NCLEX-RN · 2026 TEST PLAN · PHARMACOLOGY INFOGRAPHIC

Calcium Channel Blockers

Rx

A high-yield, clinical-judgment-focused review of CCBs — covering dihydropyridines (DHPs) and non-dihydropyridines (non-DHPs), with priority safety, NCLEX traps, and clinical-reasoning anchors.

Class: Calcium Channel Blockers | System: Cardiovascular | NGN / NCJMM Aligned

1 Drug overview

INDICATIONS

WHY WE GIVE CCBS

- **Hypertension** — first-line (esp. African American & elderly pts, per JNC/ACC guidelines)
- **Angina** — stable, unstable, and **vasospastic (Prinzmetal's)**
- **Rate control** in atrial fibrillation / atrial flutter *(non-DHPs only)*
- **SVT termination** — IV verapamil or diltiazem
- **Raynaud's phenomenon** — nifedipine, amlodipine
- **Subarachnoid hemorrhage** — **nimodipine** prevents cerebral vasospasm
- **Hypertensive emergency** — IV nicardipine or clevidipine

TWO SUBCLASSES (MUST KNOW)

- **Dihydropyridines (DHPs)** — end in **-dipine**. Vascular-selective → **vasodilation**.
  Amlodipine, nifedipine, nicardipine, clevidipine, felodipine, nimodipine
- **Non-dihydropyridines** — **verapamil & diltiazem**. Cardiac-selective → **↓HR, ↓contractility, ↓AV conduction**.
- **Memory:** "DHP = Dilates vessels. Non-DHP = Depresses the heart."

2 Mechanism of action

SIMPLIFIED

CCBs block **L-type calcium channels**, preventing Ca^{2+} entry into vascular smooth muscle and/or cardiac tissue. Less intracellular Ca^{2+} → less muscle contraction.

DIHYDROPYRIDINES (VASCULAR)

Block L-type Ca^{2+} in arterioles → ↓ Ca^{2+} in smooth muscle → Vasodilation → ↓ SVR / ↓ afterload → ↓ BP

NON-DHPS (CARDIAC)

Block L-type Ca^{2+} in SA / AV node & myocardium →

↓ SA firing → ↓ HR + ↓ AV conduction →

↓ contractility → ↓ myocardial O_2 demand

KEY PHYSIOLOGY ANCHOR

- Calcium is required for **muscle contraction** everywhere — vascular, cardiac, and GI smooth muscle. Block it → everything relaxes.
- This explains **why verapamil causes constipation** (GI smooth muscle relaxation).
- This explains **why DHPs cause peripheral edema** (arteriolar dilation > venular dilation → capillary leak).

3 Therapeutic effects

WHAT "WORKING" LOOKS LIKE

HYPERTENSION

- BP trending toward goal (<130/80 for most)
- Patient reports ↓ headache, ↓ dizziness
- No orthostatic symptoms

ANGINA

- ↓ frequency / severity of chest pain
- ↑ exercise tolerance
- ↓ PRN nitroglycerin use

AFIB RATE CONTROL

- HR < 110 at rest (lenient) or < 80 (strict)
- Improved cardiac output, ↓ palpitations

NIMODIPINE (SAH)

- No new neuro deficits
- Stable LOC, no vasospasm on imaging

4 Side effects & adverse reactions

COMMON VS SERIOUS

COMMON — DHPS (-DIPINES)

- **Peripheral edema** — ankles/feet (dose-related)
- **Headache** — from vasodilation
- **Flushing** — face, neck
- **Reflex tachycardia** — body compensates for ↓BP
- **Dizziness / orthostatic hypotension**
- **Gingival hyperplasia** — classic with nifedipine

COMMON — NON-DHPS (VERAPAMIL / DILTIAZEM)

- **Bradycardia** — HR < 60
- **Hypotension**
- **Constipation** — verapamil >> diltiazem (classic boards Q)
- **Fatigue**
- **Dizziness**

SERIOUS / LIFE-THREATENING (STOP & NOTIFY)

- **AV block (2°/3°)** — non-DHPs → can progress to asystole
- **Symptomatic bradycardia** → syncope, ↓CO
- **Heart failure exacerbation** — ↓contractility (non-DHPs)
- **Cardiogenic shock** — esp. with beta-blocker combo
- **Severe hypotension** — SBP < 90
- **Reflex tachycardia worsening ischemia** — short-acting nifedipine in ACS is contraindicated
- **Ventricular fibrillation** — verapamil in WPW + afib
- **Hepatotoxicity** — rare, all CCBs

TOXICITY PICTURE (OVERDOSE)

- **Profound hypotension + bradycardia + hyperglycemia** (CCBs block Ca^{2+} in pancreatic β-cells → ↓insulin release)
- **First-line antidote:** IV calcium (calcium gluconate or chloride)
- Adjuncts: IV fluids, glucagon, **high-dose insulin + dextrose ("HIE therapy")**, vasopressors, lipid emulsion

5 Priority nursing considerations

ASSESS · MONITOR · HOLD · NOTIFY

→ ASSESS & MONITOR

- **BP** before every dose + orthostatic checks
- **HR / apical pulse** × 1 full minute (esp. non-DHPs)
- **ECG** — look for PR prolongation, AV block
- **Peripheral edema** — daily weights, ankle/sacral check
- **Chest pain** frequency, character, triggers
- **Signs of HF** — SOB, crackles, JVD, weight gain > 2 lb/day
- **Bowel pattern** (verapamil)

→ HOLD THE DRUG IF...

