

CARDIOVASCULAR · PROCEDURE

Percutaneous Coronary *Intervention* (PCI)

A complete pre-op → intra-op → post-op nursing reference for the NGN NCLEX 2026

Cath Lab

Stent & Balloon

Antiplatelet Therapy

Bleeding Risk

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Definition & Overview

WHAT IT IS · WHY IT MATTERS

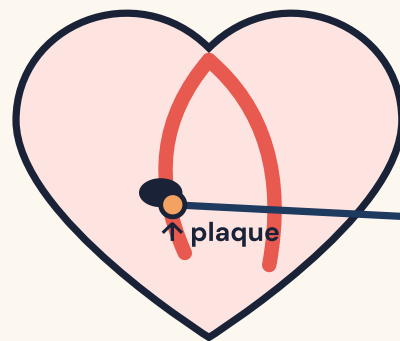
What is PCI?

- ▶ A **minimally invasive** procedure to open a blocked coronary artery using a balloon-tipped catheter, usually with stent placement
- ▶ Catheter inserted via **radial** (preferred) or **femoral** artery and threaded to the heart
- ▶ Also called *balloon angioplasty* or *PTCA* (percutaneous transluminal coronary angioplasty)

Why it Matters

- ▶ First-line emergent therapy for **STEMI** — goal: door-to-balloon time **≤ 90 minutes**
- ▶ Restores myocardial perfusion → limits infarct size → saves muscle and lives
- ▶ Used for: stable angina, unstable angina, NSTEMI, STEMI, multi-vessel CAD
- ▶ Less invasive alternative to **CABG** (which is open-heart surgery)

Coronary Artery



Stent



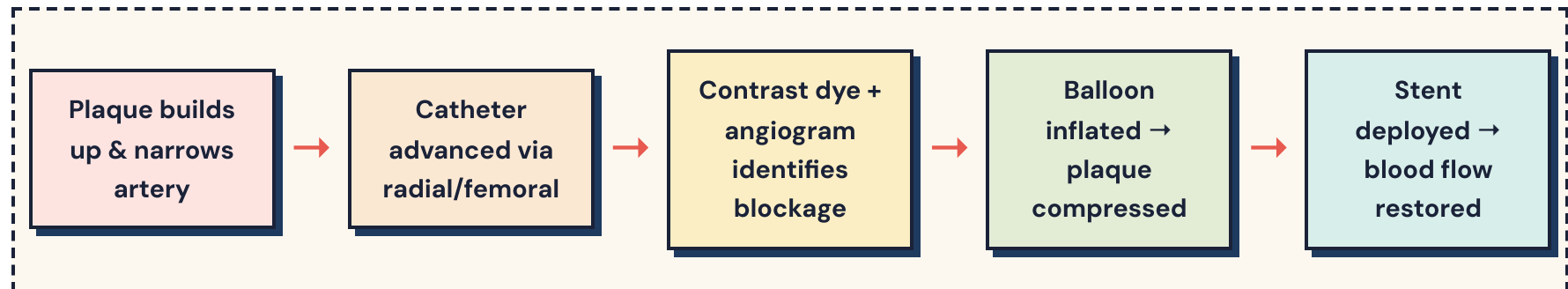
catheter

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Pathophysiology & Mechanism

FROM PLAQUE → REPERFUSION

Atherosclerotic plaque builds up in the coronary artery → narrows the lumen → reduces oxygen delivery to myocardium → ischemia → infarction if untreated. PCI mechanically reopens the vessel.



Stent Types

- ▶ **Bare-Metal Stent (BMS):** shorter DAPT duration (~1 month)
- ▶ **Drug-Eluting Stent (DES):** coated with medication to prevent restenosis; requires **DAPT 6–12+ months**

Access Routes

- ▶ **Radial (preferred):** ↓ bleeding, faster ambulation, no bedrest restriction
- ▶ **Femoral:** larger sheath possible; requires **strict bedrest 2–6 hr** with leg straight

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Indications & Red-Flag Findings

WHEN PCI IS NEEDED • WHAT TO WATCH FOR

PCI Indications (Pre-Procedure Cues)

- ▶ Chest pain unrelieved by nitroglycerin × 3 doses
- ▶ ST-elevation on 12-lead ECG (**STEMI**)
- ▶ Elevated cardiac biomarkers (**Troponin I, T**)
- ▶ Unstable angina / NSTEMI
- ▶ Positive stress test or cardiac catheterization findings
- ▶ Multi-vessel CAD not requiring CABG

