

Myocardial Infarction

Heart Attack · Acute Coronary Syndrome · STEMI / NSTEMI

- CARDIAC
- PRIORITY
- PHARMACOLOGY
- CLINICAL JUDGMENT
- NCJMM FRAMEWORK



1 · DEFINITION & OVERVIEW

- ▶ **MI (Heart Attack):** Irreversible death (necrosis) of myocardial tissue due to prolonged ischemia from blocked coronary artery blood flow
- ▶ **STEMI:** ST-Elevation MI — complete occlusion; full-thickness damage; EMERGENCY
- ▶ **NSTEMI:** Non-ST Elevation MI — partial occlusion; subendocardial damage; still life-threatening
- ▶ **Why it matters:** Leading cause of death in the U.S.; requires rapid identification and intervention within the "golden hour"
- ▶ **Common culprits:** Atherosclerosis → plaque rupture → thrombus → occlusion → ischemia → injury → infarction

2 · PATHOPHYSIOLOGY (SIMPLIFIED)

- ① **Atherosclerosis** → fatty plaques build up in coronary artery walls
- ↓
- ② **Plaque rupture** → triggers platelet aggregation + clot formation
- ↓
- ③ **Thrombus occludes coronary artery** → blood flow stops or severely diminishes
- ↓
- ④ **Myocardial ischemia** begins within *seconds* → anaerobic metabolism → lactic acid buildup
- ↓
- ⑤ **Injury zone** (still salvageable with rapid intervention)
- ↓
- ⑥ **Infarction (necrosis)** → permanent cell death after ~20–40 minutes without reperfusion
- ↓
- ⑦ Cardiac enzymes (Troponin, CK-MB) **leak into blood** → hallmark lab findings

3 · SIGNS & SYMPTOMS

- | CLASSIC PRESENTATION | ATYPICAL (WATCH FOR!) |
|---|---|
| <ul style="list-style-type: none">● Crushing/squeezing chest pain● Radiates to left arm, jaw, neck, back● Pain >30 minutes (NOT relieved by NTG)● Diaphoresis (cold, clammy sweat)● Nausea / vomiting● Shortness of breath● Sense of impending doom | <ul style="list-style-type: none">● No silent chest MI — common in diabetics, elderly, women● Epigastric pain / indigestion-like symptoms● Extreme fatigue● Shoulder pain only● Confusion / syncope (elderly) |
- 🚩 **RED FLAG FINDINGS**

 - 🚩 BP ↓ + HR ↑ → Cardiogenic shock
 - 🚩 New crackles + JVD → Left-sided heart failure
 - 🚩 New murmur → papillary muscle rupture
 - 🚩 Dysrhythmias (V-fib, V-tach) → most common cause of death post-MI

4 · PRIORITY NURSING INTERVENTIONS

- ⚡ **MONA-B PROTOCOL (IMMEDIATE)**
- ABC** **Morphine** (or alternative analgesic) — IV; reduces pain and preload; monitor BP and respirations
- ABC** **Oxygen** — administer if SpO₂ < 90%; high-flow O₂ via mask; assess respiratory status continuously
- MED** **Nitroglycerin (NTG)** — sublingual or IV drip; vasodilates; DO NOT give if SBP < 90 mmHg or patient took PDE-5 inhibitor within 24–48 hrs
- MED** **Aspirin** — 325 mg chewed immediately (antiplatelet); contraindicated if true ASA allergy
- MON** **12-lead ECG** — obtain within 10 minutes of symptom onset; monitor continuously; assess for ST elevation, Q waves
- MON** **Labs:** Troponin (I & T) — gold standard; CK-MB; BMP; CBC; lipid panel; coagulation studies (PTT if heparin planned)
- SAFE** **IV access × 2** — large bore peripheral lines; keep patient on **strict bedrest**; call light in reach
- SAFE** **NPO status** if PCI/CABG anticipated; prepare for emergent catheterization

