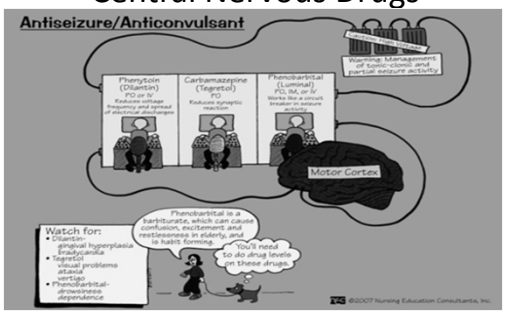
# Central Nervous Drugs

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# Required Reading

- Kee (8th ed.): Chapter 22 pp. 304-313
- Kee (8th ed.): Chapter 23, pp. 314-325
- Lecture notes

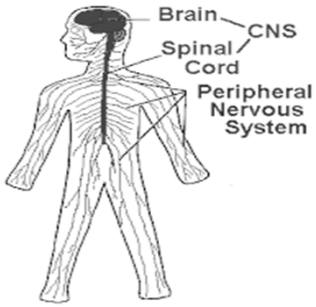
"It's called 'reading'. It's how people install new software into their brains."

NYCEducator

# Objectives

Analyze the implementation of the nursing process in the promotion and maintenance of system stability for individuals receiving central nervous system drugs

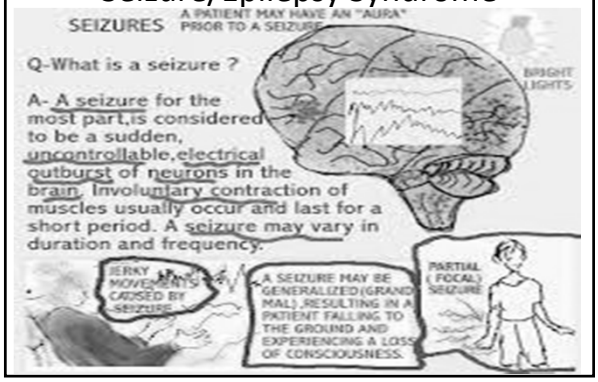
## Quick Review




## Indications Central Nervous System Drugs (CNS)

- Seizure disorders
- Alzheimer's Disease
- Parkinson's
- Neuromuscular disorders

## Seizure/Epilepsy Syndrome



## Causes of Seizures

- Stroke
- Failure to take medication
- ETOH w/drawl
- Cardiovascular disease
- High fever
- Tumors
- 3-D movie

## Types of Seizures

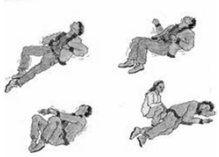
- Partial
- Generalized
- Status epilepticus

## Partial Seizure

- Petite Mal or Absence seizure
- Person “goes away” for a short time
- May or may not experience missing time
- Little or no tonic-clonic movements
- https://www.youtube.com/watch?v=BcdxpjvsXNY

## Generalized Seizure

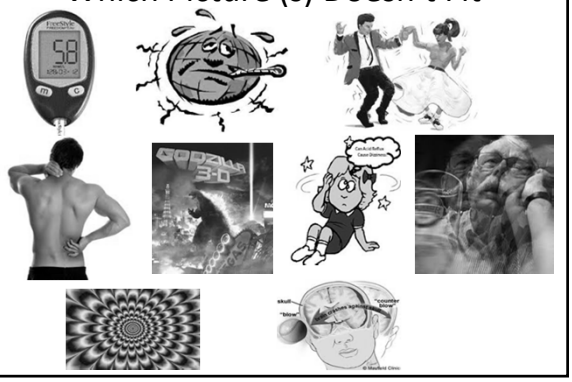
- Tonic-clonic movements
- Most dangerous type of seizure
- https://www.youtube.com/watch?v=FBEj9H42fa4



## Status Epilepticus (SE)

- Medical Emergency
- One seizure after another w/o interruption
- Most common cause is stopping meds and ETOH withdrawal*
- https://www.youtube.com/watch?v=xPoAQaVy-7s

## Which Picture (s) Doesn't Fit



## Medical Management Seizure Disorder

- First rule of thumb is to protect the person from injury during a seizure
- Next is to treat the underlying cause
- Persons with a seizure disorder or epilepsy syndrome should be advised to avoid situations that could be dangerous or life-threatening should a seizure occur
- Always start w/the lowest dose possible

