

⚡ TIME IS MUSCLE

Unstable Angina, NSTEMI & STEMI

*The acute coronary syndrome spectrum — one pathophysiology,
three faces, one mandate: reperfuse before necrosis wins.*

SYSTEM • CARDIOVASCULAR

CATEGORY • PHYSIOLOGICAL ADAPTATION

PRIORITY • EMERGENT

NCJMM • ALL 6 STEPS

§ 01 Definition & Overview

one disease, graded by damage

Acute coronary syndrome is a **continuum of coronary ischemia** triggered by plaque rupture and thrombus formation — ranging from reversible ischemia to full-thickness muscle death.

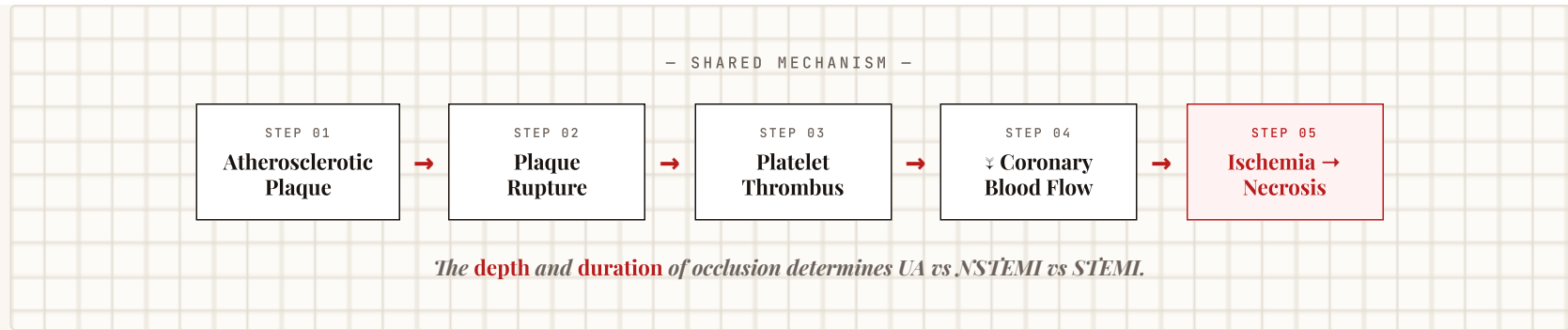
UA — Chest pain at rest or minimal exertion; partial occlusion; *troponin negative*.

NSTEMI — Partial occlusion causing subendocardial infarction; *troponin positive, no ST elevation*.

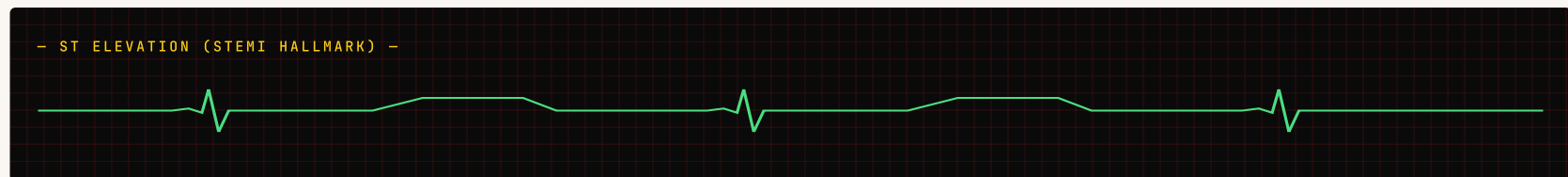
STEMI — Complete coronary occlusion; *transmural infarction, ST elevation, troponin positive*. Emergency.

§ 02 Pathophysiology — Simplified

the plaque-to-infarct pathway



FEATURE	UNSTABLE ANGINA	NSTEMI	STEMI
Occlusion	Partial — transient	Partial — sustained	Complete — total
Damage	No necrosis (ischemia only)	Subendocardial (inner layer)	Transmural (full thickness)
Troponin	Negative	Positive ↑	Positive ↑↑↑
ECG Changes	ST depression / T inversion (transient)	ST depression / T inversion (persistent)	ST ELEVATION in ≥2 contiguous leads
Pain Pattern	Relieved by rest / nitro	Persistent, unrelieved	Severe, crushing, unrelieved
Treatment Window	Urgent	Cath within 24–72 hr	PCI within 90 min



