

NCLEX-RN 2026 • TEST PLAN ALIGNED • DAY 12 OF PHARMACOLOGY MASTERY

Neuro *Pharmacology* Deck — Day 12

Parkinson's, dementia, migraine, and seizure-rescue medications. Built to the 2026 NCLEX-RN Test Plan — Pharmacological & Parenteral Therapies (13–19% of exam) — applying NCJMM clinical judgment at application level and above.

DECK • DAY 12

20 Flashcards • 5 Safety Rules
5 Calculations • 5 NGN Items
1 Case • Red Flags • Compare

01

Advanced Flashcards

Each card maps to NCJMM cues + actions. Priority labels signal exam weight: **SAFETY-ALERT** drugs are most heavily tested.

CARD 01 • PARKINSON DISEASE

Levodopa / Carbidopa (Sinemet)

Dopamine precursor + decarboxylase inhibitor

HIGH-RISK • TEACHING-HEAVY

MECHANISM	Levodopa crosses the blood–brain barrier and converts to dopamine; carbidopa blocks peripheral breakdown so more dopamine reaches the brain (less nausea, less BP drop).
WHY	Replaces depleted dopamine in Parkinson's disease — reduces tremor, rigidity, bradykinesia.
ASSESS	BP (orthostatic), mental status, swallowing, motor baseline, current diet (high-protein meals reduce absorption), MAOIs (hypertensive crisis), antipsychotic use (antagonism).
LABS/MONITOR	LFTs, CBC, motor scoring; watch for "on–off" phenomenon and end-of-dose wearing.
WORST EFFECT	Dyskinesias , sudden sleep attacks, severe orthostatic hypotension, neuroleptic malignant–like syndrome if abruptly stopped.
COMMON SE	Nausea, dark urine/sweat (harmless), dizziness, vivid dreams.
HOLD/NOTIFY	Worsening involuntary movements, hallucinations, syncope, melanoma changes. Never stop abruptly.
ANTIDOTE	None — supportive; pyridoxine (B6) <i>reduces</i> levodopa effect (avoid high-dose B6 without carbidopa).
TEACHING	Take on empty stomach if tolerated; separate from high-protein meals by 30–60 min; rise slowly; effects may take weeks; report mood/behavior changes (impulse-control disorder).
ACTION	Follow precautions, schedule consistent dosing, screen for melanoma.
NCJMM CUE	Client reports new gambling and hypersexuality → impulse-control disorder; notify provider.

Q: Which finding is the priority to report after 6 weeks on carbidopa-levodopa?

A: New writhing involuntary movements (dyskinesia) — sign of toxicity/over-replacement. Dark urine is benign; dry mouth is common; appetite changes are nonspecific.

Tip: "L-dopa replaces dopamine" — anything that blocks dopamine (antipsychotics, metoclopramide) antagonizes the drug. If you see them together on NCLEX → red flag.

CARD 02 • PARKINSON DISEASE

Pramipexole / Ropinirole

Non-ergot dopamine agonists

SAFETY-ALERT

MECHANISM	Directly stimulate dopamine receptors (don't need conversion).
WHY	Early Parkinson's, restless legs syndrome.
ASSESS	BP, orthostasis, history of sleep disorders, gambling, psychosis , renal function (pramipexole renally cleared).
LABS/MONITOR	Renal panel, BP, behavioral screening.
WORST EFFECT	Sudden sleep attacks while driving ; severe impulse-control disorders (gambling, hypersexuality, binge eating); orthostatic syncope.
COMMON SE	Nausea, dizziness, hallucinations (more in older adults), peripheral edema.
HOLD/NOTIFY	Falling asleep during activities, hallucinations, edema, new compulsive behaviors.
ANTIDOTE	None — taper to discontinue; abrupt stop → dopamine agonist withdrawal syndrome.
TEACHING	Do not drive until you know how it affects you; report compulsions; rise slowly.
ACTION	Screen at every visit for impulse-control behaviors — <i>nurse must ask</i> ; clients underreport.
NCJMM CUE	Spouse reports husband fell asleep at the wheel → hold dose, notify provider, do not drive.

Q: A client on pramipexole confides \$20,000 in online gambling losses. The nurse's priority?

A: Notify the prescriber — impulse-control disorder is a known dopamine-agonist adverse effect requiring dose reduction or change of therapy. Counseling alone misses the pharmacologic cause.

Tip: "-pexole / -inirole" endings = dopamine agonists. Pair them mentally with "sleep + gambling + edema."

CARD 03 • PARKINSON DISEASE

Selegiline / Rasagiline

MAO-B inhibitors

INTERACTION-HEAVY

MECHANISM	Block enzyme that breaks down dopamine in the brain → more dopamine available.
WHY	Adjunct in Parkinson's; may delay need for levodopa.
ASSESS	Medication list for SSRIs, SNRIs, TCAs, meperidine, tramadol, dextromethorphan, St. John's wort (serotonin syndrome risk); diet for tyramine (only at higher doses).
LABS/MONITOR	BP, mental status, mood.
WORST EFFECT	Serotonin syndrome (HR ↑, hyperthermia, clonus, agitation); hypertensive crisis with tyramine at higher doses.
COMMON SE	Insomnia, dizziness, nausea, dry mouth.
HOLD/NOTIFY	Headache + flushing + chest pain → possible hypertensive crisis; tremor + diaphoresis + confusion → serotonin syndrome.
ANTIDOTE	None specific — supportive; cyproheptadine for serotonin syndrome.
TEACHING	Avoid tyramine-rich foods at higher doses (aged cheese, cured meats, soy, draft beer, wine). Take in AM (insomnia).
ACTION	Reconcile every new med before adding.
NCJMM CUE	Client on rasagiline + sertraline arrives with HR 132, T 39.5°C, clonus → serotonin syndrome — rapid response.

Q: Which OTC medication must a client on selegiline avoid?

A: Dextromethorphan-containing cough syrups — serotonergic. Acetaminophen, loratadine, and calcium carbonate are safe.

Tip: Selegiline = "Select nothing serotonergic." Memorize the bad combos.

