NCLEX-RN ▸ 2026 TEST PLAN · NGN / NCJMM ALIGNED · VOL. ${'\U00B7'} CARDIOVASCULAR · HIGH-ALERT MED

Nitro·glycerin

organic nitrate · the original "rescue" vasodilator

GENERIC
Nitroglycerin (NTG)

CLASS
Organic Nitrate · Vasodilator · Antianginal

SYSTEM
Cardiovascular

HIGH-ALERT IV · ALL ROUTES

BRANDS: Nitrostat (SL tab) · Nitrolingual / Nitromist (spray) · Nitro-Bid (ointment) · Nitro-Dur / Minitran (patch) · Tridil (IV) · Nitro-Time (PO ER)

STOP NEVER CO-ADMINISTER WITH PDE-5 INHIBITORS (SILDENAFIL / TADALAFIL / VARDENAFIL) WITHIN 24-48 HRS · CATASTROPHIC HYPOTENSION · DEATH

01 DRUG OVERVIEW — Why we give it

- **Acute angina** — chest pain relief (SL tab / spray)
- **Chronic angina prophylaxis** — PO ER, ointment, patch
- **Acute MI** — IV (Tridil) for ongoing ischemia
- **Acute decompensated heart failure** — IV (preload + afterload reduction)
- **Hypertensive emergency / urgency** — IV titrated
- **Controlled hypotension** during surgery — IV
- **Coronary vasospasm** (Prinzmetal angina)

RESCUE: SL / SPRAY · PROPHYLAXIS: PATCH / PO · ICU: IV TITRATION

02 MECHANISM OF ACTION — How it works

NTG → converted to **nitric oxide (NO)** in vascular smooth muscle
NO → activates **guanylate cyclase** → ↑ **cGMP**
↑ cGMP → smooth muscle **relaxation**

VENOUS dilation (low dose) → ↓ **preload** → ↓ myocardial O_2 demand
ARTERIAL dilation (high dose) → ↓ **afterload**
Coronary dilation → ↑ O_2 **supply** to ischemic myocardium

Net effect: ↓ workload + ↑ perfusion = relief of ischemia

03 THERAPEUTIC EFFECTS
It's working when...

- ✓ **Chest pain relief** within 1–3 min (SL/spray)
- ✓ **BP decreases** (target ↓ ~10% in normotensive; ↓ ~30% in HTN crisis)
- ✓ **ST-segment normalization** on ECG
- ✓ **Improved exercise tolerance** (chronic use)
- ✓ **Decreased pulmonary congestion** in acute HF (↓ JVD, ↓ crackles)
- ✓ **Reduced PCWP** on hemodynamic monitoring (IV)

04 SIDE EFFECTS · ADVERSE REACTIONS
Common vs Serious

• Common

- **Headache** (throbbing — #1 SE)
- Flushing, warm skin
- Dizziness / lightheadedness
- Orthostatic hypotension
- Reflex tachycardia
- Nausea

Serious

- ! **Severe hypotension → shock**
- ! Syncope → fall / injury
- ! Reflex tachy → ↑ ischemia
- ! Methemoglobinemia (high dose)
- ! Tolerance (continuous use)
- ! Paradoxical bradycardia (rare)
- ! ↑ ICP (head trauma pts)

05 PRIORITY NURSING CONSIDERATIONS
Assess · Monitor · Hold

- **ASSESS:** chest pain (PQRST), BP, HR, SpO_2 — *before & after every dose*
- **MONITOR:** continuous ECG (IV), pain scale, mental status
- **NOTIFY HCP:** pain unrelieved by 1 SL, SBP <90, HR >100
- ⚠ **CONTRAINDICATIONS:** PDE-5 inhibitors (24–48 hr), riociguat, RV infarct, severe AS / HOCM, ↑ ICP, severe anemia, hypersensitivity, constrictive pericarditis
- **INTERACTIONS:** alcohol, antihypertensives, β-blockers, CCBs, TCAs (additive ↓ BP)

✋ HOLD & NOTIFY HCP IF

SBP < 90 mmHg
HR > 100 bpm
HR < 50 bpm
Recent PDE-5 use

06 LABS · DIAGNOSTICS
What to watch

- **BP & HR** — the most important "labs" — q5 min during IV titration; q15 min once stable
- **12-lead ECG** — ST segments, ischemic changes; resolution = working
- **Troponin I/T** — trend if MI suspected
- **BNP / NT-proBNP** — heart failure response
- **CBC / Hgb** — severe anemia is contraindication
- **Methemoglobin level** — if cyanosis with normal SpO_2 on prolonged high-dose IV
- **Hemodynamics** (ICU): ↓ PCWP, ↓ SVR, stable CO

