www.emsnotes.com
By Forrest Munden

EMT Cardiology Study Guide

2025 Edition – NREMT & AHA BLS Aligned

This guide covers the entire cardiology domain for EMT certification and street practice. **Cardiology/Resuscitation** questions typically account for ~15–20% of the NREMT EMT cognitive exam (2025 format) and are central to the psychomotor skills stations (Adult CPR/AED, Bleeding Control/Shock Management, etc.).

> **Core EMT Cardiology Principle (2025):**
> High-quality CPR is the single most important intervention you can perform. Everything else (AED, aspirin, oxygen, transport) supports it or buys time until ALS/hospital can do more. **Push hard, push fast, let the chest come all the way up, and minimize interruptions.**

⚠ **EMT Scope Reminder:** High-quality CPR, AED use, aspirin for suspected cardiac chest pain, assist with prescribed nitroglycerin (per protocol), oxygen administration/titration, bleeding control, shock positioning, and rapid transport. *No manual defibrillation, no pacing, no IV/IO, no advanced cardiac medications.*

Section 1: Cardiac Arrest – The EMT Bread & Butter

Adult BLS Cardiac Arrest Algorithm (AHA 2025)

1. **Ensure scene safety** → Check responsiveness → Shout for help / activate EMS.
2. **Check breathing & pulse simultaneously** (≤10 seconds).
3. **If no normal breathing / no pulse** → Start CPR immediately.
   - **Compressions:** Center of chest, 100–120/min, 2–2.4 inches deep, full recoil, minimize interruptions.
   - **Ventilations:** 30:2 ratio (single rescuer); 2 breaths every 30 compressions.
4. **Attach AED as soon as available** → Analyze rhythm → Shock if advised → Resume CPR immediately.
5. **Continue 2-minute cycles of CPR** → Analyze → Shock if advised.
6. If suspected opioid overdose → **Naloxone 2–4 mg IN during CPR** (do NOT stop compressions).

Key 2025 AHA BLS Updates for EMTs:

- **Naloxone** strongly recommended in suspected opioid-associated arrest
- Visible chest rise only for ventilations (avoid hyperventilation)
- Head tilt-chin lift permitted if jaw thrust fails and airway obstructed in trauma arrest
- **High-performance team CPR:** Rotate compressors every 2 minutes, minimize pauses

AED Use Steps (NREMT Skill)

1. Power on AED
2. Apply pads (right upper chest, left mid-axillary line)
3. Clear patient → Analyze
4. If shock advised: **"Clear!"** → Shock → Immediate CPR

CPR Quality Metrics (Memorize!)

Parameter	Target	Why It Matters
Rate	100–120/min	Too slow = inadequate perfusion; too fast = incomplete recoil
Depth	2–2.4 inches (5–6 cm)	Shallow = poor cardiac output
Recoil	Full chest recoil	Leaning = decreased venous return
Interruptions	<10 seconds	Every pause = coronary perfusion drops to zero
Ventilations	Visible chest rise	Over-ventilation = decreased venous return

Section 2: Suspected Acute Coronary Syndrome (ACS) / Chest Pain

Recognition (OPQRST + Red Flags)

Onset: Sudden or gradual?
Provocation/Palliation: Exertion? Rest? Nitroglycerin?
Quality: Pressure, squeezing, heaviness (NOT sharp/stabbing)
Region/Radiation: Substernal, left arm/jaw/neck/back
Severity: 7–10/10 common
Time: >5–10 min concerning

Associated Symptoms (High-Risk)

- Shortness of breath
- Nausea/vomiting
- Diaphoresis (sweating)
- Weakness/fatigue
- Syncope

EMT Management Sequence (Priority Order)

1. **High-flow O_2** if SpO_2 <94% (titrate to 94–98%)
2. **Aspirin 162–325 mg chewed** (first-line, do NOT delay)
3. **Assist with prescribed nitroglycerin** (0.3–0.4 mg SL q5min, max 3 doses) if BP >90–100 systolic and no contraindications
4. **Position of comfort** (usually sitting)
5. **Rapid transport** to PCI-capable facility if STEMI suspected

Contraindications to Nitroglycerin (Memorize!):

- BP <90–100 systolic
- Recent PDE5 inhibitor (Viagra, Cialis, Levitra) within 24–48 h
- Suspected right ventricular infarct (inferior STEMI pattern)
- Patient already took 3 doses without relief

Section 3: Shock Recognition & Management

Signs of Shock (Compensated → Decompensated)

- Tachycardia → hypotension
- Pale, cool, clammy skin
- Delayed cap refill (>2 sec)
- Altered mental status (late sign)
- Weak/thready pulses

EMT Shock Management

1. **Control any external bleeding** (direct pressure, tourniquet if extremity)
2. **High-flow O_2**

3. **Position:** Supine with legs elevated (if no spinal injury or respiratory distress)
4. **Keep warm** (blankets)
5. **Rapid transport** to appropriate facility

Type	Cause	Signs/Symptoms	EMT Treatment
Cardiogenic	Heart failure, MI, arrhythmia	JVD, pulmonary edema, weak pulse, cool/clammy	Position of comfort, O_2, rapid transport, support ventilations PRN
Hypovolemic	Bleeding, dehydration, burns	Tachycardia, weak pulse, cool/pale/clammy, delayed cap refill	Control bleeding, supine with legs elevated, keep warm, rapid transport
Distributive (Septic)	Infection/sepsis	Fever, warm/flushed skin (early), altered mental status	O_2, keep warm, rapid transport
Distributive (Anaphylactic)	Allergic reaction	Hives, swelling, stridor, hypotension	Epinephrine auto-injector, O_2, supine, rapid transport
Obstructive	Tension pneumo, cardiac tamponade, PE	JVD, tracheal deviation, muffled heart sounds	O_2, rapid transport (ALS for needle decompression)