CARD 04 • PARKINSON DISEASE

Entacapone (Comtan)

COMT inhibitor

ADJUNCT

MECHANISM	Blocks COMT enzyme that breaks down levodopa peripherally → more levodopa reaches the brain.
WHY	Add-on for end-of-dose wearing in Parkinson's.
ASSESS	Always given with levodopa; LFTs (tolcapone — black box; entacapone is safer).
LABS/MONITOR	LFTs, motor response, BP.
WORST EFFECT	Severe diarrhea (delayed weeks), worsened levodopa adverse effects (dyskinesia).
COMMON SE	Bright orange urine (harmless), nausea, dyskinesia.
HOLD/NOTIFY	Persistent watery diarrhea, jaundice.
ANTIDOTE	None.
TEACHING	Orange urine expected; report ongoing diarrhea; do not stop levodopa.
ACTION	Anticipate dyskinesia with addition — may need lower levodopa dose.
NCJMM CUE	Watery diarrhea ×3 weeks + 5-lb loss → discontinue, notify.

Q: A client starting entacapone reports orange urine. Best nurse response?

A: "This is a harmless effect of the medication." Do not stop the drug, no labs needed, no infection workup.

Tip: "-capone = COMT." Orange urine = entacapone, not a worry.

CARD 05 • EPS / PARKINSONISM

Benzotropine (Cogentin)

Anticholinergic (centrally acting)

SAFETY-ALERT • OLDER ADULTS

MECHANISM	Blocks acetylcholine in the brain to restore dopamine–ACh balance.
WHY	Tremor in Parkinson's; acute dystonia and extrapyramidal symptoms (EPS) from antipsychotics (e.g., haloperidol).
ASSESS	Glaucoma (narrow-angle = contraindicated), BPH, bowel/bladder function, cognition (Beers list — avoid in older adults), tachyarrhythmias.
LABS/MONITOR	None routine; bowel pattern, urinary output, mental status.
WORST EFFECT	Anticholinergic toxicity: hyperthermia, confusion/delirium, urinary retention, ileus, hot dry flushed skin ("hot as a hare, dry as a bone, red as a beet, mad as a hatter, blind as a bat").
COMMON SE	Dry mouth, blurred vision, constipation, urinary hesitancy, sedation.
HOLD/NOTIFY	Confusion in older adult, no urine ×8 h, distended bladder, temp ↑.
ANTIDOTE	Physostigmine (rarely used — last resort for severe toxicity).
TEACHING	Hard candy/sips for dry mouth; fiber + fluids; avoid heat (no sweating); don't stop suddenly.
ACTION	For acute dystonia from antipsychotic → give IM right away; reassure the client.
NCJMM CUE	Older adult on benztropine + diphenhydramine + oxybutynin → triple anticholinergic burden, expect delirium.

Q: A client receiving haloperidol develops a fixed upward gaze and stiff neck. The priority action?

A: Administer benztropine IM as ordered — this is acute dystonic reaction, a medical emergency due to airway risk. Don't wait, don't switch antipsychotic first, don't reassure without acting.

Tip: Benztropine = "Bentz the brakes on cholinergic." Everything dries and slows. Avoid in older adults with cognitive change.

CARD 06 • PARKINSON / DYSKINESIA

Amantadine

NMDA antagonist / dopamine releaser

ADJUNCT

MECHANISM	Increases dopamine release and blocks NMDA receptors; reduces levodopa-induced dyskinesia.
WHY	Parkinson's tremor, dyskinesia control.
ASSESS	Renal function (renally cleared — adjust dose), cardiac history (CHF, edema), seizure history.
LABS/MONITOR	Creatinine, BP, edema.
WORST EFFECT	CHF exacerbation, suicidal ideation, severe livedo reticularis.
COMMON SE	Livedo reticularis (purple mottled skin), ankle edema, insomnia, dry mouth, hallucinations.
HOLD/NOTIFY	New edema/dyspnea, mood changes.
ANTIDOTE	None.
TEACHING	Take early in the day; report ankle swelling; mottled legs are expected but tell provider.
ACTION	Daily weights if CHF risk.
NCJMM CUE	2 kg overnight gain + new crackles → possible CHF; hold and notify.

Q: Purple mottling of the legs in a client on amantadine is best explained as:

A: A known dermatologic side effect (livedo reticularis) — usually benign but should be documented. Not DVT, not embolism, not allergic reaction.

Tip: Amantadine = "ant-anti-dyskinesia." Lacy mottled skin is the signature finding.

CARD 07 • ALZHEIMER DISEASE

Donepezil (Aricept)

Acetylcholinesterase inhibitor

HIGH-RISK • TEACHING-HEAVY

MECHANISM	Blocks the enzyme that breaks down acetylcholine → more ACh in the brain → improved cognition.
WHY	Mild–severe Alzheimer's dementia. Does <i>not</i> cure — slows decline.
ASSESS	HR (bradycardia), syncope, peptic ulcer/GI bleed history, asthma/COPD, weight, fall risk.
LABS/MONITOR	HR (apical 1 min), weight, ECG if syncope, MMSE/cognitive trend.
WORST EFFECT	Symptomatic bradycardia / syncope (cholinergic), GI bleeding, bronchospasm.
COMMON SE	Nausea, diarrhea, vivid dreams, insomnia, weight loss, urinary urgency.
HOLD/NOTIFY	HR < 50, syncope, melena, dyspnea.
ANTIDOTE	Atropine (for symptomatic bradycardia).
TEACHING	Take at bedtime to minimize GI/insomnia tradeoff (provider-dependent); rise slowly; medication doesn't reverse memory loss; report falls; remind family of realistic goals.
ACTION	Hold dose and notify if HR<50 or new dizziness/falls; coordinate with caregiver about safety.
NCJMM CUE	87-y/o on donepezil: HR 42, light-headed standing → hold, atropine ready, ECG.

Q: Which assessment finding warrants holding donepezil and notifying the provider?

A: Apical HR of 46 with dizziness. Mild GI upset, vivid dreams, and 1-lb weight loss are common and tolerated.

Tip: "-stigmine / -pezil / -galantamine" = cholinesterase inhibitors. Cholinergic = SLUDGE + bradycardia. Atropine reverses.