ADMINISTRATION · SAFETY

07 All routes — every detail you must know

ROUTE	USE	DOSE / ONSET	HOW TO GIVE	CRITICAL SAFETY
Sublingual Tab Nitrostat	ACUTE	0.3 / 0.4 / 0.6 mg Onset 1–3 min Duration 30–60 min	Sit/lie down · place under tongue · do **NOT** swallow, chew, crush · let dissolve · 1 tab q5 min × 3	**Burning/tingling = drug is fresh.** Store in **original amber glass**, away from heat/light. Replace 3–6 mo after opening. Carry at all times.
Translingual Spray Nitrolingual · Nitromist	ACUTE	0.4 mg/spray Onset 1–3 min	Do **NOT** shake. Prime new bottle (5 sprays in air). Spray **on or under** tongue · close mouth · do not inhale · 1 spray q5 min × 3	Longer shelf life than tabs. Same hypotension/PDE-5 cautions. Keep upright.
PO Extended-Release Nitro-Time	CHRONIC	2.5–9 mg q8–12 h Onset 20–45 min Duration 8–12 h	Swallow **whole** · do not crush/chew · empty stomach · same time daily · NOT for acute attacks	Maintain **nitrate-free interval** (e.g., skip overnight dose) to prevent tolerance.
Topical Ointment Nitro-Bid 2%	CHRONIC	½–2 inches q6–8 h Onset 15–60 min Duration 4–8 h	Wear **gloves** (nurse) · measure on application paper · apply to clean, dry, hairless skin (chest/upper arm) · cover with paper/wrap · **rotate sites** · remove old dose first · wipe off if BP drops	**NEVER touch with bare hands** — nurse will absorb it (HA, hypotension). Date / time / initial paper.
Transdermal Patch Nitro-Dur · Minitran · Transderm-Nitro	CHRONIC	0.1–0.8 mg/hr Onset 30–60 min Duration 8–14 h	Apply to **clean, dry, hairless** skin · **rotate sites** daily · ON 12–14 h, **OFF 10–12 h** (typically apply AM, remove HS) · remove old patch first · fold sticky-side in to discard	**REMOVE before defibrillation** (burn / arc risk) · **REMOVE before MRI** (foil backing burns) · nitrate-free interval prevents tolerance.
IV Infusion Tridil — HIGH-ALERT	EMERGENCY / ICU	Start 5 mcg/min Titrate ↑ 5 mcg/min q3–5 min Range 5–200 mcg/min	**Glass bottle ONLY** · **Non-PVC (polyethylene) tubing** — NTG absorbs into PVC, drug loss up to 80% · infusion pump · do **NOT** mix with other meds · dedicated line	BP q5 min during titration → q15 min once stable · arterial line preferred · continuous ECG · taper to wean (rebound ischemia).

ROUTE	USE	DOSE / ONSET	HOW TO GIVE	CRITICAL SAFETY
Buccal ER (less common)	CHRONIC	1–3 mg q3–5 h Duration 3–5 h	Place between **cheek and gum**, upper lip · let dissolve slowly · do not chew/swallow	Patient may eat/drink while in place.

08 PATIENT EDUCATION — What they MUST know

- **Sit or lie down** before taking SL — prevents fall from orthostasis
- **Carry SL tabs at all times** — original amber glass bottle
- Take at **first sign of chest pain**; may take prophylactically before exertion
- Call **911 immediately** if chest pain is unrelieved after the **FIRST** SL dose *(current AHA guideline)*. Continue 1 tab q5 min up to 3 doses while EMS responds.
- Burning/tingling sensation under tongue = **drug is fresh and active** (not a problem)
- **Headache is expected** — take acetaminophen; will diminish over days. Do **NOT** stop drug.
- **Replace SL tabs every 3–6 months** after opening (loses potency)
- **Avoid:** alcohol, hot tubs, saunas, hot showers, prolonged heat (additive vasodilation → severe hypotension)
- ⚠ **NEVER take with Viagra · Cialis · Levitra · Stendra · Revatio** — fatal hypotension. Tell every provider.
- **Rise slowly** from sitting/lying
- **Patch:** remove HS for 10–12 hr nitrate-free interval; rotate sites; remove before MRI/defib

09 NCLEX TEST TRAPS — ⚠ Where students lose points

"Pt asks if he can take Viagra for ED while on NTG..."
→ STOP. Life-threatening hypotension. 24–48 hr washout. Notify HCP — pick the option that DOES NOT give NTG.