## Medical Management Seizure Disorder

- Treatment of the underlying cause may reduce the frequency or eliminate the occurrence of seizures
- Once the underlying cause is treated, the aim of treatment is to bring the seizure under control w/the least amount of disruption in life-style &minimum side effects from medication

## Medical Management Seizure Disorder

- Correct dosage selection & consistent patient compliance w/the prescribed medical regimen is extremely important to maintaining serum drug concentration w/in therapeutic range

## Pharmacological Management of Seizure Disorder

## Anticonvulsants (AEDs)

- **Hydantoins**
- Benzodiazepines
- Imiostilbene
- Succinimides
- Barbiturates

## Anticonvulsants/Antiepileptics/AEDs

- Suppress the rapid & excessive firing of neurons that start a seizure
- Prevent the spread of the seizure w/in the brain & offer protection against brain damage

## Selection of Seizure Medication

- Type of seizure (s)
- Age of patient
- Previous medical history
- Cultural variations
- Patient tolerance for side effects
- Diagnostic studies
- Pathological processes causing the seizure
- The therapeutic goal to be achieved

## Mechanism of Action AEDs

- Block the movement of sodium ions into nerve cells
- Suppress calcium influx
- Increase action of GABA

## Hydantoins

- **Most** commonly used drug for controlling seizures
- Act primarily on the motor cortex
- Inhibit the spread of seizure activity by either ↑ing or ↓ing the sodium ions across the motor cortex during generation of nerve impulses

## Hydantoins

- Least toxic effects
- Minor effect on general sedation
- Teratogenic effect on the fetus
- Nonaddicting

## Hydantoins

- Fosphenytoin (Cerebyx)
- Phenytoin (Dilantin)

## Hydantoins
## Fosphenytoin (Cerebyx)

- Only comes in IV form only
- Converts to phenytoin
- Management of:
  grandmal seizures
  complex seizure
  status epilepticus

Hydantoin
**Phenytoin (Dilantin)**

- **Phenytoin (Dilantin)**
- Narrow therapeutic range 10-20 mcg/mL
- Toxic range 30-50 mcg/mL
- Used in the management of all seizures with the exception of **absence seizures, hypo or hyperglycemic seizure disorders or any seizure caused by a metabolic disorder**

Hydantoin
**Phenytoin (Dilantin)**

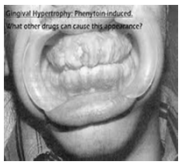
- Given IV for status epilepticus
- IV loading dose of 10 to 15mg/kg
- Given slowly no more than 50 mg/min
- Elderly rate is 20 mg/min
- Oral dose is 100 mg every 6-8 hours

Dilantin
Dial at Ten

**G**ingival hyplerplasia
**U**se alternate birth control
**M**outh care
**S**oft tooth brush, don't stop abruptly

Narrow therapeutic range of **10-20mcg/mL***

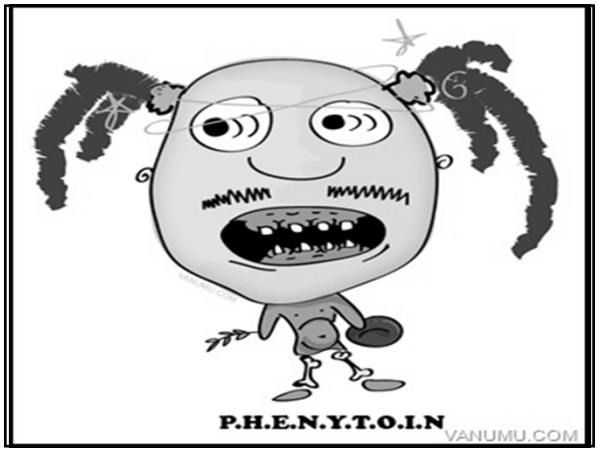
## Gingival Hyperplasia



## Hydantoins

- **Highly protein bound**
- What's the significance of this?
- Herbal alert

  Ginkgo may decrease phenytoin effectiveness



## Drug Interactions Hydantoins

- Antacids
- Calcium preparations
- Sucralfate (Carafate)
- Antineoplastic drugs

Decrease absorption

- **Antipsychotics**

Lower seizure threshold******

## Test Your Knowledge Dilantin Toxic Levels

_____to_____mcg/mL=

_____to _____mcg/mL=

_____mcg/mL=

## Test Your Knowledge

The nurse evaluates patient teaching related to causes of seizure activity. Further teaching is needed if the client makes which of the following statements?