CARD 08 • ALZHEIMER / LEWY BODY

Rivastigmine (Exelon)

Acetylcholinesterase inhibitor (oral & transdermal patch)

PATCH- SAFETY

MECHANISM	Same class as donepezil — boosts ACh.
WHY	Alzheimer's and Parkinson's-related dementia.
ASSESS	Skin integrity (patch site), HR, GI history.
LABS/MONITOR	HR, weight, skin.
WORST EFFECT	Double-patching — old patch left on + new one → cholinergic crisis. Bradycardia, GI bleed.
COMMON SE	Nausea, vomiting, weight loss, dizziness, application-site irritation.
HOLD/NOTIFY	HR<50, severe GI symptoms, patch errors.
ANTIDOTE	Atropine; remove patch immediately if toxicity.
TEACHING	Remove old patch before applying new one; rotate sites; do not cut patch; document site change with caregiver.
ACTION	Two-nurse verification for new caregivers; check daily for old patch.
NCJMM CUE	Family applies new patch without removing yesterday's → bradycardia, vomiting → remove all patches, atropine ready.

Q: Caregiver teaching for rivastigmine patch — which statement indicates understanding?

A: "I will remove yesterday's patch before placing today's." Cutting the patch, applying to same site daily, or covering with plastic wrap are all wrong.

Tip: Patch errors are the #1 source of rivastigmine toxicity NCLEX questions. "Off before on."

CARD 09 • ALZHEIMER DISEASE

Memantine (Namenda)

NMDA receptor antagonist

TEACHING-HEAVY

MECHANISM	Blocks excess glutamate at NMDA receptors — reduces excitotoxic neuron damage.
WHY	Moderate–severe Alzheimer's; often combined with donepezil.
ASSESS	Renal function (dose-adjusted), seizure history, urinary alkalinizing conditions (excretion changes).
LABS/MONITOR	Creatinine/eGFR, cognition, BP.
WORST EFFECT	Seizures (rare), severe confusion in renal impairment.
COMMON SE	Dizziness, headache, confusion, constipation.
HOLD/NOTIFY	New seizure activity, marked confusion change, oliguria.
ANTIDOTE	None — supportive.
TEACHING	Titrate slowly; can be taken with or without food; does <i>not</i> cure dementia; expect gradual benefit; report falls/confusion.
ACTION	Combine with donepezil — distinct mechanisms; safety-net family caregivers with realistic expectations.
NCJMM CUE	eGFR drops to 20 mL/min → dose reduction needed; notify provider before next dose.

Q: A family asks why both donepezil and memantine are prescribed. Best response?

A: "They work on different brain chemicals — one boosts acetylcholine, the other blocks excess glutamate. Together they may slow decline more than either alone."

Tip: Donepezil = boost ACh. Memantine = block glutamate. Both **slow** dementia; neither cures.

CARD 10 • MIGRAINE — ABORTIVE

Sumatriptan (Imitrex)

5-HT_{1B/1D} receptor agonist (triptan)

CARDIAC-RISK

MECHANISM	Constricts cranial blood vessels, blocks pain pathways in trigeminal nerve.
WHY	Acute migraine and cluster headache. Not preventive.
ASSESS	Cardiac history — contraindicated in CAD, prior MI, uncontrolled HTN, stroke, Prinzmetal angina, pregnancy. Check use within 24 h of ergot or another triptan; SSRI/SNRI/MAOI use (serotonin syndrome).
LABS/MONITOR	BP, HR, chest assessment after first dose (some give first dose in clinic for cardiac patients).
WORST EFFECT	Coronary vasospasm → MI , stroke, serotonin syndrome.
COMMON SE	Tingling, chest tightness/pressure (usually benign but evaluate), flushing, dizziness.
HOLD/NOTIFY	Chest pain, jaw/arm pain, focal neuro changes, severe BP rise.
ANTIDOTE	None — supportive; treat MI per protocol.
TEACHING	Take at first sign of migraine, not aura; may repeat in 2 h if needed; max 2 doses/24 h; do not combine with ergots within 24 h; report any chest pain.
ACTION	Verify no contraindications every visit (cardiac status changes).
NCJMM CUE	Client with new HTN reports "crushing chest pressure" after sumatriptan → 12-lead ECG, troponin, hold further dose.

Q: Which client should NOT receive sumatriptan?

A: 58-y/o with history of MI last year — vasoconstriction risk. Migraine with aura, age 30, mild HTN controlled, are not absolute contraindications by themselves (though caution applies).

Tip: "-triptan" = think **triple** contraindication: **Coronary, Stroke, Pregnancy/uncontrolled HTN.**

CARD 11 • MIGRAINE — ABORTIVE

Ergotamine / Dihydroergotamine (DHE)

Ergot alkaloid — non-selective serotonin agonist

HIGH-RISK • PREGNANCY

MECHANISM	Potent vasoconstrictor of cranial vessels.
WHY	Acute migraine (less first-line now); cluster.
ASSESS	Absolute contraindications: pregnancy, CAD, peripheral vascular disease, severe HTN, sepsis, use of strong CYP3A4 inhibitors (macrolides, azoles, protease inhibitors), recent triptan.
LABS/MONITOR	Peripheral pulses, BP, pregnancy test.
WORST EFFECT	Ergotism: peripheral ischemia (cold blue extremities), MI, stroke, ergot-induced fibrosis.
COMMON SE	Nausea/vomiting, leg cramps, paresthesias.
HOLD/NOTIFY	Numbness, blue/cold fingers, chest pain.
ANTIDOTE	None; vasodilators (nitroprusside) for severe ischemia.
TEACHING	Never combine with triptan within 24 h; pregnancy category X; report cold fingers/toes immediately.
ACTION	Verify pregnancy status before each dose in reproductive-age clients.
NCJMM CUE	Pregnant client given ergotamine in error → notify provider STAT, fetal monitoring; document incident.

Q: Pregnant client requests "her usual migraine pill" (ergotamine). Best response?

A: "Ergotamine is unsafe in pregnancy. I'll contact the provider for a safer option." Safe alternatives include acetaminophen, antiemetics, and limited triptan use after weighing risk.

Tip: Ergot = "ends in gangrene." Cold blue extremities = stop drug.