- **HR < 60** bpm (non-DHPs) — notify provider
- **SBP < 90** mmHg or symptomatic hypotension
- **New 2°/3° AV block** on ECG
- **Signs of decompensated HF**
- **Dizziness, syncope, or near-syncope**

CONTRAINDICATIONS

- 2°/3° AV block *without* pacemaker *(non-DHPs)*
- Sick sinus syndrome *(non-DHPs)*
- Severe hypotension / cardiogenic shock
- Decompensated systolic HF *(non-DHPs; amlodipine/felodipine are OK)*
- **WPW with atrial fibrillation** — verapamil/diltiazem can precipitate VF
- Pregnancy — most CCBs category C (nifedipine used cautiously)

KEY DRUG INTERACTIONS

- **Beta-blockers + non-DHP** = additive bradycardia, heart block, HF → **AVOID** (huge NCLEX trap)
- **Digoxin + verapamil / diltiazem** → ↑ dig levels → dig toxicity
- **Grapefruit juice** → ↑ CCB levels (esp. felodipine, amlodipine, nifedipine) via CYP3A4
- **Simvastatin + amlodipine/diltiazem** → rhabdomyolysis risk; cap simvastatin at 20 mg/day
- **Other antihypertensives** → additive hypotension
- **CYP3A4 inhibitors** (erythromycin, azoles, protease inhibitors) → ↑ CCB levels

6 Labs & diagnostics

WHAT TO WATCH

PARAMETER	BASELINE / MONITORING	WHAT ABNORMAL MEANS
BP	Every dose; home log	SBP < 90 → hold & notify
HR (apical)	Non-DHPs: every dose	< 60 → hold; < 50 = symptomatic concern
ECG	Baseline + routine if non-DHP	PR > 0.20 s, dropped beats = AV block
LFTs (AST/ALT)	Baseline + periodic	↑ 3× ULN → hepatotoxicity; notify
BUN / creatinine	Baseline + periodic	Adjust dose in renal impairment
Digoxin level	If on combo with verapamil/diltiazem	> 2.0 ng/mL = toxicity
Daily weight	Outpatient teaching	↑ 2 lb/day or 5 lb/week → HF / edema
Glucose	In overdose scenarios	Hyperglycemia = classic CCB toxicity sign

7 Administration & safety

ROUTE · TIMING · HIGH-ALERT

ROUTES & FORMS

- **PO** — most outpatient use (amlodipine, diltiazem ER, verapamil ER, nifedipine XL)
- **IV** — **nicardipine, clevidipine** for hypertensive emergency; **verapamil, diltiazem IV** for SVT/afib rate control
- **Sublingual nifedipine** — **NOT used** (precipitous BP drop, stroke/MI risk)

CRITICAL SAFETY RULES

- **Do NOT crush / chew** sustained-release tablets (SR, ER, XL, CD, XR) — dose-dumping can kill
- **Continuous cardiac monitoring** for IV verapamil / diltiazem
- **BP & HR before every dose** — document
- **Nimodipine:** 60 mg PO q4h × 21 days post-SAH; if can't swallow, extract capsule contents into syringe and give via NG/PEG — **NEVER give nimodipine IV** (deaths reported)
- **IV clevidipine** — lipid emulsion; contraindicated in soy/egg allergy, defective lipid metabolism
- **Have IV calcium available** for overdose / toxicity

8 Patient education

TEACH-BACK POINTS

MUST-KNOW TEACHING

- **Rise slowly** from sitting or lying — orthostatic hypotension risk
- **Take at the same time daily**; don't skip doses
- **Don't stop abruptly** — rebound HTN, angina, tachycardia
- **Avoid grapefruit / grapefruit juice** — raises drug level
- **Swallow ER tablets whole** — no crushing, splitting, chewing
- **Good oral hygiene** — floss, dental visits (gingival hyperplasia with nifedipine)
- **Limit alcohol** — additive hypotension
- **Elevate legs** / compression stockings for ankle edema
- **Daily weights** — report ↑ 2 lb/day or 5 lb/week

CALL 911 / SEEK HELP FOR...