Red Flag Findings (Pre or Post)

- ▶ **Chest pain returning** after PCI = stent occlusion until proven otherwise
- ▶ **ST changes** on continuous ECG monitoring
- ▶ **Diminished or absent pulse** distal to insertion site
- ▶ **Cool, pale, mottled extremity**
- ▶ **Sudden back/flank pain** + ↓BP = retroperitoneal bleed (femoral)
- ▶ **Hematoma expanding** at insertion site
- ▶ **Decreased urine output** = contrast-induced nephropathy

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The Three Phases of PCI Care

PRE-OP · INTRA-OP · POST-OP

Phase 1 · Pre-Op

Before the Procedure

- ▶ Verify **informed consent**
- ▶ **NPO 6–8 hours** before
- ▶ Assess allergies → especially **iodine, shellfish, contrast dye**
- ▶ Baseline labs: **BUN, creatinine, eGFR**, PT/PTT/INR, CBC, troponin
- ▶ **HOLD METFORMIN** 24–48 hr before & after (lactic acidosis risk with contrast)
- ▶ Two large-bore IVs (18 g)
- ▶ Mark **distal pulses** (pedal/radial) with X for post-op comparison
- ▶ Pre-medicate: **aspirin + clopidogrel** loading dose

Phase 2 · Intra-Op

During the Procedure

- ▶ Performed in the **cath lab** under fluoroscopy
- ▶ Patient is **awake** (conscious sedation, not general anesthesia)
- ▶ **Local anesthetic** at insertion site
- ▶ Sheath inserted → catheter advanced to coronary arteries
- ▶ **Contrast dye** injected → expect warm flushing sensation, metallic taste (normal & transient)
- ▶ Balloon inflated → *brief chest pain is expected* when artery is occluded
- ▶ Stent deployed and expanded

Phase 3 · Post-Op

After the Procedure

- ▶ **VS & site checks Q15 min × 1 hr**, then Q30 min × 2 hr, then Q1 hr
- ▶ Assess **5 P's** distal to site: Pulse, Pallor, Pain, Paresthesia, Paralysis
- ▶ **Femoral:** bedrest **2–6 hr flat, leg straight**, HOB ≤ 30°
- ▶ **Radial:** compression band, arm immobilized, can ambulate sooner
- ▶ Continuous **ECG monitoring** for arrhythmias
- ▶ Monitor insertion site for **bleeding, hematoma, bruit**
- ▶ **Force fluids** (PO & IV) → flush contrast through kidneys

- ▶ Shave/prep insertion site; remove jewelry, dentures
- ▶ Empty bladder pre-procedure
- ▶ Establish baseline VS, ECG, weight

against vessel wall

- ▶ **IV heparin** given during procedure to prevent clot
- ▶ Continuous ECG, BP, SpO₂, ACT monitoring
- ▶ Sheath may stay in for several hours post-procedure

- ▶ Monitor I&O, daily weight, BUN/Cr (contrast nephropathy)
- ▶ Assess for **recurrent chest pain** = stent occlusion → notify HCP STAT
- ▶ Resume diet as tolerated; encourage hydration

⚠ **DO NOT FLEX THE HIP / LEG** with femoral access. No coughing, sneezing, or straining without applying manual pressure to the site. Patient must lie flat — elevating the HOB > 30° can dislodge the clot and cause sudden, life-threatening bleeding.

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Priority Nursing Interventions

ABCS • SAFETY • NCLEX PRIORITIZATION

A Airway / Breathing / Circulation

- ▶ **Monitor** continuous ECG for dysrhythmias (V-tach, V-fib, bradycardia)
- ▶ **Assess** SpO₂, lung sounds — watch for pulmonary edema (fluid overload from contrast)
- ▶ **Check BP frequently** — hypotension = bleeding until proven otherwise
- ▶ **Palpate** distal pulses bilaterally and compare

🔴 Bleeding / Site Management

- ▶ **Inspect** insertion site Q15 min initially for hematoma, bleeding, swelling
- ▶ **Apply pressure** immediately if bleeding (femoral: pressure above puncture site)
- ▶ Look for **retroperitoneal bleeding**: flank/back pain, ↓BP, ↑HR, restlessness
- ▶ **Hold** antiplatelets/anticoagulants only with HCP order if bleeding

