

NCLEX-RN • 2026 TEST PLAN • NGN ALIGNED

Anticonvulsants

Antiepileptic Drugs (AEDs) — The Seizure Stoppers



System: Neurological

Class: AEDs

High-Alert Category

Black Box: Suicidality (all AEDs)

01

 Drug Overview

AEDs suppress abnormal neuronal firing to prevent and stop seizures. Selection depends on seizure type — wrong drug = worsened seizures.

KEY INDICATIONS

- **Epilepsy** — prophylaxis of recurrent seizures (tonic-clonic, focal, absence, myoclonic)
- **Status epilepticus** — medical emergency (>5 min seizure or >2 without recovery)
- **Neuropathic pain** — gabapentin, pregabalin, carbamazepine (trigeminal neuralgia)
- **Bipolar disorder / mood stabilization** — valproate, lamotrigine, carbamazepine
- **Migraine prophylaxis** — topiramate, valproate
- **Alcohol withdrawal** — benzodiazepines, phenobarbital

CORE PRINCIPLE

Seizure type drives drug choice.

ETHOSUXIMIDE = ABSENCE ONLY.

Valproate = broad spectrum. Carbamazepine/phenytoin = focal & tonic-clonic (can WORSEN absence & myoclonic).

★ Most Tested Drugs in This Class

Tap any drug for the high-yield breakdown. Color = mechanism class.

Expand All

Collapse All

Na⁺ CHANNEL

Phenytoin (Dilantin) / Fosphenytoin (Cerebyx)

★ HIGHEST YIELD

+

Na⁺ CHANNEL

Carbamazepine (Tegretol) / Oxcarbazepine (Trileptal)

★ HIGH YIELD

+

MIXED

Valproic Acid / Divalproex (Depakote, Depakene)

★ HIGH YIELD

+

Na⁺ CHANNEL

Lamotrigine (Lamictal)

+

SV2A BINDING

Levetiracetam (Keppra)

★ COMMON CHOICE

+

MIXED

Topiramate (Topamax)

+

GABA

Phenobarbital (Luminal) — barbiturate

+

BENZO

Lorazepam / Diazepam / Midazolam

★ STATUS FIRST LINE

+

T-Ca²⁺

Ethosuximide (Zarontin)

+

Ca²⁺ CHANNEL

Gabapentin (Neurontin) / Pregabalin (Lyrice)



02

Mechanism of Action

All AEDs do the same thing differently: **suppress hyperexcitable neurons** via one of four targets.

1. **Na⁺ channel blockers** (phenytoin, carbamazepine, lamotrigine, oxcarbazepine)
→ block voltage-gated Na⁺ influx → ↓ repetitive firing → seizure threshold ↑
2. **GABA enhancers** (benzos, phenobarbital, valproate)
→ ↑ GABA (inhibitory NT) → Cl⁻ influx → hyperpolarize neuron → firing stops
3. **Ca²⁺ channel blockers** (ethosuximide – T-type; gabapentin, pregabalin)
→ block Ca²⁺ influx in thalamic neurons → stops absence seizure rhythm
4. **Glutamate / SV2A modulators** (topiramate, levetiracetam, lamotrigine)
→ ↓ glutamate (excitatory NT) release → ↓ excitation

UNIFYING CONCEPT

Net effect =

↓ **EXCITATION** + ↑ **INHIBITION**

. The neuron becomes harder to fire abnormally without being shut down completely.

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Therapeutic Effects — "Is It Working?"

- ✓ **↓ Seizure frequency & duration** — gold standard of efficacy
- ✓ **Seizure-free status** documented in seizure diary/log
- ✓ **Therapeutic drug levels** in range (see Section 6)
- ✓ **Improved quality of life** — return to driving, work, school
- ✓ **For neuropathic pain:** ↓ pain scale, improved sleep/function
- ✓ **For status epilepticus:** seizure activity stops within minutes of IV benzo

TIMELINE REALITY

AEDs take

DAYS TO WEEKS

to reach steady state. Do not judge efficacy at day 2. Drug levels are typically drawn at steady state (after ~5 half-lives).