§ 03 Signs & Symptoms

classic vs atypical presentations

Classic Presentation

— THE TEXTBOOK MI —

- 01 **Crushing substernal chest pain** — pressure, tightness, "elephant on chest"
- 02 **Radiation** to left arm, jaw, neck, back, or epigastrium
- 03 **Diaphoresis** — cool, clammy skin
- 04 **Dyspnea** — shortness of breath
- 05 **Nausea & vomiting**
- 06 **Anxiety** — sense of impending doom
- 07 Pain **unrelieved** by rest or nitroglycerin (MI)

Atypical Presentation

— WOMEN · ELDERLY · DIABETICS —

- 01 **Extreme fatigue** — often days before event
- 02 **Epigastric pain** / indigestion ("heartburn")
- 03 **Jaw or back pain** without chest pain
- 04 **Shortness of breath** as the only symptom
- 05 **Syncope / dizziness**
- 06 **Silent MI** — especially in diabetics (neuropathy masks pain)
- 07 **Unusual weakness** or sleep disturbance

 RED FLAG FINDINGS — ACT IMMEDIATELY

Chest pain > 20 min, unrelieved by 3 SL nitro doses

This is a STEMI until proven otherwise. Other critical cues: **new-onset S3 / S4**, **new murmur** (papillary muscle rupture), **JVD + crackles** (cardiogenic shock / LV failure), **hypotension with bradycardia** (inferior MI), and **any lethal dysrhythmia** (V-fib, V-tach, complete heart block). The first 15 minutes after arrival carry the highest death rate — obtain a 12-lead ECG within 10 minutes of door time.



§ 04 Priority Nursing Interventions

ABC · safety · time-critical

First-Line Pharm

MONA-B — the initial ACS bundle

M
Morphine

O
Oxygen
Only if SpO₂ < 90% or distress.

N
Nitroglycerin

A
Aspirin

B
Beta-blocker

Pain + ↓ preload. Hold if hypotensive.

SL × 3, 5 min apart. Check BP each dose.

162–325 mg chewed. Antiplatelet.

Within 24 hr if stable. ↓ O₂ demand.

Priority 01 • Assessment

12-Lead ECG within 10 minutes

Door-to-ECG ≤ 10 min is the standard. Look for **ST elevation in ≥ 2 contiguous leads**, new LBBB, or reciprocal changes. Repeat serial ECGs.

Priority 02 • Labs

Cardiac biomarkers — serial troponins

Draw **troponin I or T** on arrival and at 3–6 hours. Troponin is the most specific and sensitive marker — rises in 3–4 hr, peaks at 10–24 hr, stays elevated 10–14 days.

Priority 03 • Monitoring

Continuous cardiac monitoring + IV access

Place on telemetry (watch for **V-tach, V-fib, heart blocks**). Establish **two large-bore IVs**. Keep defibrillator at bedside.

Priority 04 • Positioning & Comfort

Semi-Fowler's • rest • emotional support

Semi-Fowler's improves oxygenation. **Reduce myocardial O₂ demand** — bed rest, quiet environment, reduce anxiety. Pain is ischemia — treat it.

× STEMI Reperfusion Clock

The only way to save dying muscle is to open the artery — fast.

90 min

DOOR-TO-BALLOON (PCI)

Percutaneous coronary intervention (cath lab) is the **gold standard**. Goal: first medical contact to balloon inflation within 90 minutes.

30 min

DOOR-TO-NEEDLE (FIBRINOLYTICS)

Used when PCI is **unavailable within 120 min**. Give tPA / alteplase / tenecteplase. **Screen for bleeding contraindications** first.

§ 05 Pharmacology

the ACS medication arsenal

Aspirin

ANTIPLATELET

MECH Irreversibly blocks COX-1 → ↓ thromboxane A₂ → ↓ platelet aggregation.

DOSE **162–325 mg chewed** (faster absorption than swallowed).

SIDE FX GI bleed, tinnitus, Reye syndrome (peds).

Nitroglycerin

VASODILATOR • NITRATE

MECH Relaxes vascular smooth muscle → ↓ preload → ↓ myocardial O₂ demand; dilates coronaries.

ROUTE **SL q5 min × 3 doses**, then IV if needed.

SIDE FX Headache, **hypotension**, reflex tachycardia, flushing.