CARD 12 • MIGRAINE — NEWER

CGRP Inhibitors

Erenumab, fremanezumab, galcanezumab (mAbs, monthly SQ) · Rimegepant, ubrogepant (oral "gepants")

NEWER • TEACHING

MECHANISM	Block calcitonin gene-related peptide (CGRP), a key driver of migraine pain and inflammation.
WHY	Migraine prevention (monoclonal antibodies, monthly) or acute treatment (gepants — alternative when triptans contraindicated).
ASSESS	Hypersensitivity, constipation history (erenumab), pregnancy intent, hepatic function (gepants).
LABS/MONITOR	Migraine days/month, BP, hepatic panel if gepant.
WORST EFFECT	Hypersensitivity/anaphylaxis (rare), severe constipation (erenumab) → impaction, hypertension worsening (post-marketing).
COMMON SE	Injection-site reactions, constipation, nasopharyngitis.
HOLD/NOTIFY	Severe constipation, signs of hypersensitivity, BP rise.
ANTIDOTE	None — supportive.
TEACHING	Rotate SQ sites (thigh, abdomen, upper arm); track headache days in diary; effect may take 2–3 months; gepants can be used same day as triptans (no vasoconstriction).
ACTION	Bowel regimen if on erenumab.
NCJMM CUE	No BM ×7 days on erenumab + abdominal distention → impaction; intervene, consult provider.

Q: A client with prior MI needs migraine therapy. The best choice is:

A: A gepant (rimegepant/ubrogepant) — no vasoconstriction, safe in CAD. Sumatriptan and ergots are contraindicated.

Tip: CGRP drugs end in "-mab" (monthly) or "-gepant" (oral). They **don't** vasoconstrict — safe in cardiac patients.

CARD 13 • MIGRAINE PREVENTION + SEIZURE

Topiramate (Topamax)

Anticonvulsant / migraine prophylaxis

TERATOGEN • COGNITIVE

MECHANISM	Modulates Na channels, enhances GABA, blocks glutamate; also weak carbonic anhydrase inhibitor.
WHY	Migraine prevention, partial & generalized seizures, weight loss adjunct.
ASSESS	Pregnancy status (cleft lip/palate risk), kidney stone history, cognition baseline, eye history (acute angle-closure glaucoma).
LABS/MONITOR	Serum bicarbonate (metabolic acidosis), ammonia if confused, BMP.
WORST EFFECT	Metabolic acidosis , acute angle-closure glaucoma (sudden vision loss/eye pain), kidney stones, oligohidrosis (heat stroke in kids), birth defects.
COMMON SE	"Dopa-Max" — word-finding difficulty, paresthesias (tingling), weight loss, taste changes (carbonation tastes flat).
HOLD/NOTIFY	Sudden eye pain/blurred vision, marked confusion, flank pain.
ANTIDOTE	None.
TEACHING	Use effective contraception; stay hydrated (stones); avoid overheating in summer; report any eye pain immediately; do not stop abruptly.
ACTION	Pregnancy test before starting; review effective contraception (topiramate may reduce oral contraceptive effectiveness at higher doses).
NCJMM CUE	Acute unilateral eye pain + blurred vision + headache 2 weeks after starting → angle-closure glaucoma, stop drug, ED.

Q: A 22-y/o starting topiramate for migraine prevention asks about pregnancy. Priority teaching?

A: Use reliable contraception — topiramate is teratogenic (cleft palate) and can reduce oral contraceptive effectiveness. Folic acid alone, weight monitoring, and BP checks are secondary.

Tip: "Dopa-Max" = word-finding loss + weight loss + paresthesias. Plus eye pain = emergency.

CARD 14 • MIGRAINE PREVENTION

Propranolol (Inderal)

Nonselective beta blocker

HIGH-YIELD CROSSOVER

MECHANISM	Blocks β_1 & β_2 receptors → ↓ HR, ↓ BP, prevents migraine via vascular and central effects.
WHY	Migraine prophylaxis, performance anxiety, essential tremor, HTN, post-MI.
ASSESS	Asthma/COPD (β_2 blockade = bronchospasm), HR, BP, diabetes (masks hypoglycemia), heart block.
LABS/MONITOR	HR (apical 1 min), BP, glucose in diabetics, ECG if indicated.
WORST EFFECT	Bradycardia, heart block, bronchospasm, masked hypoglycemia, abrupt withdrawal → rebound HTN/MI.
COMMON SE	Fatigue, cold extremities, depression, sleep disturbance, decreased exercise tolerance.
HOLD/NOTIFY	HR<60, SBP<100, wheezing.
ANTIDOTE	Glucagon (for severe overdose), atropine.
TEACHING	Take pulse daily; do not stop abruptly (taper); rise slowly; diabetics use other signs of low sugar (sweating still occurs).
ACTION	Verify no asthma history before first dose.
NCJMM CUE	Asthmatic client given propranolol → wheezing, dyspnea → hold, albuterol, notify.

Q: Which finding requires the nurse to hold propranolol?

A: Apical HR 52. BP 118/72 is acceptable; mild fatigue is expected; cold hands are common.

Tip: All "-olol" drugs share: hold for HR<60, watch in asthma/diabetes, never stop abruptly.

CARD 15 • STATUS EPILEPTICUS — FIRST LINE

IV Lorazepam (Ativan)

Benzodiazepine — seizure rescue

EMERGENCY

MECHANISM	Enhances GABA → CNS depression → stops seizure activity.
WHY	First-line for status epilepticus (seizure >5 min or repeated without recovery).
ASSESS	Airway, breathing, IV access, pulse ox, BP, glucose (always check glucose in active seizure — hypoglycemia mimics).
LABS/MONITOR	Glucose, electrolytes, ABG, AED level if known epilepsy.
WORST EFFECT	Respiratory depression / apnea , hypotension, oversedation.
COMMON SE	Sedation, hypotension, amnesia.
HOLD/NOTIFY	RR<8, SpO ₂ <90%, SBP<90.
ANTIDOTE	Flumazenil — but rarely used in seizure patients (can precipitate seizures).
TEACHING	Caregivers of home seizure clients: emergency dose only, then call 911.
ACTION	Push slowly (≤2 mg/min); have BVM and suction ready; never leave the patient.
NCJMM CUE	Post-dose RR drops to 6, SpO ₂ 84% → BVM, reposition, call rapid response.