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Side Effects & Adverse Reactions

COMMON (CLASS-WIDE)

- ▶ Drowsiness, sedation, fatigue
- ▶ Dizziness, ataxia, unsteady gait
- ▶ Nausea, vomiting, GI upset
- ▶ Diplopia, blurred vision
- ▶ Cognitive slowing, memory issues
- ▶ Weight changes (↑ valproate/gabapentin; ↓ topiramate)

SERIOUS / LIFE-THREATENING

- ⚠ **SJS / TEN** — lamotrigine, phenytoin, carbamazepine
- ⚠ **Hepatotoxicity** — valproate (black box), carbamazepine
- ⚠ **Pancreatitis** — valproate
- ⚠ **Agranulocytosis / aplastic anemia** — carbamazepine
- ⚠ **Thrombocytopenia** — valproate
- ⚠ **Hyponatremia / SIADH** — carbamazepine, oxcarbazepine
- ⚠ **Respiratory depression** — benzos, phenobarbital
- ⚠ **Suicidal ideation** — **BLACK BOX — ALL AEDs**
- ⚠ **Teratogenicity** — valproate (worst), phenytoin, carbamazepine
- ⚠ **Acute glaucoma** — topiramate

SJS / TEN RED FLAGS

Fever + flu-like symptoms +

PAINFUL RASH

+ mucosal involvement (mouth, eyes, genitals) + blistering/sloughing skin →

STOP DRUG + ED IMMEDIATELY

. Most common in first 2–8 weeks of therapy.

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Priority Nursing Considerations

MONITOR → ASSESS

- **Seizure activity** — type, duration, frequency, post-ictal state
- **Airway / respirations / SpO₂** — especially with IV benzos, phenobarbital
- **Vital signs** — HR, BP (IV phenytoin → hypotension, bradycardia)
- **Mental status & mood** — suicidality screen at every visit
- **Skin** — any rash = serious until proven otherwise
- **Labs** — drug levels, CBC, LFTs, Na⁺ (see Section 6)

HOLD / NOTIFY PROVIDER

- ⚠ **Any new rash** (especially lamotrigine, carbamazepine, phenytoin)
- ⚠ Drug level **above therapeutic range** or signs of toxicity (nystagmus → phenytoin)
- ⚠ LFTs > 3× upper limit, ↑ ammonia, ↑ amylase/lipase (valproate)
- ⚠ ANC < 1500, WBC ↓, platelets < 100k (carbamazepine, valproate)
- ⚠ Na⁺ < 135 with symptoms (carbamazepine/oxcarbazepine)
- ⚠ RR < 12 or SpO₂ < 90% with benzos/phenobarbital
- ⚠ New suicidal ideation

CONTRAINDICATIONS / DRUG INTERACTIONS

- ▶ **Pregnancy** — valproate (NTDs), phenytoin (hydantoin syndrome), carbamazepine

- ▶ **Grapefruit juice** → ↑ carbamazepine levels → toxicity
- ▶ **CYP450 inducers** (phenytoin, carbamazepine, phenobarbital) ↓ effectiveness of: **warfarin, OCPs, corticosteroids, many antibiotics** → backup contraception required
- ▶ **Alcohol & CNS depressants** — additive sedation/resp depression (especially phenobarbital)
- ▶ **Lamotrigine + valproate** → ↑ lamotrigine levels → ↑ SJS risk
- ▶ **Phenytoin IV** — incompatible with D5W, most other IV drugs; flush line with NS

NEVER STOP ABRUPTLY

Abrupt AED discontinuation →

STATUS EPILEPTICUS

. Always taper. Ensure patient has refills, no gaps.

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Labs & Diagnostics

DRUG	THERAPEUTIC LEVEL	ALSO MONITOR
Phenytoin	10–20 mcg/mL	Albumin (free phenytoin if low), CBC, LFTs, folate, vit D, Ca ²⁺
Carbamazepine	4–12 mcg/mL	CBC w/ diff , LFTs, Na⁺ , HLA-B*1502 baseline
Valproic acid	50–100 mcg/mL	LFTs, ammonia , amylase/lipase, CBC (platelets)
Phenobarbital	15–40 mcg/mL	CBC, LFTs, RR/SpO ₂
Ethosuximide	40–100 mcg/mL	CBC
Lamotrigine	1–15 mcg/mL (not routine)	Clinical response, skin assessment
Levetiracetam	Not routinely monitored	BUN/Cr (renal dosing), mood/behavior
Topiramate	Not routinely monitored	Bicarb (acidosis), BUN/Cr, vision changes

LEVEL TIMING = TROUGH

Draw serum drug levels

IMMEDIATELY BEFORE NEXT DOSE

(trough). For IV loading doses, wait for distribution (phenytoin ≥ 2 hr post-load).

FREE VS. TOTAL PHENYTOIN

Phenytoin is protein-bound. In

LOW ALBUMIN, RENAL FAILURE, PREGNANCY

→ total level looks normal but

FREE (ACTIVE) LEVEL IS TOXIC

. Order free phenytoin when unsure.