💧 Renal Protection

- ▶ **Encourage PO fluids** + maintain IV fluids to flush contrast
- ▶ **Monitor** urine output (≥ 30 mL/hr, ≥ 0.5 mL/kg/hr)
- ▶ Trend **BUN, creatinine** for 48–72 hr
- ▶ Hold metformin per protocol

💊 Medication Administration

- ▶ **Administer** dual antiplatelet therapy as ordered (aspirin + P2Y12 inhibitor)
- ▶ **Continue** heparin/bivalirudin per protocol
- ▶ **Manage** PRN nitroglycerin for chest pain (notify HCP if unrelieved)

- ▶ **Educate** on the absolute necessity of NEVER stopping antiplatelets without provider approval

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Complications to Recognize

RECOGNIZE EARLY · ACT FAST

Complication	Cues / Assessment Findings	Priority Action
Stent Thrombosis / Re-occlusion	Sudden return of chest pain, ST elevation, ↓BP, diaphoresis	Notify HCP STAT → repeat cath; give O ₂ , NTG, ASA
Bleeding / Hematoma at Site	Visible bleeding, swelling, ecchymosis, ↑HR, ↓BP	Apply firm pressure proximal to site; hold pressure 15+ min; notify HCP
Retroperitoneal Hemorrhage	Flank/back pain, abdominal distension, hypotension, restlessness, ↓ Hgb/Hct	Stop anticoagulants ; fluid resuscitation; CT abdomen; notify HCP
Pseudoaneurysm	Pulsatile mass, bruit, expanding hematoma at site	Mark site; do not apply pressure inappropriately; ultrasound; notify HCP
Contrast-Induced Nephropathy	↑ Creatinine, ↓ urine output 48–72 hr post; weight gain	Hydration; hold nephrotoxic meds; trend renal labs
Allergic Reaction to Contrast	Hives, itching, wheezing, hypotension, tongue swelling	Stop infusion; give O ₂ ; epinephrine + diphenhydramine + steroids per protocol
Dysrhythmias	V-tach, V-fib, bradycardia, heart block	ACLS; defibrillation if shockable; atropine/pacing for bradyarrhythmias
Vasovagal Response	Bradycardia + hypotension during sheath removal	Atropine ready; supine position; IV fluids

Complication	Cues / Assessment Findings	Priority Action
Distal Embolization / Limb Ischemia	Cool, pale, pulseless, painful extremity below site (5 P's)	Notify HCP STAT ; do not warm with heat; surgical eval

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Pharmacology

PRE, INTRA & POST-PCI MEDICATIONS

Aspirin (ASA)

ANTIPLATELET

Action: Inhibits platelet aggregation (COX-1)

Use: Lifelong post-stent

Side effects: GI bleeding, tinnitus, bruising

Nursing: Take with food; report black stools, ringing in ears

Clopidogrel (Plavix)

P2Y12 INHIBITOR

Action: Blocks ADP-induced platelet activation

Use: DAPT × 6–12 mo (longer for DES)

Side effects: Bleeding, bruising, rash

Nursing: NEVER stop abruptly → stent thrombosis risk

Ticagrelor / Prasugrel

P2Y12 INHIBITOR

Action: Stronger antiplatelet than clopidogrel

Use: ACS post-PCI

Side effects: Bleeding, dyspnea (ticagrelor)

Nursing: Avoid prasugrel in stroke/TIA history

Heparin / Bivalirudin

ANTICOAGULANT

Action: Prevents clot formation during PCI

Use: IV during & briefly after procedure

Side effects: Bleeding, HIT (heparin)

Nursing: Monitor aPTT, ACT, platelets; antidote = **protamine sulfate**

Nitroglycerin

VASODILATOR

Action: Dilates coronary arteries → ↑ O₂ to myocardium

Use: Chest pain, peri-procedural

Side effects: Headache, hypotension, flushing

Nursing: Hold if SBP < 90; **no PDE-5 inhibitors** (Viagra) within 24–48 hr

Statins (Atorvastatin)

HMG-COA REDUCTASE INHIBITOR

Action: ↓ LDL, plaque stabilization

Use: Long-term post-PCI

Side effects: Myopathy, ↑ liver enzymes, rhabdomyolysis

Nursing: Monitor LFTs & CK; report muscle pain/dark urine

Beta-Blockers (Metoprolol)