Q: Priority intervention during active tonic-clonic seizure?

A: Protect airway and turn to side; loosen restrictive items; time the seizure; never insert anything into mouth. Lorazepam comes *after* airway protection.

Tip: First-line status epilepticus = Lorazepam IV. ABC always comes before the drug.

CARD 16 • SEIZURE — OUT OF HOSPITAL

Diazepam Rectal Gel (Diastat)

Benzodiazepine — rescue

CAREGIVER-CRITICAL

MECHANISM	Same as lorazepam — GABA enhancer.
WHY	Acute repetitive seizures or cluster seizures at home (peds & adults).
ASSESS	Caregiver training, seizure pattern, baseline respiratory function.
LABS/MONITOR	None at home; document time and response.
WORST EFFECT	Respiratory depression, oversedation.
COMMON SE	Sedation, ataxia, behavior change.
HOLD/NOTIFY	If respiratory rate slows after dose, call 911.
ANTIDOTE	Flumazenil (used cautiously).
TEACHING	Use only for seizures lasting > defined time (per individualized plan, often >5 min); call 911 if seizure continues 5 min after dose, or 2 doses given, or if breathing changes; record events.
ACTION	Verify dose by weight; demonstrate technique with return demonstration.
NCJMM CUE	Caregiver gave 2 doses 30 min apart, child sleeping but RR 8 → 911, position, monitor.

Q: A parent asks when to use Diastat. Best teaching?

A: "Use it when your child has a cluster of seizures or a seizure lasting longer than the time your provider listed in your action plan. Call 911 if breathing slows or seizures continue."

Tip: Rectal diazepam = home rescue. Always pair the dose with a **call-911 trigger**.

CARD 17 • SEIZURE — INTRANASAL RESCUE

Intranasal Midazolam (Nayzilam)

Benzodiazepine — rescue

NEWER • CAREGIVER

MECHANISM	Same — GABA enhancer; intranasal absorption.
WHY	Acute treatment of seizure clusters ≥ 12 y/o; alternative to rectal route.
ASSESS	Caregiver competence, nasal patency, respiratory status, alcohol/opioid use.
LABS/MONITOR	Watch for respiratory depression for 2 h after dose.
WORST EFFECT	Respiratory depression (potentiated by alcohol/opioids).
COMMON SE	Somnolence, headache, nasal discomfort, throat irritation.
HOLD/NOTIFY	Slow breathing, bluish color.
ANTIDOTE	Flumazenil (cautious in seizure patients).
TEACHING	One spray, one nostril; second dose (other nostril) after 10 min if needed; max 1 episode/3 days, max 5 episodes/month; do not blow nose for 30 min after spray; call 911 if seizure continues 5 min after dose.
ACTION	Caregiver return demonstration; medication plan signed.
NCJMM CUE	Adolescent given midazolam at school + reported THC edible earlier $\rightarrow$ high resp-depression risk, monitor closely, EMS.

Q: After administering intranasal midazolam, the nurse's priority is:

A: Monitor respiratory rate and SpO₂ for at least 2 hours. Documenting is important but secondary; oral fluids are not the priority; positioning is part of ongoing care.

Tip: Nasal benzo = same risks as IV. Watch the breathing, not the seizure.

CARD 18 • SEIZURE — SECOND LINE

Phenytoin (Dilantin) • Fosphenytoin (Cerebyx)

Sodium channel blocker — antiepileptic

NARROW THERAPEUTIC INDEX

MECHANISM	Stabilizes neuronal Na channels — prevents seizure spread.
WHY	Maintenance and status epilepticus (after benzo); fosphenytoin preferred IV (less tissue toxic).
ASSESS	IV site (phenytoin $\rightarrow$ purple-glove syndrome , extravasation, never give IM/SQ; fosphenytoin can go IM), HR, BP, gingival hygiene baseline, pregnancy.
LABS/MONITOR	Phenytoin level: 10–20 mcg/mL therapeutic ; albumin (free phenytoin if low albumin); CBC, LFTs.
WORST EFFECT	Stevens-Johnson syndrome / TEN , agranulocytosis, hepatic necrosis, cardiac arrest with fast IV push, fetal hydantoin syndrome.
COMMON SE	Gingival hyperplasia , hirsutism, ataxia, nystagmus, rash, drowsiness.
HOLD/NOTIFY	Rash (any rash), level > 20 , severe drowsiness, IV infiltration.
ANTIDOTE	None for phenytoin overdose — supportive; treat SJS rapidly.
TEACHING	Brush + floss daily, regular dental visits; never stop abruptly; use effective contraception; avoid alcohol; report rash, fever, sore throat (blood dyscrasia); take with food.
ACTION	Mix only in NS (not D5W — precipitates); large-bore IV; flush with NS before/after; max IV rate 50 mg/min adults (25 mg/min older adults).
NCJMM CUE	Phenytoin level 28, nystagmus, slurred speech, ataxia $\rightarrow$ hold dose, notify.

Q: Phenytoin level returns 24 mcg/mL. Which finding most supports toxicity?

A: Horizontal nystagmus + ataxia. Gingival hyperplasia is chronic (not toxicity); pink urine is unrelated; hirsutism is cosmetic SE.

Tip: Therapeutic **10–20**. Toxicity = brain effects ("walks like drunk" — nystagmus, ataxia, slurred speech). NS only, slow push, rash = stop.

CARD 19 • SEIZURE — VERSATILE

Levetiracetam (Keppra)

SV2A modulator — antiepileptic

FAVORABLE PROFILE

MECHANISM	Binds synaptic vesicle protein SV2A → modulates neurotransmitter release.
WHY	Partial and generalized seizures; status epilepticus (third-line); preferred when liver disease or drug interactions a concern.
ASSESS	Renal function (renally cleared — adjust dose), mood history (suicidality), behavior baseline.
LABS/MONITOR	Creatinine/eGFR; mood; no routine drug levels.
WORST EFFECT	Suicidal ideation , severe behavioral changes ("Kepprage"), rare SJS.
COMMON SE	Drowsiness, irritability, mood changes, weakness.
HOLD/NOTIFY	New depression, aggression, suicidal thoughts.
ANTIDOTE	None.
TEACHING	Mood/behavior changes are common — tell family to watch and report; do not stop abruptly; can be taken with or without food.
ACTION	Screen for suicidal thoughts at follow-up (all AEDs carry FDA warning).
NCJMM CUE	Adolescent on Keppra: parent reports rage outbursts, talking about death → urgent psych eval, notify provider.