A. “Seizures are caused by inflammation of the brain.”

B. “Seizures can by caused by low blood sugar.”

C. “ My relative had seizures because of a large tumor growing in his muscle.”

d. “Seizures may occur after a head injury.”

## Benzodiazepines (BDZs)

- Very potent anticonvulsants w/life saving properties in the management of SE
- They act on the limbic, thalmic &hypothalmic regions of the CNS
- Decreases vasopressor response and increases arousal threshold
- Used as sedatives, muscle relaxants, etoh w/d, to treat anxiety disorders

## Benzodiazepines "PAMs"

- Clonezapm/Klonopin
- Diazepam/Valium
- Lorazepam/Ativan

## Clonezapm/Klonopin

Therapeutic range 20-80 /mL

## Diazepam/Valium Management Status Epilepticus (SE)

- Not mixed or diluted with other solutions or drugs
- Interacts w/plastic containers & administration sets
- 10 mg IVP over 30 t0 60 seconds
- Repeated 10-15 min intervals up to a max of 30 mg

## Lorazepam/Ativan Management of SE

- Drug of choice for SE
- Ativan remains active for up to 12 hours
- When given IV diluted 1:1 w/NS or D5W

## Lorazepam/Ativan Management of SE(cont.)

- For SE 4mg IVP is the recommended rate
- Repeated q 5 to 15 min
- Max dose/day is 480mg
- Monitor for metabolic acidosis

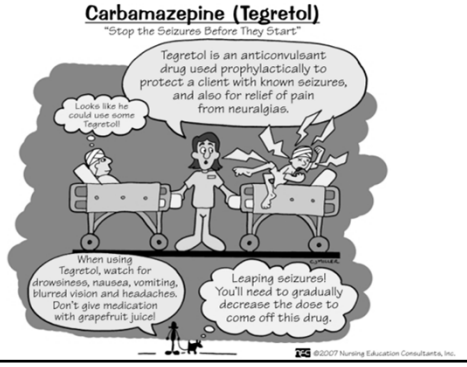
## Test Your Knowledge

The antidote for a benzodiazepine overdose is_____

## Imiostilbene

- Used to treat refractory seizure disorders
- Inhibit influx of sodium ions into the motor cortex
- Carbamazepine/Tegretol
- Oxycarbazepine/Trileptal
- The drug of choice is **Carbamazepine/Tegretol**
- Therapeutic range Tegretol is 5-12 mcg/mL

## Carbamazepine (Tegretol)



## Succinimides "Ximide's"

- Suppress seizure activity by delaying calcium influx into neurons
- Used in the management of **absence seizures**
- **Ethrosuximide (Zarontin)* is the drug of choice for absence seizure**
- Therapeutic range 40-100mcg/mL

## Valporic Acid/Depakote

**D** on't chew, give with carbonated drinks, aspirin
**E** levate levels of GABA in the brain
**P** rolonged bleeding if given w/antiplatelet agent
**A** void CNS depressants
**C** auses deficiencies in folic acid, Vit E&D
**O** observe & monitor hepatic function
**Y** es must monitor mental & respiratory status
**O** bserve for psychomotor agitation
**T** herapeutic range 50-100mcg/mL
**E** ducation and evaluation

## Barbiturates

- Reduce seizure activity by intensifying GABA
- Treat all seizures except **absence*****
- Long-acting
- Phenobarbital (Luminal)

## Phenobarbital/Luminal

- 1st line of defense for partial and generalized seizures
- 1st line of defense for the treatment of neonatal seizures
- 2nd line of defense acute episodes of status epilepticus
- Therapeutic range 10-40 mcg/mL
- **Given IV every 6 hours****
- **https://www.picmonic.com/learn/phenobarbital-barbiturates_2035**

## Adjunct Anticonvulsants

- **Gabapentin (Neurontin)**
- **Levetiracetam (Keppra)**
- Topiramae (Topamax)
- Lamotrigine (Lamictal)
- Zonisamide (Zonegran)
- Vigabatrin (Sabril)
- **Pregabalin (Lyrica)**

## Test Your Knowledge

A Dilantin overdose is treated with_____ and _____

## Test Your Knowledge

- When should serum dosage levels be drawn?
- Can patients be successfully managed above or below a drugs therapeutic range?