- Fainting, severe dizziness, or near-syncope
- Irregular or very slow pulse (< 50)
- New or worsening chest pain
- Sudden shortness of breath, leg swelling, > 2 lb/day weight gain
- Yellowing of skin/eyes (hepatotoxicity)
- Severe constipation / no BM > 3 days (verapamil)

9 NCLEX test traps

⚠ PRIORITY TRIPWIRES

Trap #1 — Combining a non-DHP with a beta-blocker +

Trap #2 — Holding parameters: HR vs BP +

Trap #3 — Grapefruit juice +

Trap #4 — Peripheral edema ≠ heart failure +

Trap #5 — Short-acting nifedipine in acute MI or unstable angina +

Trap #6 — Verapamil in WPW + atrial fibrillation +

Trap #7 — Nimodipine is NOT for hypertension +

Trap #8 — Verapamil causes constipation (not diarrhea) +

Trap #9 — CCB overdose → hyperglycemia +

Trap #10 — Don't confuse "dipine" with other -ine endings +

10 Memory boosters

MNEMONICS & PATTERNS

CORE MNEMONICS

- **"Very Nice Drugs"** — Verapamil, Nifedipine, Diltiazem (the big 3)
- **DHP = Dilates** vessels · **Non-DHP = Depresses** the heart
- **Verapamil → "Very Constipating"**
- **Nifedipine → "Nasty gums"** (gingival hyperplasia)
- **"CAL-cium blocker, give CAL-cium"** — antidote for overdose is IV calcium
- **Nimodipine → "Ni-mo brain"** — only CCB with cerebral selectivity; SAH use

CROSS-CLASS PATTERNS

- **All cardiac suffix endings:** -dipine (CCB), -olol (BB), -pril (ACE), -sartan (ARB), -osin (α-blocker), -zosin (selective α_1)
- **Three "rate-control" drug classes for afib:** non-DHP CCBs, beta-blockers, digoxin
- **Hold-for-HR drugs:** digoxin, beta-blockers, non-DHP CCBs (all hold < 60)
- **Grapefruit-sensitive drugs:** CCBs (esp. felodipine), statins, some benzos, cyclosporine

SIDE EFFECT ACRONYM — "CCB FLAB"

- **C** — Constipation (verapamil)
- **C** — Cardiac depression (non-DHPs)
- **B** — Bradycardia / AV block (non-DHPs)
- **F** — Flushing (DHPs)
- **L** — Lower-extremity edema (DHPs)
- **A** — AV block (non-DHPs)
- **B** — BP drop (all)

★ Most-tested drugs in this class

CLASS ADD-ON

DRUG	SUBCLASS	PRIMARY USE	SIGNATURE BOARD FACT
Amlodipine (Norvasc)	**DHP**	HTN, chronic stable angina	Long half-life (30–50 h); safe in HF; ankle edema is #1 complaint
Nifedipine (Procardia, Adalat)	**DHP**	HTN, vasospastic angina, Raynaud's	**Short-acting form = never in ACS**; gingival hyperplasia
Nicardipine (Cardene IV)	**DHP**	Hypertensive emergency (IV drip)	Titratable; continuous BP monitoring required
Clevidipine (Cleviprex)	**DHP**	Hypertensive emergency	Lipid emulsion; avoid in soy/egg allergy
Felodipine	**DHP**	HTN	Most grapefruit-juice-sensitive CCB
Nimodipine (Nymalize)	**DHP**	Prevention of vasospasm after SAH	**PO only — fatal if given IV**; 60 mg q4h × 21 days
Verapamil (Calan, Verelan)	**Non-DHP**	SVT, afib rate control, HTN, angina	Worst constipation of the class; ↑ digoxin levels; avoid in WPW + afib
Diltiazem (Cardizem)	**Non-DHP**	Afib/flutter rate control, HTN, angina	Balanced cardiac + vascular effects; IV drip for rapid rate control

KEY CLASS DISTINCTIONS AT A GLANCE

- **DHPs:** end in *-dipine*, vascular-selective → **vasodilation & edema & reflex tachycardia**. Safer in HF (amlodipine, felodipine).
- **Non-DHPs:** verapamil & diltiazem → ↓ **HR,** ↓ **contractility, AV block**. Used for arrhythmias, **avoided** in systolic HF.
- **IV CCBs:** nicardipine, clevidipine (HTN emergency); verapamil, diltiazem (SVT/afib).
- **Special use:** *nimodipine = brain*, *clevidipine/nicardipine = ICU HTN*, *amlodipine = outpatient workhorse*.

⚠ CLINICAL JUDGMENT SNAPSHOT · NCJMM

If you forget everything else — remember this.

#1 PRIORITY RISK

Hemodynamic collapse — symptomatic bradycardia, AV block, and severe hypotension, particularly with **non-DHPs (verapamil, diltiazem)** and especially when combined with a beta-blocker or digoxin.

WHAT WILL HARM THE PATIENT FIRST

Cardiovascular depression. Rapid drop in BP, HR, and cardiac output → syncope, heart block, shock. With IV push verapamil or diltiazem, the drop can be minutes. In overdose, add **hyperglycemia** to the picture.

FIRST NURSING ACTION IN A SCENARIO

Before giving: assess **apical HR × 1 full minute and BP**. If HR < 60 or SBP < 90 → **HOLD the dose and notify the provider**.
If the patient becomes symptomatic after a dose:

1. Lay patient flat, elevate legs.
2. Check BP, HR, ECG, pulse ox.
3. Stop further CCB doses; **prepare IV calcium gluconate** (antidote).
4. Establish IV access, prepare atropine / pacing / vasopressors per order.
5. Notify the rapid response / provider.