Q: Which assessment is most important for a client newly started on levetiracetam?

A: Screen for mood and suicidal ideation — class warning. Liver function, drug levels, and gum exam are not Keppra priorities.

Tip: Keppra = "Kepprage." Watch behavior. Few interactions; renally cleared.

CARD 20 • SEIZURE / MIGRAINE / MOOD

Valproic Acid / Divalproex (Depakote)

Multi-mechanism AED · mood stabilizer · migraine prophylaxis

HEPATOTOXIC · TERATOGEN

MECHANISM	Increases GABA, Na/Ca channel modulation.
WHY	Generalized & absence seizures, status epilepticus alternative, bipolar mania, migraine prophylaxis.
ASSESS	LFTs (hepatotoxicity), platelets, ammonia (encephalopathy), pregnancy (neural tube defects, lowered IQ), pancreatitis history.
LABS/MONITOR	Therapeutic level 50–100 mcg/mL ; LFTs, CBC, ammonia, amylase/lipase.
WORST EFFECT	Fatal hepatotoxicity (esp. children <2), pancreatitis, thrombocytopenia, hyperammonemic encephalopathy, severe birth defects.
COMMON SE	GI upset, weight gain, hair loss, tremor, sedation.
HOLD/NOTIFY	Jaundice, abdominal pain, bleeding/bruising, confusion, vomiting child <2.
ANTIDOTE	None; L-carnitine for severe hyperammonemia.
TEACHING	Effective contraception mandatory in reproductive-age clients; report jaundice/abdominal pain/bruising; do not stop abruptly; take with food; folic acid supplementation if pregnancy possible.
ACTION	Pregnancy test before; baseline + scheduled LFTs and CBC.
NCJMM CUE	Confused client on valproate, ammonia 95, normal LFTs → hyperammonemic encephalopathy; hold, notify, L-carnitine.

Q: Which lab abnormality on valproate prompts the nurse to hold the next dose and notify?

A: AST/ALT 4× upper normal — hepatotoxicity risk. Mild hair shedding, slight weight gain, and an ammonia of 28 (normal) do not.

Tip: Valproate = "Very Poisonous to Liver." Check LFTs, platelets, ammonia. Never in pregnancy.

02

Must-Not-Miss Safety Rules

Memorize these five — they appear in nearly every neuro-pharm question.

1. **SR-1 Never stop levodopa or any AED abruptly.** Levodopa → neuroleptic malignant–like syndrome. AEDs → status epilepticus. *Always taper.*
2. **SR-2 Triptans + ergots within 24 h of each other = vasospasm.** Triptans contraindicated in CAD, recent MI, uncontrolled HTN, pregnancy, hemiplegic migraine. Use a gepant instead.
3. **SR-3 Phenytoin IV: NS only, large-bore IV, slow push (≤ 50 mg/min adult; ≤ 25 mg/min older adult).** Watch for purple-glove syndrome; switch to fosphenytoin if peripheral access is questionable.
4. **SR-4 Cholinesterase inhibitors (donepezil, rivastigmine) cause bradycardia and syncope.** Always count apical HR. Patches: **remove old before applying new.**
5. **SR-5 MAO-B inhibitors + SSRIs/SNRIs/TCA/meperidine/tramadol/dextromethorphan = serotonin syndrome.** Reconcile every new med before adding.

03 Medication Calculations & Dosage Safety

Show your work. Round per facility policy; cross-check with a second nurse for high-alert drugs.

1. **Q1.** A 32-kg child in status epilepticus needs IV lorazepam 0.1 mg/kg. The vial reads 2 mg/mL. How many mL will the nurse draw up?

Dose = 32 kg × 0.1 mg/kg = 3.2 mg
Volume = 3.2 mg ÷ 2 mg/mL = 1.6 mL

Answer: 1.6 mL

2. **Q2.** Fosphenytoin loading dose: 20 mg PE/kg for a 70-kg adult. The maximum infusion rate is 150 mg PE/min. What is the minimum infusion time?

Total = 70 kg × 20 mg PE/kg = 1400 mg PE
Time = 1400 ÷ 150 = 9.33 min ≈ 10 min

Answer: ~10 minutes (round up for safety)

3. **Q3.** Sumatriptan SC autoinjector delivers 6 mg. Patient took one dose at 09:00 with partial relief. Per label, second dose may be repeated in ≥1 h, max 12 mg/24 h. The earliest second dose time and remaining 24-h allowance?

Earliest second dose: 10:00
Max 24-h: 12 mg total → 6 mg remaining after the second dose

Answer: 10:00; 6 mg remains for the rest of 24 h (one more dose max)

4. **Q4.** A levetiracetam IV loading dose of 60 mg/kg is ordered for a 25-kg child (max 4500 mg). Drug is supplied 100 mg/mL. Volume to draw up?

Dose = 25 × 60 = 1500 mg (under 4500 max — OK)
Volume = 1500 ÷ 100 = 15 mL

Answer: 15 mL

5. **Q5.** Phenytoin level returns 8 mcg/mL with breakthrough seizures. Provider orders a loading "top-up" of 5 mg/kg over 30 min for a 70-kg client. Available concentration: 50 mg/mL. mL/h on the pump?

Dose = 70 × 5 = 350 mg
Volume = 350 ÷ 50 = 7 mL over 30 min
Rate = 7 mL × (60/30) = 14 mL/h

Answer: 14 mL/h (run for 30 min)

04

NGN-Style Items

Five formats covering the clinical judgment measurement model.

SATA • RECOGNIZE CUES

1. Phenytoin Toxicity

A 56-year-old has been on phenytoin 300 mg PO daily for 4 years. They report worsening unsteadiness and slurred speech over the past week.