DOC Reperfusion goal: Door-to-balloon time < **90 minutes** for STEMI (PCI); thrombolytics if PCI unavailable within 120 min

MON **VS + cardiac rhythm** every 15 min (acute phase); monitor urine output ≥ 30 mL/hr; daily weights

5 • PHARMACOLOGY

Aspirin	Antiplatelet	Nitroglycerin	Nitrate / Vasodilator	Morphine Sulfate	Opioid Analgesic
Action	Inhibits COX $\rightarrow$ $\downarrow$ thromboxane A2 $\rightarrow$ $\downarrow$ platelet aggregation	Action	Dilates coronary arteries + peripheral veins $\rightarrow$ $\downarrow$ preload + workload	Action	Reduces pain + anxiety $\rightarrow$ $\downarrow$ O ₂ demand; also reduces preload
SE	GI bleeding, tinnitus (toxicity)	SE	Hypotension, headache, reflex tachycardia	SE	Respiratory depression, hypotension, N/V
Nursing	Chew — do NOT swallow whole in acute MI. Check for peptic ulcer disease	Nursing	SBP must be ≥ 90 before giving. Titrate IV drip by BP response	Nursing	Have naloxone (Narcan) available; monitor RR and BP closely

Heparin	Anticoagulant	Beta-Blockers	e.g. Metoprolol	Thrombolytics	e.g. tPA / Alteplase
Action	Inhibits thrombin formation $\rightarrow$ prevents clot extension	Action	$\downarrow$ HR + BP $\rightarrow$ $\downarrow$ myocardial O ₂ demand; $\downarrow$ dysrhythmia risk	Action	Dissolves existing clot via fibrinolysis $\rightarrow$ restores perfusion
SE	Bleeding, HIT (heparin-induced thrombocytopenia)	SE	Bradycardia, hypotension, bronchospasm	SE	Serious bleeding (especially intracranial hemorrhage)
Nursing	Monitor aPTT (goal: 60–100 sec); antidote = Protamine sulfate	Nursing	Hold if HR < 60 or SBP < 90. Contraindicated in acute decompensated HF	Nursing	Screen for contraindications: recent surgery, stroke Hx, active bleeding. Monitor neuro status closely

6 • NCLEX TEST TRAPS

⚠ TRAP #1 — PAIN CHARACTER

Students confuse angina and MI. Anginal pain **resolves with rest or NTG**. MI pain does **NOT** resolve with NTG and lasts >30 minutes. This distinction drives the priority answer.

⚠ TRAP #2 — NTG & BP

Never administer NTG if SBP < 90 mmHg or if patient took a **PDE-5 inhibitor** (Viagra, Cialis) within 24–48 hours $\rightarrow$ life-threatening hypotension.

⚠ TRAP #3 — LAB TIMING

Troponin is the **gold standard** but rises 3–6 hours after onset. It *peaks* at 24–48 hrs and stays elevated for 7–14 days. CK-MB rises earlier but normalizes faster. Do NOT rule out MI with one normal troponin.

⚠ TRAP #4 — SILENT MI

Diabetics, women, and elderly patients frequently **deny chest pain**. The NCLEX will present fatigue, jaw pain, or epigastric pain. Do not miss the MI because "no chest pain" was mentioned.

⚠ TRAP #5 — PRIORITY IN DYSRHYTHMIA

Ventricular fibrillation is the **#1 cause of death** in the first hour post-MI. When the rhythm shows V-fib $\rightarrow$ **defibrillate first** before calling the physician. Airway comes first only if the patient is breathing.

⚠ TRAP #6 — ACTIVITY

Post-MI patients should be on **strict bedrest** acutely. Valsalva maneuver (straining at stool) is dangerous $\rightarrow$ always give stool softeners. The NCLEX may ask which activity to avoid: the answer involves anything that dramatically increases cardiac workload.