CARDIO-SELECTIVE B1

Action: ↓ HR, ↓ contractility, ↓ O₂ demand

Use: Post-MI, post-PCI

Side effects: Bradycardia, hypotension, fatigue

Nursing: Hold if HR < 60 or SBP < 100; never stop abruptly

ACE Inhibitors (Lisinopril)

RAAS BLOCKER

Action: ↓ Afterload, cardiac remodeling

Use: Post-MI with ↓ EF

Side effects: Dry cough, hyperkalemia, angioedema

Nursing: Monitor K⁺, BUN/Cr; teach "first-dose" hypotension

Morphine

OPIOID ANALGESIC

Action: Pain relief; ↓ preload & anxiety

Use: Pain unrelieved by NTG

Side effects: Resp depression, hypotension, constipation

Nursing: Antidote = **naloxone**; monitor RR & BP

 **DAPT RULE:** Dual Antiplatelet Therapy = ASA + P2Y12 inhibitor. Stopping early = highest risk of stent thrombosis (catastrophic). Patients must inform *every* dentist, surgeon, and provider that they are on DAPT before any procedure.

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NCLEX Test Traps

WHAT STUDENTS CONFUSE · WRONG VS RIGHT ANSWERS

✗ WRONG-ANSWER PATTERN

Elevating HOB to 60° to make a femoral PCI patient comfortable.

✓ CORRECT ACTION

Keep HOB $\leq 30^\circ$ (some facilities $\leq 15^\circ$) and the affected leg **straight** for 2–6 hr to prevent bleeding.

✗ WRONG-ANSWER PATTERN

Telling the patient that "chest pain after PCI is normal — just rest."

✓ CORRECT ACTION

New chest pain post-PCI = **stent occlusion / re-MI**. Notify HCP **STAT**; obtain ECG & troponin.

✗ WRONG-ANSWER PATTERN

Continuing metformin the morning of PCI because "diabetes must always be controlled."

✓ CORRECT ACTION

HOLD metformin 24–48 hr before AND after PCI → contrast + metformin = lactic acidosis risk.

✗ WRONG-ANSWER PATTERN

Stopping clopidogrel at the patient's request because "they bruise easily."

✓ CORRECT ACTION

Never stop antiplatelets without HCP order; abrupt discontinuation = stent thrombosis & sudden cardiac death.

✗ WRONG-ANSWER PATTERN

Treating new flank/back pain post-PCI with PRN acetaminophen.

✓ CORRECT ACTION

New flank/back pain + $\downarrow$ BP/ $\uparrow$ HR = **retroperitoneal hemorrhage**. Assess Hgb/Hct, notify HCP, prepare for

fluids & possible transfusion.

❌ WRONG-ANSWER PATTERN

Confusing PCI with CABG — answering that PCI requires sternotomy & cardiopulmonary bypass.

✅ CORRECT ACTION

PCI = **minimally invasive catheter procedure**; CABG = open-heart surgery with sternotomy. Recovery and education differ dramatically.

❌ WRONG-ANSWER PATTERN

Reassuring the patient that a feeling of warmth and a metallic taste during contrast injection means an allergic reaction.

✅ CORRECT ACTION

Warmth + metallic taste = **normal, expected, transient**.
Hives, wheezing, hypotension, tongue swelling = true allergic reaction.

❌ WRONG-ANSWER PATTERN

Skipping pulse checks because the patient "looks fine."

✅ CORRECT ACTION

Distal pulse, color, temp, capillary refill checks are **mandatory** per protocol — limb ischemia can be silent until catastrophic.

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NCJMM Clinical Judgment Framework

THE 6-STEP MODEL APPLIED TO PCI

1

Recognize Cues

Chest pain, ST changes, ↑ troponin, ↓ BP, hematoma, ↓ urine output, returning chest pain after stent placement, diminished distal pulses, restlessness.

2

Analyze Cues

Cluster findings: new chest pain + ST elevation = stent occlusion. Flank pain + ↓BP = retroperitoneal bleed. ↑Cr 48 hr post = contrast nephropathy.

3

Prioritize Hypotheses

Life-threatening first: re-occlusion / MI > hemorrhage > dysrhythmia > contrast reaction > nephropathy. Apply ABCs and time-sensitivity.