Which findings should the nurse identify as consistent with phenytoin toxicity? Select all that apply.

- ☒ Horizontal nystagmus
- ☒ Ataxia and slurred speech
- ☒ Phenytoin level 26 mcg/mL
- ☐ Gingival hyperplasia
- ☐ Hirsutism
- ☒ New diplopia
- ☐ Pink urine

Rationale: Toxicity reflects CNS effects — nystagmus, ataxia, diplopia, slurred speech — and a level >20 mcg/mL. Gingival hyperplasia and hirsutism are *chronic* side effects, not toxicity. Pink urine is not associated with phenytoin.

BOW-TIE • GENERATE SOLUTIONS + TAKE ACTION

2. Status Epilepticus

A 24-year-old presents to the ED in active generalized tonic-clonic seizure for 7 minutes. Glucose 96 mg/dL. SpO₂ 91% on RA. No IV yet.

Actions to Take (choose 2)	Condition	Parameters to Monitor (choose 2)
☒ Position on side, suction, O₂ ☐ Administer IV phenytoin first ☒ Establish IV access, give IV lorazepam 0.1 mg/kg ☐ Insert oral airway during seizure ☐ Restrain extremities	STATUS EPILEPTICUS	☒ Respiratory rate & SpO₂ ☒ Seizure duration & pattern ☐ Phenytoin level immediately ☐ Daily weights

Rationale: ABCs always come first. After airway, suction, O₂ → IV lorazepam is first-line. Phenytoin/fosphenytoin is *second-line* after benzo fails. Never insert anything into the mouth during a seizure. Respiratory status is the #1 monitoring parameter because both seizure activity and lorazepam cause respiratory depression.

MATRIX • ANALYZE CUES

3. New Parkinson's Medications — Anticipated vs Adverse

A 68-year-old started carbidopa-levodopa 25/100 TID and pramipexole 0.125 mg TID 3 weeks ago. The nurse reviews findings at follow-up.

Finding	Anticipated	Adverse — Notify
Dark-colored urine	✓	
Improved bradykinesia	✓	
New-onset gambling at the casino		✓
Mild nausea taken with food	✓	
Fell asleep while driving last Tuesday		✓
BP 110/70 sitting, 88/52 standing, dizzy		✓
Vivid dreams	✓	
New writhing tongue movement		✓

Rationale: Impulse-control disorder, sleep attacks, severe orthostasis, and dyskinesia are pharmacologically driven adverse effects that require provider notification and possible dose adjustment. Dark urine, mild nausea, and vivid dreams are common and tolerated. Improved bradykinesia is the desired effect.

PRIORITIZATION • ORDERED RESPONSE

4. Acute Dystonic Reaction

A psychiatric inpatient received IM haloperidol 30 minutes ago and now has fixed upward eye deviation, neck stiffness, and difficulty swallowing. Order the nurse's actions:

1. Assess airway patency and respiratory effort
2. Notify the prescriber and request benztropine IM
3. Administer benztropine 1–2 mg IM as ordered
4. Remain at the bedside; reassure the client (dystonia is frightening but reversible)
5. Document the event, time, and response

Rationale: Acute dystonic reaction can compromise the airway (laryngeal dystonia). Always assess airway first, then secure the antidote order, administer, support the client, and document. Stopping haloperidol alone is not enough — the active dystonia must be treated.

CLOZE / DROP-DOWN • EVALUATE OUTCOMES

5. Migraine Therapy Selection

A 62-year-old with controlled HTN and a prior MI (4 years ago) reports 8 migraine days/month. Current meds: lisinopril, atorvastatin, ASA 81 mg.

The most appropriate **abortive** agent is _____, because _____. For **prevention**, _____ is preferred over topiramate because _____.

Blank	Options	Best
Abortive agent	sumatriptan / dihydroergotamine / ubrogepant / butalbital	ubrogepant
Because	it is cheapest / it does not cause vasoconstriction / it works prophylactically / it is sedating	it does not cause vasoconstriction
Prevention	valproic acid / ergotamine / erenumab / opioids	erenumab
Because	it is not teratogenic, cognitive, or vasoconstrictive / it is the cheapest / it works immediately / it reverses dementia	it is not teratogenic, cognitive, or vasoconstrictive

Rationale: Triptans and ergots are contraindicated in CAD/prior MI due to vasoconstriction. Gepants (ubrogepant, rimegepant) and CGRP monoclonal antibodies (erenumab) act on CGRP without vasoconstriction. Topiramate is effective but has cognitive side effects and teratogenicity concerns — less ideal for many patients. Valproate is contraindicated in pregnancy and heavily monitored.

05

Mini Case Study — NCJMM Walkthrough

Apply all six clinical-judgment steps to a high-stakes neuro-pharm scenario.

The Newly Diagnosed Epileptic on Phenytoin

A 22-year-old college student with new-onset generalized tonic-clonic seizures has been on phenytoin 300 mg PO daily for 6 weeks. Returns to clinic with their roommate reporting "she's been falling, slurring her speech, and her eyes are jumpy."

BP 118/72	HR 88	RR 16	SpO ₂ 98%	Temp 36.8	Glucose 92
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Labs: Phenytoin level 27 mcg/mL · Albumin 3.9 · ALT 32 · Creatinine 0.7 · Negative pregnancy test.

Exam: Horizontal nystagmus, wide-based gait, mild slurring. Gums slightly swollen. No rash. No fever.

1. RECOGNIZE CUES

Ataxia + horizontal nystagmus + slurred speech + phenytoin level above therapeutic range (10–20) + reports of falls. Gingival hyperplasia is chronic.

2. ANALYZE CUES

Classic CNS pattern of

PHENYTOIN TOXICITY

. Albumin is normal, so the total level reflects free drug accurately. No rash → not SJS. Glucose normal → not hypoglycemia-mimicking seizures. Pregnancy negative.

3. PRIORITIZE HYPOTHESES

Most likely: phenytoin toxicity (level 27 with classic triad). Less likely: hepatic involvement (LFTs normal), drug interaction, breakthrough seizures, alcohol use (must screen).