⚠ **Cardiogenic Shock Clues:**

- Chest pain history
- Pulmonary edema (rales, pink frothy sputum)
- JVD
- **Do NOT give large fluid boluses** → worsens pulmonary edema

Shock = Inadequate Tissue Perfusion. Early signs: Tachycardia, anxiety, pale skin. Late signs: Hypotension, altered LOC, weak/absent pulses. *Don't wait for BP to drop—tachycardia is your early warning!*

Section 4: Bleeding Control & Hemorrhagic Shock

Bleeding Control Sequence (Stop the Bleed / NREMT)

1. **Direct pressure** (first-line for all external bleeding)
2. **Wound packing** (junctional wounds: groin, axilla, neck)
3. **Tourniquet** (extremity bleeding not controlled by direct pressure)
4. **Pressure dressing** (maintain pressure during transport)

> **Tourniquet Rules:**
>
> - Apply 2–3 inches above wound (NOT over joint)
> - Tighten until bleeding stops
> - Note time of application
> - Do NOT remove in the field once applied
> - Second tourniquet if first doesn't control bleeding

Hemorrhagic Shock Stages

Class	Blood Loss	Heart Rate	BP	Mental Status
I	<15% (<750 mL)	Normal	Normal	Alert
II	15–30% (750–1500 mL)	100–120	Normal	Anxious
III	30–40% (1500–2000 mL)	120–140	Decreased	Confused
IV	>40% (>2000 mL)	>140 or absent	Very low	Lethargic/unresponsive

Section 5: Special Situations

Pediatric Cardiac Arrest

- **Most common cause:** Respiratory failure (not cardiac)
- **Compression depth:** 1/3 chest depth (~2 inches child, 1.5 inches infant)
- **Rate:** 100–120/min
- **Ratio:** 30:2 (1 rescuer) or 15:2 (2 rescuers)
- **AED:** Use pediatric pads if available; adult pads OK if no pediatric

Drowning

- **Priority:** Rescue breaths/ventilation (hypoxia is the killer)
- Start CPR immediately if pulseless
- AED safe to use even if patient is wet (dry chest first)

Pregnant Patient Cardiac Arrest

- CPR as normal with modifications
- **Left lateral tilt** or manual uterine displacement (relieve aortocaval compression)
- Rapid transport—perimortem C-section may be performed at hospital

Section 6: High-Yield NREMT / Street Judgment Questions

1. 62 y/o male, crushing chest pain 8/10 × 15 min, pale, diaphoretic, BP 142/88. What is the first medication you give?

→ **Aspirin 162–325 mg chewed** (before nitro or oxygen).

2. You give one nitro dose. BP drops to 86/52. Patient still in pain. Next step?

→ **Hold further nitro**, high-flow O_2, rapid transport. Hypotension contraindicates repeat doses.

3. Witnessed collapse, no pulse, agonal gasps. You are alone. What do you do first?

→ **Start CPR (30:2).** Do NOT delay compressions for AED setup or airway.

4. 55 y/o female, syncope, now alert, BP normal, history of "heart fluttering." Refuses transport.

→ **Strongly encourage transport** → exertional or unexplained syncope in >50 y/o = presumed cardiac until ruled out. Document risks thoroughly if refused.

5. During CPR, how often should you rotate compressors?

→ **Every 2 minutes** (or every 5 cycles of 30:2). Rotate during rhythm analysis to minimize interruptions.

6. Trauma patient with severe leg laceration. Direct pressure not controlling bleeding. Next step?

→ **Apply tourniquet** 2–3 inches above wound. Tighten until bleeding stops. Note time.

Section 7: "Sick or Not Sick" Cardiology Cheat Sheet

⚠ SICK (Act Fast – Load & Go)

- Chest pain >5–10 min unrelieved by rest/nitro
- Hypotension after nitro
- Syncope with cardiac history
- Sudden collapse / cardiac arrest
- Pulmonary edema with dyspnea

✓ NOT SICK (Monitor & Transport)

- Brief chest pain relieved quickly
- Stable vitals after intervention
- No high-risk features

Section 8: Quick Reference – Normal Values

Parameter	Normal Adult	Notes

Heart Rate	60–100/min	<60 = bradycardia; >100 = tachycardia
Blood Pressure	90–140 / 60–90	Systolic <90 = hypotension (shock)
SpO_2	94–99%	Target 94–98% in cardiac patients
Capillary Refill	<2 seconds	>2 sec suggests poor perfusion
CPR Rate	100–120/min	Push to the beat of "Stayin' Alive"
CPR Depth	2–2.4 inches	At least 2 inches, allow full recoil

The 5 H's and 5 T's of Cardiac Arrest (Reversible Causes):

H's: Hypovolemia, Hypoxia, Hydrogen ion (acidosis), Hypo/Hyperkalemia, Hypothermia

T's: Tension pneumothorax, Tamponade (cardiac), Toxins, Thrombosis (pulmonary/coronary), Trauma

Master EMT Cardiology

Master EMT cardiology by obsessing over **two things**:

1. **Early aspirin for suspected ACS**
2. **High-quality, uninterrupted CPR in arrest**

Everything else supports those two pillars.

Practice CPR on manikins until your arms burn. Give aspirin like it's candy (when indicated). Transport like time is myocardium.

You're the first link in the chain. Make it strong.