4

Generate Solutions

Activate cath lab for re-MI; apply pressure for bleeding; fluids/diuretics for overload; hold nephrotoxins; reinforce DAPT compliance.

5

Take Action

Stay with patient; notify HCP; obtain ECG; draw labs; administer ordered meds; position appropriately; document VS & site checks.

6

Evaluate Outcomes

Chest pain resolved? VS stable? Distal pulses palpable? Site dry & intact? Urine output ≥ 30 mL/hr? Patient verbalizes DAPT importance?

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Patient & Family Education

DISCHARGE TEACHING · LIFESTYLE · WARNING SIGNS



Medication Teaching

- ▶ Take aspirin daily for life
- ▶ Take clopidogrel/ticagrelor exactly as prescribed for the full duration (6–12+ mo)
- ▶ **NEVER stop antiplatelets** without provider approval — even before dental/surgical procedures
- ▶ Inform every dentist, surgeon, provider that you have a stent
- ▶ Take statin, beta-blocker, ACE inhibitor as prescribed
- ▶ Sublingual NTG at first sign of chest pain (call 911 if not relieved after 1 dose)



Activity & Lifestyle

- ▶ No driving for **1 week** (or per HCP)
- ▶ No lifting > **10 lbs** for 1 week (femoral) or per HCP
- ▶ No tub baths, swimming, hot tubs until site fully healed (~1 wk)
- ▶ Showers OK after 24–48 hr
- ▶ Walk daily; gradually increase activity
- ▶ Enroll in **cardiac rehabilitation**
- ▶ Heart-healthy diet: low sodium, low saturated fat, ↑ fiber, ↑ veggies
- ▶ **STOP SMOKING** — vasoconstriction worsens CAD & increases stent re-occlusion
- ▶ Limit alcohol; manage stress



When to Call 911 / HCP

- ▶ **Chest pain** not relieved by 1 NTG (call 911)



Stent & MRI Safety

- ▶ SOB, palpitations, fainting, dizziness
- ▶ **Bleeding** at insertion site that won't stop
- ▶ Expanding hematoma, increasing pain, numbness/tingling at site
- ▶ Cool, pale, pulseless extremity below site
- ▶ Fever > 100.4°F
- ▶ Black tarry stools, blood in urine, severe bruising

- ▶ Most modern stents are **MRI-compatible** after ~6 weeks
- ▶ Always **carry stent ID card** with type/date
- ▶ Airport metal detectors are safe
- ▶ Notify all providers about your stent before any procedure or imaging

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Memory Boosters & Mnemonics

ANCHOR THE HIGH-YIELD CONTENT

5 P's — Distal Limb Assessment

- P** **Pain** distal to insertion site
- P** **Pallor** — pale or mottled
- P** **Pulse** — diminished or absent
- P** **Paresthesia** — numbness, tingling
- P** **Paralysis** — late, ominous sign

MONA-B — Acute MI Pre-PCI

- M** **Morphine** for unrelieved pain
- O** **Oxygen** if $\text{SpO}_2 < 90\%$
- N** **Nitroglycerin** SL $\times 3$ PRN
- A** **Aspirin** 325 mg chewed
- B** **Beta-blocker** (when stable)

BLEED — Post-PCI Bleeding Watch

- B** **Back / flank pain** = retroperitoneal bleed
- L** **Low BP, $\uparrow$ HR**
- E** **Extremity** 5 P's check
- E** **Ecchymosis** & expanding hematoma

STENT — Discharge Teaching

- S** **Stop smoking** & manage risk factors
- T** **Take antiplatelets** — never stop without HCP
- E** **Exercise** via cardiac rehab
- N** **NTG** for chest pain $\rightarrow$ 911 if not relieved
- T** **Tell every provider** you have a stent

D

Distal pulses Q15 min

⚡ **HIGHEST-YIELD PEARL:** Door-to-balloon time for STEMI = **≤ 90 minutes**. "Time = Muscle." Every minute of delay = more myocardium lost.

🎯 **PRIORITY PEARL:** If a post-PCI patient has new chest pain — **this is NEVER expected**. Treat it as stent occlusion until proven otherwise. ECG → troponin → notify HCP → prep for return to cath lab.

NGN NCLEX 2026 Study Reference · Cardiovascular System · Percutaneous Coronary Intervention
Always follow current institutional policy and provider orders. For exam preparation only.