## Test Your Knowledge

10 to 20 mcg/mL_____

5-12 mcg/mL_____

50-100 mcg/mL_____

10-40-mcg/mL_____

2-20 mcg/mL_____

40 to 100mcg/mL_____

## Test Your Knowledge
## Who Am I?

Don't take aspirin products with this medication

Deficiencies Vit E, D and folic acid

## Seizure/Epilepsy Syndrome Patient Teaching

## QSEN In Action

- Knowledge
- Skill
- Attitude

What do you need to know to safely care for a patient?

## QSEN in Action

- Are your safe nursing practices going to be the same for all AEDs?

## Parkinson's

## Parkinson's Disease (PD)

- There is a depletion of dopamine
- There is an increase in Ach
- **There is no cure**
- Therapy is based on easing s/s of the disease &to assisting in maintaining the pt's mobility as long as possible

## Drugs Used to Treat Parkinson's

- **Dopaminergics******
- Dopamine agonist
- COMT inhibitors
- MAO-B inhibitors

## Dopaminergics

- Act on the sympathetic nervous system
- Affect the dopamine content of the brain
- Carbidopa-levodopa
- Sinemet 10/100
- Sinemet 25/100
- Sinemet 25/250
- Sinemet 50/200

## Dopaminergics

- Apomorphine hydrochloride (APOKYN)
- Antidote drug for Carbidopa-levodopa
- Given SQ only

## Contraindications Dopaminergic Drugs

- Angle-closure glaucoma
- Cardiovascular disease
- Bronchial asthma
- Urinary obstruction
- Peptic ulcer disease
- Pts using antipsychotic drugs

## Dopamine Agonist

- Stimulates dopamine receptors
- Act on dopamine receptors
- Taken alone or in combination w/other PD drugs

## Dopamine Agonist

- Amantadine hydrochloride (Symmetrel)
- Bromocriptine mesylate (Parlodel)

## Catechol O-methyltransferase (COMT)

- Inactivates dopamine
- When taken w/increases amount of levodopa concentration in brain
- **Tolcapone (Tasmar)**
- **Entacapone (Stalevo)**

## MAO-B inhibitors

- Breakdown of dopamine
- Selegiline HCL (Eldepryl)
- Rasagiline (Azilect)

## QSEN In Action

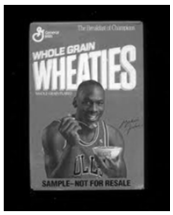
- Knowledge
- Skills
- Attitude

## Safe Nursing Practices & Patient Teaching PD

- Assessment of tremors, gait, strength
- Drooling
- Speech patterns
- Frustration level
- Injury prevention
- Bowel function
- Co-morbidities

## Safe Nursing Practices & Patient Teaching (cont.)

- Avoid foods high in vitamin B6



## What Picture Doesn't Fit

## Skeletal Muscle Relaxants

## Goal of Skeletal Muscle Relaxants

- Decrease pain & discomfort
- Improve range of motion
- Improve pt's ability to function independently
- Designed for short-term use

## Skeletal Muscle Relaxants

- Centrally acting
- Peripherally acting

## Centrally Acting

- Depress neuron activity in the spinal cord or brain & act directly on the skeletal muscle
- Baclofen (Lioresal)
- Tizanidine (Zanaflex)
- Dantrolene (Dantrium)
- Diazepam (Valium)
- Cyclobenzaprine (Flexeril)
- Methacarbamol (Robaxin)

## Centrally Acting

- **Baclofen**
- Muscle spasms cause by multiple sclerosis and spinal cord injury

## Centrally Acting

- Dantrolene (Dantrium)
- https://www.youtube.com/watch?v=uLFotTYI7HM
- https://www.youtube.com/watch?v=CgD1qekoocl
- https://www.youtube.com/watch?v=jWxniQ5WPP8

## Thought For The Day

Life has a variety of ways of testing a person's will, either by having nothing happen all day or by having everything happen all at once. With everything that happens to you, you can choose to feel sorry for yourself or treat what happened as a gift. Everything is either an opportunity for growth or an obstacle to keep you from growing. You get to choose.

## Positive Thought For The Day

Life has a variety of ways of testing a person's will, either by having nothing happen all day or by having everything happen all at once. With everything that happens to you, you can choose to feel sorry for yourself or treat what happened as a gift. Everything is either an opportunity for growth or an obstacle to keep you from growing. You get to choose.