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Administration & Safety

IV PHENYTOIN — HIGH-ALERT RULES

- ⚠ Dilute in **NORMAL SALINE ONLY** (precipitates in D5W)
- ⚠ Use **in-line filter** (0.22 micron)
- ⚠ Max rate: **50 mg/min adult; 25 mg/min elderly** (faster → hypotension, dysrhythmias, cardiac arrest)
- ⚠ **Continuous cardiac monitor + BP q15 min** during load
- ⚠ Never IM (erratic absorption, tissue necrosis → use fosphenytoin)
- ⚠ Avoid small/dorsal hand veins → **purple glove syndrome**
- ⚠ Flush line before & after with NS

GENERAL ADMIN PEARLS

- ▶ **Oral AEDs:** consistent timing; with food for GI tolerance (valproate, carbamazepine)
- ▶ **ER/XR tablets:** do **NOT crush or chew**
- ▶ **Phenytoin oral suspension:** shake well (suspension settles → underdose/overdose)
- ▶ **Tube feedings ↓ phenytoin absorption** — hold feeds 1–2 hr before/after
- ▶ **Lamotrigine:** slow titration per schedule — skipped doses mean restarting titration
- ▶ **Status epilepticus algorithm:**
 1. ▶ ABCs, O₂, IV access, glucose check, thiamine if malnourished
 2. ▶ **IV lorazepam 0.1 mg/kg** (or diazepam) — **1st line**
 3. ▶ IV fosphenytoin or levetiracetam or valproate — 2nd line

4. ▶ Phenobarbital / propofol / midazolam infusion — refractory

HIGH-ALERT MEDICATIONS

IV phenytoin, IV phenobarbital, IV benzos — ISMP high-alert list. Require independent double-check, continuous monitoring, and emergency airway equipment at bedside.

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Patient Education

MUST KNOW

- ▶ **Take every day, same time** — missed doses = breakthrough seizures
- ▶ **Never stop suddenly** — even if feeling better; taper under provider direction
- ▶ **No alcohol** — ↑ sedation, ↑ seizure risk
- ▶ **Medic-alert bracelet** + seizure diary + emergency contacts
- ▶ **Driving restrictions** — varies by state, typically seizure-free 3–12 months
- ▶ **No swimming alone, no working at heights**, bath vs. shower (shower safer)
- ▶ **Phenytoin oral care**: brush/floss 2×/day, dental visits q3mo → prevent gingival hyperplasia
- ▶ **Contraception backup** — enzyme-inducer AEDs ↓ OCP effectiveness; use barrier method
- ▶ **Folic acid** 1–4 mg/day (especially women of childbearing age)
- ▶ **Bone health** — Ca^{2+} + vit D supplementation (long-term AEDs ↓ BMD)

WHEN TO SEEK HELP — IMMEDIATELY

- ⚠ **Any rash**, fever, mouth sores, blistering (SJS/TEN)
- ⚠ **Yellowing skin/eyes**, dark urine, severe abdominal pain (hepatitis, pancreatitis)
- ⚠ **Unusual bleeding/bruising** (thrombocytopenia)
- ⚠ **Fever + sore throat** (agranulocytosis — carbamazepine)
- ⚠ **New or worsening depression, mood changes, suicidal thoughts**
- ⚠ **Difficulty breathing, extreme drowsiness** (benzo/phenobarbital)

⚠ **Seizure lasting > 5 minutes or back-to-back seizures** — call 911

⚠ **Sudden eye pain or vision changes** (topiramate → glaucoma)

SEIZURE FIRST AID TEACHING (FAMILY)

Time the seizure • Turn person on SIDE (recovery position) • Cushion head • Loosen tight clothing • Clear area of hazards •

DO NOT RESTRAIN

•

DO NOT PUT ANYTHING IN MOUTH

• Stay until fully alert • Call 911 if >5 min, repeated, injury, pregnant, first-ever, or in water.

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NCLEX Test Traps ⚠

- ⚠ **Status epilepticus** → **IV benzo FIRST**, not phenytoin. Stem may list both; lorazepam wins.
- ⚠ **Phenytoin + D5W = precipitate**. NS only. Classic "which is the priority intervention?" setup.
- ⚠ **Pink/red/brown urine with phenytoin is HARMLESS** — NOT hematuria. Don't pick "notify provider."
- ⚠ **Gingival hyperplasia** → teach oral hygiene. Do **NOT** pick "stop the drug."
- ⚠ **Nystagmus = first sign of phenytoin toxicity** — test may bury it among "normal" findings.
- ⚠ **Ethosuximide = absence seizures ONLY**. Ineffective (and dangerous) for tonic-clonic.
- ⚠ **ANY rash on lamotrigine = STOP + notify**. Never "continue and monitor."
- ⚠ **Valproate in pregnancy = ABSOLUTE NO** (neural tube defects).
- ⚠ **Carbamazepine** → **check CBC & Na⁺ routinely** (agranulocytosis, SIADH).
- ⚠ **Abrupt discontinuation = status epilepticus**. Never "stop immediately" unless SJS/overdose.
- ⚠ **OCP failure on enzyme-inducer AEDs** — teach backup barrier contraception (not "continue current method").
- ⚠ **Flumazenil caution** — can precipitate seizures in chronic benzo users. Not a routine reversal.
- ⚠ **Suicidal ideation is a class warning** — all AEDs, not just one. Assess mood on every visit.
- ⚠ **Therapeutic level timing** — draw **trough** (before next dose), not random.
- ⚠ **Tube feedings ↓ phenytoin absorption** — hold feeds around PO phenytoin doses.

