



IU Health ACLS Study Guide

Preparing For Your Upcoming ACLS Class

UPDATED May 2016

Course Curriculum: 2015 American Heart Association (AHA) Guidelines for Advanced Cardiac Life Support (ACLS)

AHA recommends the following to prepare for the course:

1. Able to perform high-quality CPR and use an AED
2. Understand the 10 cases in the ACLS Provider Manual
3. Understand the ACLS algorithms for the cases in the ACLS Provider Manual
4. Complete the online ACLS Pre-course Self-Assessment, Rhythm Identification, Pharmacology, and Practical Application with a minimum score of 70%.

Recommended Resources for Course Preparation:

*Advanced Cardiac Life Support Provider Manual (2015)

Optional Resources for Course Preparation:

- *AHA Pocket card – ACLS Cardiac Arrest, Arrhythmias, and Their Treatment
- *AHA Pocket card – ACLS Acute Coronary Syndromes and Stroke
- *AHA 2015 Handbook of Emergency Cardiovascular Care for Healthcare Providers
- *ACLS Student Website supplementary resources

**** The Precourse Self-Assessment is mandatory. Link can be found on page ii of the ACLS Provider Manual and <http://www.heart.org/eccstudent>. The password is acls15. You must pass with a score of 70% or better. This is a requirement from the AHA. Please bring a printed copy or electronic picture of your completed assessment with you to class.****

To successfully pass the ACLS course, AHA requires you to pass a written exam with a score of $\geq 84\%$ and to successfully manage a simulated megacode. A megacode is a hands-on, dynamic, in real time practice of treating a life-threatening cardiac emergency. The cardiac emergency will progress in the following sequence of rhythms: 1) an arrhythmia with a pulse, 2) a SHOCKABLE, pulseless rhythm, 3) a NON-SHOCKABLE, pulseless rhythm, and finally 4) a return of spontaneous circulation. Each potential scenario can be found in the Appendix section of the ACLS Provider Manual.

In managing the megacode as the team leader, you will be required to: 1) recognize and correctly identify the cardiac rhythms or arrhythmias, 2) assess the patient's general condition, 3) effectively treat the patient according to ACLS algorithms, 4) utilize the recommended drugs and dosages, and 5) safely administer any recommended electrical or shock treatment using a manual defibrillator.

Course preparation is highly recommended to make your experience valuable, as well as to ensure your successful completion. You are encouraged to purchase or borrow an ACLS Provider Manual to assist you in preparation for your course and the written exam. Any of the other AHA resources listed above may also be helpful. You will be allowed to use AHA resources for the megacode and the written exam.



This study guide is not to be considered a replacement for the *ACLS Provider Manual*, the online pre-course assessment, and other resources offered by the AHA.

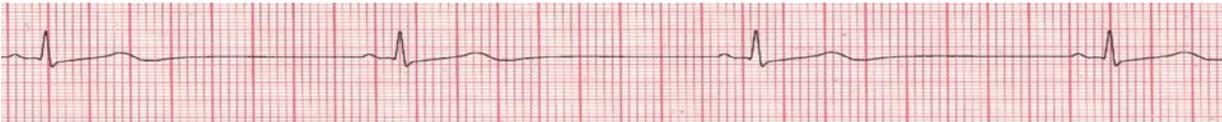
BLS CPR

The sequence for CPR is “CAB”: Compressions – Airway – Breathing. Here are the basic steps in the **BLS assessment**:

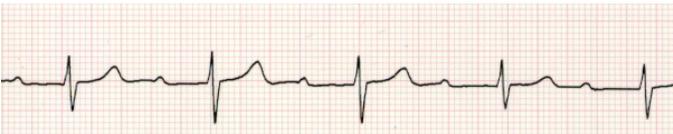
1. Scene Safety
2. Check for responsiveness
3. Call for help and an AED (in hospital, call Medical Alert-Code Blue)
4. Simultaneously scan the chest for breathing and pulse
5. If no pulse, begin compressions – give 30 compressions then give two breaths—continue 30:2 ratio; maintain a rate of 100-120 compression/min at a depth of 2-2.4 inches
6. Apply the AED as soon as it arrives

Bradycardia - Any rhythm disorder with a rate **<50/min** in a symptomatic patient. The clinical picture is important here to determine if the patient needs monitoring or treatment. The goal in the management of symptomatic bradycardia is clinical improvement.