NURSE Hold for active bleeding / allergy; give *even if on daily low-dose*.

NURSE **NEVER with PDE-5 inhibitors** (sildenafil/Viagra, tadalafil) — severe hypotension. Hold if SBP < 90.

Morphine

OPIOID ANALGESIC

MECH μ -opioid agonist → pain relief, venodilation, ↓ preload, ↓ anxiety.

USE Chest pain unrelieved by nitro.

SIDE FX **Respiratory depression**, hypotension, bradycardia, N/V, constipation.

NURSE Monitor RR & BP; have **naloxone** available. Hold for RR < 12.

Beta-Blockers

METOPROLOL · ATENOLOL

MECH Block β_1 → ↓ HR, ↓ contractility, ↓ BP → ↓ myocardial O₂ demand.

USE Given within 24 hours; continued long-term.

SIDE FX **Bradycardia**, hypotension, bronchospasm, fatigue, masks hypoglycemia.

NURSE Hold for HR < 60 or SBP < 100. **Never stop abruptly** — rebound HTN / MI.

Clopidogrel / Ticagrelor

P2Y₁₂ INHIBITOR

MECH Blocks ADP receptor → prevents platelet aggregation (works with ASA = "dual antiplatelet").

USE Load dose, continue × 12 months after PCI / stent.

SIDE FX Bleeding, bruising, TTP (rare).

NURSE Hold 5–7 days before surgery. Teach bleeding precautions.

Heparin / Enoxaparin

ANTICOAGULANT

MECH Activates antithrombin III → blocks clot propagation.

MONITOR Heparin → **aPTT** (1.5–2.5 × control); Enoxaparin → *no routine labs*.

SIDE FX Bleeding, **HIT** (heparin-induced thrombocytopenia) — check platelets.

ANTIDOTE **Protamine sulfate** for heparin.

Fibrinolytics (tPA)

ALTEPLASE · TENECTEPLASE

MECH Converts plasminogen → plasmin → dissolves the clot.

USE STEMI when PCI unavailable. Give within **30 min of arrival**, ideally < 12 hr of symptom onset.

CONTRA **Active bleeding, recent stroke, recent surgery, uncontrolled HTN, head trauma**, bleeding disorders.

NURSE Draw all labs & start IVs *before* administration. Monitor for bleeding — neuro checks q15 min.

High-Intensity Statin

ATORVASTATIN · ROSUVASTATIN

MECH HMG-CoA reductase inhibitor → ↓ LDL; plaque stabilization.

USE Start **all ACS patients** regardless of baseline LDL.

SIDE FX **Myopathy / rhabdomyolysis**, ↑ LFTs.

NURSE Teach to report **muscle pain / dark urine**. Monitor LFTs & CK.

NCLEX Test Traps

where students lose points

▲ The eight traps that win this topic

These are the distractors NCLEX loves — learn them once, never miss them again.

01

Pain not relieved by nitro = MI, not angina. Three SL doses, 5 minutes apart, BP check before each. ~~If pain persists, give a 4th dose.~~ → **Call 911 / activate rapid response.**

02

Nitroglycerin + PDE-5 inhibitor = death. Always ask about **sildenafil (Viagra), tadalafil (Cialis), vardenafil** use within 24–48 hr before giving nitro — catastrophic hypotension.

03

Troponin — not CK-MB — is the test. Troponin is the **most specific** cardiac marker. Myoglobin rises first but is *not specific*. CK-MB is older-generation.

04

Women & diabetics don't read the textbook. No crushing chest pain? Don't rule out MI. **Fatigue, indigestion, jaw pain, SOB** in a 65-year-old woman with diabetes = MI until proven otherwise.

05

Oxygen isn't automatic anymore. Old teaching: give everyone O₂. New: give O₂ **only if SpO₂ < 90%** or respiratory distress. Routine hyperoxia *worsens* outcomes.

06

ST elevation ≠ STEMI alone. STEMI = ST elevation in **≥ 2 contiguous leads**. A single abnormal lead isn't diagnostic. NSTEMI has *NO* ST elevation — diagnosis is by **troponin**.

07

Aspirin: chewed, not swallowed. Chewing dissolves and absorbs within minutes. Give even if the client "takes a baby aspirin every day."

