Paramedic Cardiology Study Guide

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This study guide focuses on Cardiology for paramedics. It aligns with the NREMT Paramedic certification exam, National EMS Scope of Practice Model 2019 (with updates), National EMS Education Standards, AHA ACLS/PALS 2025 Guidelines, and current evidence-based prehospital cardiac care principles (as of 2026). Cardiology is a high-yield and complex domain on the NREMT Paramedic exam, covering advanced patient assessment, 12-lead ECG interpretation, advanced cardiac pharmacology, and complex resuscitation scenarios. Paramedic Scope in Cardiology: Advanced airway management, IV/IO access, fluid resuscitation, 12-lead ECG acquisition and interpretation, advanced antiarrhythmics (adenosine, amiodarone, lidocaine, procainamide), vasopressors (epinephrine, norepinephrine, dopamine), thrombolytics (if indicated by protocol), synchronized cardioversion, transcutaneous pacing, and sophisticated critical thinking. Key Principle: Rapid recognition and appropriate intervention based on rhythm, patient stability, and protocol are critical for improving patient outcomes in cardiac emergencies.

Disclaimer: This is a study aid, not official. For PDF, copy into a word processor and export. Always follow current local protocols, NREMT skill sheets, and the latest AHA 2025 ACLS/PALS guidelines.

Section 1: Advanced Cardiac Assessment (Paramedic Focus)

Primary Assessment (C-ABCDE with ALS Interventions):

C – Circulation/Compressions: Early recognition of cardiac arrest → immediate high-quality CPR, early defibrillation.

A – Airway: Advanced airway management (ETT, supraglottic airway), waveform capnography for confirmation and monitoring.

B – Breathing: Assess ventilation, avoid hyperventilation (target EtCO&sub2; 35-45 mmHg post-ROSC).

C – Circulation: IV/IO access (2 large-bore), cardiac monitor, 12-lead ECG, fluid boluses for hypotension, vasopressors, antiarrhythmics.

D – Disability: GCS, pupil exam, blood glucose.

E – Exposure: Full exposure, prevent hypothermia, consider targeted temperature management post-ROSC.

Secondary Assessment:

Detailed SAMPLE and OPQRST for chest pain.

12-Lead ECG: Obtain and interpret within 10 minutes of arrival for chest pain/cardiac symptoms.

Focused Physical Exam: Heart sounds (murmurs, rubs), lung sounds (crackles, wheezes), JVD, peripheral edema, pulses (symmetry, quality).

Section 2: 12-Lead ECG Interpretation & Cardiac Rhythms

Key Steps:

1. Rate (300 / # large boxes between R-R, or 10x # QRS in 6 sec strip)

1. Rate (300 / # large boxes between R-R, or 10x # QRS in 6-sec strip).
2. Rhythm (regular, irregular, regularly irregular).
3. P waves (present, absent, shape, PR interval).
4. QRS (width, shape, QT interval).
5. ST Segment (elevation, depression – identify STEMI/ischemia).
6. T waves (inversion, peaked).

Common Rhythms (ACLS/PALS Focus):

Sinus Rhythms: Normal Sinus, Bradycardia, Tachycardia.

Atrial Rhythms: Atrial Fibrillation (irregularly irregular, no P waves), Atrial Flutter (sawtooth P waves).

Junctional Rhythms: Junctional Escape (40-60 bpm, inverted/absent P waves).

Ventricular Rhythms: Ventricular Tachycardia (wide, regular, fast), Ventricular Fibrillation (chaotic), Asystole (flatline), PEA (organized rhythm, no pulse).

Blocks: 1st Degree, 2nd Degree Type I (Wenckebach), 2nd Degree Type II, 3rd Degree (complete heart block).

STEMI Recognition:

ST elevation ≥1mm in ≥2 contiguous leads (except V2-V3, where it's ≥1.5mm in females, ≥2mm in males ≥40, ≥2.5mm in males <40).

New LBBB with symptoms.

Reciprocal changes.

Posterior MI (ST depression in V1-V3, tall R wave in V1, ST elevation in posterior leads).