4. GENERATE SOLUTIONS

(a) Hold next phenytoin dose. (b) Notify provider with level + symptoms. (c) Fall precautions immediately. (d) Screen for adherence errors, new meds, alcohol. (e) Consider switching to levetiracetam or adding it if interactions/issues continue. (f) Reinforce contraception teaching and dental care.

5. TAKE ACTION

Hold dose; place fall-precaution signage; reposition close to nurse's station; provider notified; dose reduced from 300 mg to 200 mg daily with repeat level in 5–7 days; pt counseled to avoid driving until cleared; medication-reconciliation reveals new sertraline added 2 weeks ago — possible interaction; dental hygiene reinforced.

6. EVALUATE OUTCOMES

One week later: level 18 mcg/mL, gait improved, no nystagmus, no new seizures. Goals met: therapeutic level achieved without recurrence, fall risk reduced, adherence reinforced. Continue plan, monthly levels, dental f/u at 3 months.

06

Red-Flag Findings — Stop / Hold / Call

Any of these = the nurse acts **now**.

- 🚫 **Sumatriptan + chest pressure / jaw pain** → 12-lead ECG, troponin, hold drug — coronary vasospasm or MI until proven otherwise.
- 🚫 **Phenytoin IV with purple, cold, painful limb** → STOP infusion, leave catheter, elevate, call provider — purple-glove syndrome / extravasation.
- 🚫 **Any new rash on phenytoin, carbamazepine, lamotrigine, or valproate** → hold drug, notify — Stevens-Johnson syndrome risk.
- 🚫 **Donepezil + HR < 50 with dizziness/syncope** → hold, atropine ready, ECG.
- 🚫 **Levodopa abruptly stopped** → fever + rigidity + autonomic instability = neuroleptic malignant-like syndrome → rapid response, IV fluids, cooling, resume levodopa.
- 🚫 **Topiramate + sudden eye pain / vision change** → acute angle-closure glaucoma — discontinue, ophthalmology emergency.
- 🚫 **Valproate + confusion (even with normal LFTs)** → check ammonia → hyperammonemic encephalopathy.
- 🚫 **Status epilepticus >5 min** → IV/IO lorazepam 0.1 mg/kg first line; ABCs first.
- 🚫 **Rivastigmine patch errors** (old patch not removed) → remove all patches, atropine if symptomatic.
- 🚫 **Levetiracetam + new suicidal ideation** → emergent mental-health evaluation; FDA class-wide AED warning.

07 Confusing Drugs — Side-by-Side

High-yield pairings the NCLEX loves to scramble.

Donepezil (Aricept)

- **Mechanism:** ↑ acetylcholine
- **Risk:** Bradycardia, syncope, GI bleed
- **Watch:** Apical HR, weight
- **SLUDGE** = cholinergic excess
- Reversal: **atropine**

Memantine (Namenda)

- **Mechanism:** ↓ glutamate (NMDA block)
- **Risk:** Confusion, seizures (rare)
- **Watch:** Renal function (dose-adjust)
- No anticholinergic burden
- Reversal: **none**

Levodopa/Carbidopa

- Replaces dopamine in brain
- Avoid **high-protein meals** (block absorption)
- Avoid B6, MAOIs, antipsychotics
- Watch for **dyskinesia** after months
- **Never stop abruptly**

Pramipexole / Ropinirole

- Direct dopamine receptor agonist
- **Sleep attacks** + impulse-control disorders
- Caution in older adults (hallucinations)
- Renal dose-adjust (pramipexole)
- Taper to discontinue

Sumatriptan (triptan)

- **Vasoconstrictor**
- Contraindicated: CAD, MI, stroke, uncontrolled HTN, pregnancy, hemiplegic migraine
- Acute migraine only — not preventive
- Watch for serotonin syndrome with SSRIs

Ubrogepant / Rimegepant (gepant)

- **CGRP blocker — no vasoconstriction**
- Safe in CAD, hemiplegic migraine
- Watch hepatic function
- Can be used same day as triptan

IV Lorazepam (status epilepticus)

- **First-line** rescue
- Mechanism: ↑ GABA
- Risk: respiratory depression
- Reversal: flumazenil (cautious)
- Push slowly (≤2 mg/min)

IV Fosphenytoin (status epilepticus)

- **Second-line** after benzo
- Mechanism: Na-channel block
- Risk: hypotension, dysrhythmia
- No reversal — supportive
- Max 150 mg PE/min; cardiac monitor

08 Day 12 Infographic Summary

Neuro Pharm at a Glance

EMERGENCY

Status Epilepticus

ABCs first → glucose check → IV lorazepam 0.1 mg/kg → fosphenytoin → levetiracetam → anesthesia

PARKINSON

Levodopa/Carbidopa

Take on empty stomach; never stop abruptly; watch dyskinesia & impulse-control with agonists

ALZHEIMER

Donepezil + Memantine

Cholinesterase inhibitor + NMDA blocker — different mechanisms, additive benefit, slows decline

CARDIAC RISK

Triptans & Ergots

Vasoconstrict — avoid in CAD, MI, stroke, pregnancy, uncontrolled HTN. Use a gepant instead

NARROW INDEX

Phenytoin 10–20 mcg/mL

Toxicity = nystagmus, ataxia, slurred speech. IV: NS only, slow push, rash = stop drug

TERATOGEN

Valproate & Topiramate

Reproductive-age females need contraception + folate; valproate → liver + ammonia; topiramate → eyes + stones

FAVORABLE

Levetiracetam (Keppra)

Few interactions; renal dose-adjust; watch mood/behavior (FDA class warning, "Kepprage")

EPS RESCUE

Benztropine IM

Acute dystonia from antipsychotic = airway emergency — give IM right away, then teach about contraindications

NEWER

CGRP Therapy

"-gepant" oral (abortive) and "-mab" monthly SQ (preventive). No vasoconstriction. Watch erenumab constipation

DO-NOT-MISS

Rivastigmine Patch

Always **remove old patch before applying new one** — double-patching = cholinergic crisis

Bottom line: Neuro pharm questions test *safety* > mechanism. Memorize the contraindication list, the rescue sequence, the antidote pairs, and the "never stop abruptly" drugs. The NCLEX rarely asks *what* the drug does — it asks *what to do* when something goes wrong.