PRIORITY VS NON-PRIORITY — CLASSIC PATTERN

Airway → Breathing → Circulation → Safety → Then drug concerns. In active seizure:

PROTECT AIRWAY + TURN TO SIDE FIRST

, then meds. In SJS:

STOP DRUG + ED

before labs.

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 Memory Boosters**MNEMONICS**

- ▶ **Phenytoin toxicity = "NASH"** → Nystagmus, Ataxia, Slurred speech, Headache/confusion
- ▶ **Phenytoin ADRs = "SHAG"** → SJS, Hirsutism, Anemia (folate), Gingival hyperplasia
- ▶ **Depa-KILL-LIVER** → valproate = hepatotoxicity + pancreatitis + teratogen
- ▶ **"EthoSUXimide is for ABSENCE"** → absence seizures only
- ▶ **"Lame-otrigine → don't be LAME with the rash"** → stop immediately for SJS
- ▶ **Carbamazepine = "CBZ killed my CBC"** → agranulocytosis, aplastic anemia
- ▶ **Topamax = "Dopa-max"** → cognitive dulling + stones + weight loss + glaucoma
- ▶ **Keppra rage** → behavioral/mood changes
- ▶ **Benzos before phenytoin in status = "BP"** — always B before P

CLASS PATTERNS (RECOGNIZE FAST)

- ✓ **All AEDs** → black box suicidality + no abrupt d/c + teratogen risk + drowsiness
- ✓ **Enzyme inducers** (phenytoin, carbamazepine, phenobarbital) → ↓ OCPs, warfarin, steroids
- ✓ **SJS risk drugs** (lamotrigine, carbamazepine, phenytoin) → monitor skin; rash = emergency
- ✓ **Broad-spectrum** (valproate, levetiracetam, lamotrigine, topiramate) — work across seizure types
- ✓ **Narrow-spectrum** (phenytoin, carbamazepine) — focal + tonic-clonic only; can worsen absence/myoclonic
- ✓ **Status ladder** → Benzo → Fosphenytoin/Levetiracetam/Valproate → Phenobarbital → Anesthesia

THERAPEUTIC LEVELS — QUICK RECALL

Phenytoin 10–20

Carbamazepine 4–12

Valproate 50–100

Phenobarbital 15–40

Ethosuximide 40–100

Tip: Phenytoin narrow window (10–20) is the most tested — toxicity is a cliff, not a slope.

FINAL SECTION — NCJMM ALIGNED



Clinical Judgment Snapshot



#1 PRIORITY RISK

Airway compromise during active seizure + **respiratory depression** from IV benzos/phenobarbital + **SJS/TEN** from lamotrigine/carbamazepine/phenytoin. For valproate: **hepatotoxicity**. The common thread: these drugs can kill the patient faster than the seizure can.

WHAT HARMS THE PATIENT FIRST?

During status epilepticus: the airway — hypoxia + aspiration precede the cardiac and neurologic damage. **On a new AED:** a rash that is actually SJS. **On IV phenytoin:** hypotension/dysrhythmia from too-fast push. **On chronic therapy:** a missed dose triggering breakthrough seizure.

FIRST NURSING ACTION IN A SCENARIO

Active seizure → protect airway, turn patient to SIDE, do NOT restrain, do NOT insert anything in mouth, time the seizure, call for help.

Status epilepticus > 5 min → ABCs + O₂ + IV access, then **IV lorazepam** (benzo BEFORE phenytoin).

Rash on lamotrigine/carbamazepine/phenytoin → STOP the drug, notify provider, assess mucous membranes, prepare for ED transfer.

Phenytoin level 25 mcg/mL + nystagmus → HOLD next dose, notify provider, institute fall precautions.

Suicidal ideation → ensure safety (remove means, 1:1 observation), notify provider, do not leave patient alone.

RECOGNIZE CUES → ANALYZE → PRIORITIZE → ACT → EVALUATE

Cue: rash + fever on day 10 of lamotrigine → **Analyze:** SJS vs benign rash — ANY rash is serious until proven otherwise → **Prioritize:** stop drug + protect airway (mucosal) + call provider → **Act:** hold lamotrigine, assess mucous membranes, transfer → **Evaluate:** rash halted, no new blistering, HD stable.

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