7 • PATIENT EDUCATION

Medications: Take all cardiac medications as prescribed — never stop beta-blockers or aspirin abruptly without provider guidance

Smoking cessation: Smoking is the #1 modifiable risk factor; refer to cessation programs/nicotine replacement

Diet: Low-sodium (<2g/day), low-saturated fat diet; limit cholesterol; heart-healthy foods (Mediterranean style)

Cardiac rehab: Structured supervised exercise program; begin gradually; avoid strenuous activity until cleared

Weight management: Daily weights; report gain > 2 lb in a day or 5 lb in a week (fluid retention = HF sign)

NTG teaching: Keep sublingual NTG at bedside; call 911 if chest pain not relieved after 3 doses 5 min apart; store in dark cool place

Follow-up: Lipid panel, BP monitoring, echocardiogram; strict adherence to statin therapy (e.g., atorvastatin)

Return to ER if: Chest pain, severe SOB, palpitations, syncope, extreme fatigue — do not drive self

Sexual activity: Resume when able to climb 2 flights of stairs without symptoms (usually 4–6 weeks post-MI)

Stress reduction: Stress management techniques; avoid emotional extremes; depression screening common post-MI

8 • MEMORY BOOSTERS

⚡ LAB VALUES REFERENCE

MONA-B — ACUTE MI PROTOCOL

- M Morphine** — pain relief, reduces O₂ demand
- O Oxygen** — if SpO₂ < 90%
- N Nitroglycerin** — vasodilates, ↓ preload (check BP first!)
- A Aspirin** — 325 mg chewed STAT
- B Beta-Blocker** — ↓ HR + workload, ↓ dysrhythmia

TROPONIN TIMELINE — "RISES, PEAKS, PERSISTS"

- ⬆ **Rises** 3–6 hours after MI onset
- ★ **Peaks** at 24–48 hours
- **Persists** 7–14 days (longest of all enzymes)

💡 QUICK PATTERN TIPS

Post-MI Complication D → D → D: *Dysrhythmia* (1st hr), *Death of tissue spreads* (extensions), *Dressler's syndrome* (2–10 weeks = autoimmune pericarditis)

"Left-sided MI → Left-sided HF signs" — crackles, SOB, ↑ PAWP

"Right-sided MI (inferior MI) → Right-sided HF signs" — JVD, peripheral edema, ↓ BP

V-fib after MI? Think: *"Shock first, talk later"* — defibrillate immediately

- **Troponin I:** Normal < 0.04 ng/mL → elevated = MI confirmed
- **Troponin T:** Normal < 0.01 ng/mL → ultrasensitive = preferred
- **CK-MB:** Rises 4–6 hrs, peaks 12–24 hrs, normalizes 48–72 hrs
- **BNP:** ↑ indicates heart failure complicating MI
- **Na⁺:** Monitor — low levels may indicate diuretic overuse
- **K⁺:** Keep 4.0–5.0 mEq/L — hypokalemia increases dysrhythmia risk
- **aPTT (Heparin):** Goal 60–100 seconds (1.5–2× normal)
- **ECG — STEMI:** ST elevation ≥ 1mm in 2+ contiguous leads

🧠 NCJMM CLINICAL JUDGMENT FRAMEWORK — MI APPLICATION

RECOGNIZE CUES

Crushing chest pain, diaphoresis, ST elevation, ↑ troponin, hypotension, dysrhythmia

ANALYZE CUES

Pattern = acute coronary event. Severity cues (V-fib? Shock?) determine urgency level

PRIORITIZE HYPOTHESES

STEMI with V-fib = life threat #1. Hemodynamic instability = priority over pain management

GENERATE SOLUTIONS

MONA-B, 12-lead ECG, IV access × 2, prepare for emergent PCI or thrombolytics

TAKE ACTIONS

Administer per protocol, titrate NTG to BP, monitor continuously, notify provider + cath lab

EVALUATE OUTCOMES

Pain resolved? BP stable? Rhythm improved? Door-to-balloon < 90 min achieved?