *Sex Disab* 9 (3)243-259 (1991)

**Other common issues in epilepsy**

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- High rate of depression
- High rate of anxiety
- Memory issues
- Cognitive issues



## STIGMA

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Stigma associated with epilepsy is still a high concern for people with epilepsy. In one study of people not selected for intractability, 24% reported that they experienced anxiety about these stigma issues.

## RESOURCES

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PUBLIC HEALTH  
DIVISION OF VOC. REHABILITATION  
DEVELOPMENTAL DISABILITY PROGRAMS  
DEPT. OF MENTAL HEALTH  
COMPREHENSIVE EPILEPSY PROGRAMS  
EPILEPSY ALLIANCE AMERICA  
EPILEPSY FOUNDATION OF AMERICA  
EPILEPSY INFORMATION SERVICE 800-642-0500  
PATIENT NETWORKING  
ONE OF THE BIGGEST RESOURCES OF ALL IS THAT  
**WITHIN THE PERSON**, THEREIN LIES  
INCREDIBLE POTENTIAL THAT IS OFTEN  
UNTAPPED

## ILLNESSES

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I THINK ILLNESSES ARE KEYS THAT MAY UNLOCK CERTAIN DOORS, I THINK THERE ARE SOME DOORS THAT CAN BE UNLOCKED BY ILLNESSES ONLY. IN ANY WAY THERE IS A STATE OF HEALTHINESS THAT HINDERS US UNDERSTANDING. PERHAPS THE ILLNESS MAY SHOW US SOME TRUTHS WHICH HEALTHINESS HIDES AWAY, SO THAT IT MAKES NO DIFFERENCE ANYMORE.

AMONG THOSE WHO ARE ENJOYING A COMPLETE AND UNDESTROYABLE HEALTHINESS, I, UNTIL NOW, HAVE MET NONE WHO IS NOT SOME KIND OF POOR...LIKE THOSE WHO'VE NEVER TRAVELLED."  
TRANSLATED FROM A NOTE GIVEN TO  
A DOCTOR IN GERMANY