"Pt c/o throbbing headache after SL NTG..."
→ EXPECTED. Offer acetaminophen. Continue therapy.

"Burning under the tongue..."
→ Tablet is FRESH/active. NOT expired.

"Patch worn 24/7 — pt reports no relief..."
→ TOLERANCE. Needs 10–12 hr nitrate-free interval.

"Code blue — patient has a NTG patch on chest..."
→ REMOVE patch before defibrillation (burn/arc).

"IV NTG running through standard PVC tubing..."
→ WRONG — drug absorbs into PVC. Use non-PVC + glass bottle.

"Inferior wall MI with RV involvement..."
→ NTG CONTRAINDICATED — RV is preload-dependent; will crash BP.

"Nurse applies ointment without gloves..."
→ Self-absorption → HA, hypotension. Always wear gloves.

"Pt waited 15 min and took 3 SL tabs before calling 911..."
→ Unsafe per current AHA — call 911 after FIRST unrelieved dose.

MEMORY BOOSTERS

10 Mnemonics & quick recall

"NITRO"

- **N** **Nitric oxide** = MOA
- **I** **Inferior/RV MI** = avoid
- **T** **Tabs/spray = acute**; patches = chronic
- **R** **Rest, replace** (q3–6 mo), **rotate** sites
- **O** **Off period** 10–12 hr (no tolerance)

The 6 H's of NTG

- **H** **Headache** (most common SE)
- **H** **Hypotension** (priority risk)
- **H** **Heart rate up** (reflex tachy)
- **H** **Hot flushing** of skin
- **H** **Hold the Viagra** (PDE-5 = death)
- **H** **Hold for SBP < 90**

Quick Recall Phrases

- ★ **"BURNING = WORKING"** — fresh SL tab
- ★ **"AMBER = PROTECTOR"** — light/heat sensitive
- ★ **"GLASS + NON-PVC"** — IV tubing rule
- ★ **"GLOVES OR HEADACHE"** — ointment rule
- ★ **"PATCH OFF BEFORE SHOCK"** — defib/MRI
- ★ **"ONE & DONE → CALL 911"** — current AHA

NGN / NCJMM

CLINICAL JUDGMENT SNAPSHOT

Think like an *NCLEX nurse.*

Q1

What is the #1 priority risk?

Severe hypotension → cardiovascular collapse, especially in combination with **PDE-5 inhibitors**, RV infarct, volume depletion, or aortic stenosis. Hypotension drops coronary perfusion → worsens the very ischemia you're treating.

Q2

What harms the patient FIRST?

Sudden drop in BP and reflex tachycardia. The patient gets dizzy → falls → fractures, OR coronary perfusion drops → MI extends → cardiogenic shock. Headache is expected; *hypotension is the killer.*

Q3

FIRST nursing action — chest pain scenario?

1. Have pt **sit or lie down**
2. Check **BP** (must be SBP > 90)
3. Verify **no PDE-5** in last 24–48 h
4. Give **1 SL NTG** (0.4 mg)
5. **Call 911** if pain unrelieved at 5 min
6. Reassess pain & BP · O_2 if hypoxic · 12-lead ECG

Most Tested *Nitrate-Class* Comparisons

DRUG	ROUTE	ONSET / DURATION	PRIMARY USE	KEY DISTINCTION
Nitroglycerin SL Nitrostat	Sublingual	1–3 min / 30–60 min	ACUTE ANGINA	Gold-standard **rescue** drug. Burning = fresh.
Isosorbide Dinitrate Isordil	PO (also SL)	15–40 min / 4–6 h	PROPHYLAXIS	BID/TID dosing — must build in nitrate-free interval.
Isosorbide Mononitrate Imdur · Monoket	PO (ER once daily)	30–60 min / 12–24 h	PROPHYLAXIS	Once-daily dosing; no first-pass metabolism. Most convenient PO nitrate.
Nitroglycerin IV Tridil	IV titration	Immediate / 3–5 min	MI · HF · HTN CRISIS	HIGH-ALERT. **Glass + non-PVC** tubing. Titrate to BP.
Nitroprusside Nipride	IV titration	Immediate / 1–10 min	HTN EMERGENCY	*Not a true nitrate but compared often.* Risk of **cyanide / thiocyanate toxicity** > 24–48 h. Light-protect tubing.

Key NCLEX distinction: Nitroglycerin SL is the rescue nitrate; isosorbide mononitrate is the maintenance nitrate. Both classes share PDE-5 contraindication, headache profile, and tolerance risk requiring a nitrate-free interval.