

Antiepileptic Drugs (AEDs)

Abrams Chapter 11

Learning Objectives:

- Identify types and causes of seizures.
- List antiepileptic agents according to classification and indications for use.
- Explain the mechanisms of action, therapeutic effects, and adverse effects of antiepileptic drugs.
- Describe the nursing process relating to the administration of antiepileptic drugs.

Description & Causes of Seizures

- Definition: brief burst of abnormal electrical activity in neurons of brain producing symptoms ranging from brief staring to unconsciousness with convulsions
- Epilepsy: chronic, recurrent pattern of seizure activity
- Causes of epilepsy: fever, birth injury (infancy); genetic (childhood); stroke, brain injury, alcohol or drug effects (adults)

Types of Seizures

- Classified as partial or generalized
 - Partial
 - Seizure activity originates in specific area of brain
 - Examples: simple partial; complex partial
 - Generalized
 - Seizure activity has no specific locus (origin); seizures are bilateral and symmetrical
 - Examples: tonic-clonic; absence; myoclonic; and akinetic seizures
- Status epilepticus
 - Life-threatening prolonged tonic-clonic seizures
 - Most common cause is stopping AED's

Antiepileptics - Mech. Of Action

- Stabilize nerve cells by blocking sodium and calcium channels (Hydantoins & others)
- Increase activity of GABA (Benzodiazepines)
- Decrease activity of glutamate
- Some suppress abnormal neuronal firing without suppressing normal neurotransmission
- AED's raise the seizure threshold – amount of stimulus needed to produce a seizure

Indications for Use

- Prevention and/or treatment of seizures
- Stop acute tonic/clonic convulsions
- Treat status epilepticus
- Prevent seizures after brain injury
- Select agents are used to treat bipolar disorders, neuropathic pain

Contraindications/Cautions

- CNS depression
- Hypersensitivity to drug
- Renal or hepatic impairment
- Phenytoin – heart block, bradycardia
- Carbamazepine – leukopenia
- Lamotrigine – children < 16 serious skin rash
- Pregnancy – teratogenic effects

Hydantoins

- Widely used, may also be used to treat cardiac dysrhythmias
- Stabilize nerve cells by blocking sodium and calcium channels
- Highly protein bound
- Adverse effects: CNS and GI effects, gingival hyperplasia, increased risk of osteoporosis with long-term use
- Therapeutic serum level 5-20 mcg/mL
- Examples: **phenytoin (Dilantin)**, fosphenytoin (Cerebyx)

Hydantoins

<ul style="list-style-type: none">● Phenytoin (Dilantin)<ul style="list-style-type: none">- Capsule, chewable tablet, oral suspension, injectable solution- Poorly absorbed IM- See chart p. 198 for routes and dosage of AED's for children and adults	<ul style="list-style-type: none">● Fosphenytoin (Cerebyx)<ul style="list-style-type: none">- Prodrug converted into phenytoin in body- Dosage expressed in phenytoin equivalents- Unlike phenytoin can be diluted with D5W for IV administration- Administered IM or IV
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Benzodiazepines used in seizure disorders

- Clonazepam (Klonopin)
 - Myoclonic or akinetic seizures
- Diazepam (Valium)
 - Acute convulsive seizure, status epilepticus
- Lorazepam (Ativan)
 - Acute convulsive seizure
 - Drug of choice for treatment of status epilepticus
- Schedule IV controlled substances
- Abrupt withdrawal may precipitate seizure activity, withdrawal symptoms

Ethosuximide (Zarontin)

- Suppresses neurons in thalamus that generate absence seizures
- AED of choice for absence seizures
- Administered PO – well absorbed
- Generally well tolerated

Lamotrigine (Lamictal)

- Newer AED: “broad-spectrum” antiseizure activity
 - Used in combination with other AEDs to treat partial seizures
- Blocks Na and Ca channels - decreases release of glutamate, an excitatory neurotransmitter
- Can cause life-threatening skin rashes
 - More common in children < 16 yrs of age
- Interacts with other AEDs that inhibit or induce hepatic drug-metabolizing enzymes
 - Dose reduction when used in combination with valproic acid
- Administered PO

Oxcarbazine (Trileptal)

- Newer AED
 - Better tolerated than older carbamazepine (Tegretol)
- Used for adults and children with partial seizures
- Dose decreased for renal impairment
- Most common adverse effects: dizziness, drowsiness, double vision, nausea
- Risk of serious hypersensitivity reactions

Phenobarbital (Luminal)

- An anticonvulsant barbituate
- Potentiates effects of GABA, an inhibitory neurotransmitter
- Treatment of generalized tonic-clonic seizures and partial seizures
- Generally administered PO
- Schedule IV controlled substance
- CNS depressant effects

Topiramate (Topamax)

- Newer "broad-spectrum" antiseizure agent
- Enhances effects of GABA, blocks Na and Ca channels
- Dose decreased for renal impairment
- Administered PO
- Most common adverse effects: drowsiness, dizziness, ataxia. Rarely: kidney stones

Valproic Acid

- Widely used to treat absence; mixed, and complex partial seizures; and generalized seizures
- Also used to treat bipolar disorder and prevention of migraine headache
- Block Na and Ca channels to suppress neuronal firing, also enhances effects of GABA
- Generally well tolerated; rarely hepatic injury and pancreatitis
- Available in several related forms

Valproic Acid Forms

- Valproic acid (Depakene) capsules
- Valproate sodium (Depakene – syrup; Depacon – injection)
- Divalproex sodium
 - Depakote
 - Delayed-release enteric coated capsules
 - Sprinkle capsules containing enteric coated granules

Drug Selection

- Goal to control seizures with minimal adverse effects enabling patient to pursue normal daily activities
- Drug selection based on type of seizure, adverse effect profile, and dosage form.
- Single drug (monotherapy) preferred when possible
 - Fewer adverse effects, better adherence to medication regimen
- Cost – use is long-term
- Pregnancy risk

AEDs and Pregnancy

- All AED's are teratogens
 - Cleft lip and palate, heart defects
- Risk increased with use of multiple drugs, and higher doses
- Seizures are also potentially harmful to fetus

Nursing

- Assess: seizure history, CBC, liver & renal function, heart rhythm, drug allergy, mental state and LOC, serum drug levels, pregnancy
- Interventions: avoid precipitating events; adequate rest and nutrition; protect client during seizure; give parenteral AED deep IM; check dosage form carefully (same drug may have immediate-release, extended-release forms); shake oral suspension well before measuring dose
- Give IV phenytoin in saline, do not mix with other solutions.

Nursing continued

- Medication teaching: Do not stop abruptly; do not take other drugs or herbals without checking with MD; avoid alcohol, antihistamines and other CNS depressants; notify HCP of pregnancy; do not switch brands of Dilantin, brush and floss teeth, regular dental care; contact HCP for skin rash, severe N & V, yellowish skin or eyes, unusual bleeding or bruising, sore throat; obtain MedicAlert ID.
- See p. 204, 209-212.

Credits & Web Resources

- Abrams, *Clinical Drug Therapy*
- Lehne, *Pharmacology for Nursing Care*
- *Nurses' Drug Guide 2006*
- www.medlineplus.gov Search Epilepsy
- www.aesnet.org American Epilepsy Society