08

Priority order when client c/o chest pain: 1 Assess (VS, ECG, pain scale) → 2 O₂ if needed → 3 Nitro → 4 Aspirin → 5 Morphine → 6 Notify HCP. Don't call the doctor before you've assessed.

NCJMM — Clinical Judgment in Action

thinking like a bedside nurse

Scenario: A 62-year-old male arrives in the ED with 45 minutes of crushing substernal chest pain radiating to his left jaw, diaphoresis, and nausea. BP 148/92, HR 104, RR 22, SpO₂ 94%. He took 2 SL nitro tablets at home with no relief.

Step 1

Recognize Cues

Substernal pain + jaw radiation + diaphoresis + nitro-unresponsive = classic MI pattern. Tachycardia and borderline SpO₂ indicate sympathetic response.

Step 2

Analyze & Prioritize

Pain unrelieved by nitro + > 20 min = MI, not UA. Needs immediate ECG and troponin. Rule out STEMI first — time-critical.

Step 3

Generate Solutions / Act

12-lead ECG ≤ 10 min, establish 2 IVs, draw troponin, place on telemetry, give chewable ASA 325 mg, titrate O₂ if SpO₂ < 90%, prepare for PCI activation.

Step 4

Evaluate Outcomes

Pain relief (goal: 0/10), BP stable, no new dysrhythmias, troponin trend, ECG stable or improving, post-PCI access site intact, no bleeding.

§ 08

Patient Education

discharge & prevention

Lifestyle & Risk Reduction

- **Smoking cessation** — #1 modifiable risk factor. Offer resources.
- **Diet:** Mediterranean or DASH — ↓ saturated fat, ↓ sodium, ↑ fruits, vegetables, whole grains, fish.
- **Exercise:** 30 min moderate activity 5 days/week after clearance and cardiac rehab.
- **Weight management** — goal BMI < 25.
- **Diabetes control** — A1c < 7%. **BP control** < 130/80. **LDL** < 70 mg/dL for ASCVD.
- **Alcohol moderation** & stress management.
- **Cardiac rehab** — improves survival. Emphasize attendance.

Medication & Emergency Plan

- **Dual antiplatelet therapy (DAPT):** ASA + clopidogrel/ticagrelor × 12 mo post-stent. **Do not stop** without MD approval — stent thrombosis risk.
- **Nitroglycerin rules:** SL tab under tongue, may feel burning/headache. Call 911 **after the 1st dose** if pain doesn't ease in 5 min; may repeat q5 min up to 3 doses while waiting.
- **Store nitro** in original dark glass bottle; replace every 6 months; keep *with you at all times*.
- **Beta-blocker:** Take same time daily. **Never stop abruptly**. Report HR < 60.
- **Statin:** Report muscle aches, dark urine (rhabdo).
- **Sexual activity:** Usually safe when can climb 2 flights of stairs without symptoms. **No PDE-5 inhibitors** with nitrates.
- **Call 911** for: chest pain > 5 min, SOB at rest, fainting, or unrelieved pain after 1 nitro.

Memory Boosters

MONA-B

— initial ACS bundle —

M O N A B

Morphine · **O**xygen (if needed) · **N**itroglycerin · **A**spirin · **B**eta-blocker. The classic first-line memory aid for every ACS patient.

PQRST

— chest pain assessment —

Provokes/palliates · **Q**uality · **R**egion/radiation · **S**everity (0–10) · **T**iming. Use every time a client reports chest pain — it anchors your cue recognition.

"Time is Muscle"

— reperfusion urgency —

Every minute of occlusion kills myocardium. **90 min door-to-balloon** (PCI) and **30 min door-to-needle** (tPA) — memorize both numbers cold.

Troponin Curve: 3–10–14

— the cardiac enzyme clock —

Rises in **3–4 hr**, peaks at **10–24 hr**, stays elevated **10–14 days**. This is why we draw serial troponins — a single negative at arrival doesn't rule out MI.

ST ⬆ > ST ⬇

— differentiate on ECG —

STEMI = ST Elevation → emergency PCI.

NSTEMI / UA = ST Depression or T inversion → troponin decides which. "Up is emergent; down is urgent."

"5 B's" — tPA Contraindications

— don't lyse these clots —

Bleeding (active) · **B**rain (recent stroke/trauma) · **B**ig surgery recent · **B**lood pressure uncontrolled · **B**leeding disorder. Screen every STEMI patient before fibrinolytics.