Section 3: Advanced Cardiac Pharmacology

Medication	Indications	Dose (Adult ACLS 2025)	Key Notes
Adenosine	SVT (stable, narrow QRS)	6 mg rapid IV/IO push, then 12 mg; flush immediately	Transient asystole expected; short half-life.
Amiodarone	VFib/PVT (refractory), stable VT	Arrest: 300 mg IV/IO, then 150 mg. Stable VT: 150 mg IV over 10 min.	Slow push for stable VT; monitor BP.
Atropine	Symptomatic Bradycardia	0.5 mg IV/IO every 3-5 min; max 3 mg	Increases HR; avoid in 2nd degree Type II/3rd degree if new.
Epinephrine	Cardiac Arrest (all rhythms), Symptomatic Bradycardia (after atropine), Anaphylaxis, Shock	Arrest: 1 mg IV/IO every 3-5 min. Brady/Shock: 2-10 mcg/min infusion.	Vasoconstrictor, bronchodilator.
Lidocaine	VFib/PVT (refractory, alternative to amiodarone), stable VT	Arrest: 1-1.5 mg/kg IV/IO, then 0.5-0.75 mg/kg. Stable VT: 0.5-0.75 mg/kg.	Neurotoxicity at high doses; monitor for seizures.
Dopamine	Symptomatic Bradycardia (after atropine, if hypotension), Cardiogenic Shock	2-20 mcg/kg/min infusion; titrate to BP/HR	Vasopressor; monitor for tachyarrhythmias.
Norepinephrine (Levophed)	Cardiogenic Shock, Distributive Shock (refractory hypotension)	0.1-0.5 mcg/kg/min infusion; titrate to MAP	Potent vasoconstrictor; preferred vasopressor for most shock states.

Medication	Indications	Dose (Adult ACLS 2025)	Key Notes
Sodium Bicarbonate	TCA overdose, severe metabolic acidosis, hyperkalemia (rarely prehospital)	1 mEq/kg IV/IO	Consider for specific causes of arrest after other measures.

Section 4: Resuscitation & Post-Arrest Care (ACLS/PALS 2025)

Cardiac Arrest Algorithm (Key Points):

High-quality CPR (compressions 100-120/min, depth 2-2.4 in, full recoil, minimize pauses).

Defibrillate shockable rhythms (VFib/PVT) immediately.

Epinephrine 1 mg every 3-5 min for all arrest rhythms.

Amiodarone (or Lidocaine) for refractory VFib/PVT.

Identify and treat reversible causes (H's and T's).

Reversible Causes (H's and T's):

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

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

Post-Cardiac Arrest Care:

Optimize ventilation and oxygenation (avoid hyperoxia, target EtCO&sub2; 35-45 mmHg).

Treat hypotension (target SBP >90 mmHg, MAP >65 mmHg) with fluids/vasopressors.

12-lead ECG (emergent PCI for STEMI/high suspicion).

Targeted Temperature Management (TTM): 32-36°C for at least 24 hours (if comatose).

Glucose control, seizure management.

Section 5: Special Considerations (Paramedic)

Pediatric Cardiac Arrest: Often respiratory in origin; CPR first, then medications. Dose based on weight.

Pregnancy: Displace uterus to left; prepare for perimortem C-section (hospital).

Bariatric Patients: Larger equipment, proper positioning for airway/compressions.

Pacemakers/ICDs: Defibrillate/cardiovert as normal, avoid placing pads directly over device.

Section 6: NREMT Paramedic Skill Emphasis & High-Yield Scenarios

Synchronized Cardioversion: For unstable tachycardias with a pulse (SVT, A-Flutter, Monomorphic VT). Select energy, synchronize to R wave.

Transcutaneous Pacing: For symptomatic bradycardias unresponsive to atropine. Ensure capture, titrate mA for capture and rate for patient tolerance.

IV/IO Fluid Resuscitation: Judicious use for hypovolemia; avoid overload in CHF/cardiogenic shock.

Example Math (Drip Rate Calculation):

Question: You need to administer dopamine at 5 mcg/kg/min to an 80 kg patient. You have a premixed bag of 400 mg in 250 mL D5W. What is the drip rate in mL/hr? **Solution:**

1. Concentration: 400 mg / 250 mL = 1.6 mg/mL. Or 1600 mcg/mL.
2. Desired dose/min: 5 mcg/kg/min * 80 kg = 400 mcg/min

2. Desired dose/min: 5 mcg/kg/min * 80 kg = 400 mcg/min.
3. mL/min: 400 mcg/min / 1600 mcg/mL = 0.25 mL/min.
4. mL/hr: 0.25 mL/min * 60 min/hr = 15 mL/hr.

The drip rate is 15 mL/hr.

Reasoning: Concentration, then desired dose, then rate in mL/min, then convert to mL/hr. Mastering paramedic cardiology requires deep understanding of electrophysiology, pharmacology, and clinical algorithms. Practice 12-lead interpretation daily, review ACLS/PALS scenarios frequently, and continually apply critical thinking. Good luck on your paramedic certification—interpret the ECG, push the right drug, shock when indicated, and save a life!

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