SINUS BRADYCARDIA



1ST DEGREE HEART BLOCK



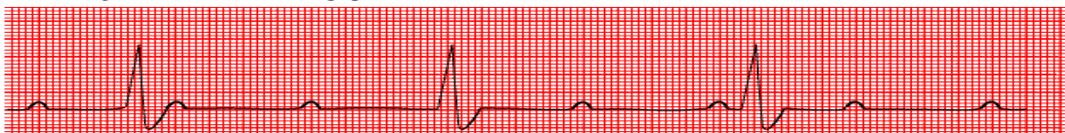
2ND DEGREE HEART BLOCK (Mobitz Type I Wenkebach)



2ND DEGREE HEART BLOCK (MOBITZ Type II)



3RD HEART BLOCK





Identify and treat underlying causes: open airway, assist breathing, O₂ administration, apply monitors, 12 lead ECG, establish IV/IO access, obtain labs, and seek expert consultation.

Is your patient with Bradycardia stable or unstable?

STABLE / Symptomatic –

- Administer **Atropine** 0.5mg
- Monitor and observe

UNSTABLE / Symptomatic – showing signs of poor perfusion (heart rate is not fast enough to deliver an adequate volume of blood to the body and requires treatment/intervention), for example: ischemic chest pain, hypotensive, feels faint/light-headed, decreased or altered mental status, cool or clammy/diaphoretic.

- Administer **Atropine** 0.5mg
- Prepare and provide external transcutaneous pacing
OR
- Administer Dopamine infusion 2-20 mcg/kg/minute
OR
- Administer Epinephrine infusion: 2-10 mcg per minute
AND
- Consider expert consultation

Supraventricular Tachycardia (SVT) - SUSTAINED - Rapid, narrow QRS, rhythm tachycardia with a rate **>150**



Identify and treat underlying causes: open airway, assist breathing, O₂ administration, apply monitors, 12 lead ECG, establish IV/IO access, obtain labs, and seek expert consultation.

Is your patient stable or unstable?

STABLE

- Attempt vagal maneuvers: bear down, hard cough, etc.
- If vagal maneuvers aren't successful: administer **Adenosine** 6 mg, **if rhythm is regular**
- You may repeat with **Adenosine** 12 mg
- If both doses of **Adenosine** are unsuccessful: seek expert consultation

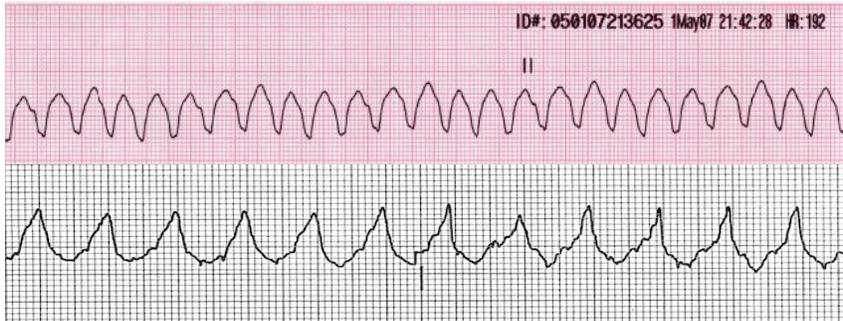
UNSTABLE – showing signs of poor perfusion (low B/P, feels faint, decreased or altered mental status, cool or clammy/diaphoretic, chest discomfort) and requires rapid treatment/intervention.

- Provide Synchronized Cardioversion 50 – 100 Joules
- Provide Synchronized Cardioversion of 120-200 Joules when treating irregular and rapid heart rate



Monomorphic Ventricular Tachycardia with a pulse (VT/V-Tach)

SUSTAINED - rapid, regular uniform, wide complex (monomorphic) tachycardia lasting >30 seconds



Identify and treat underlying causes: open airway, assist breathing, O₂ administration, apply monitors, 12 lead ECG, establish IV/IO access, obtain labs, and seek expert consultation.

Is your patient stable or unstable?

STABLE

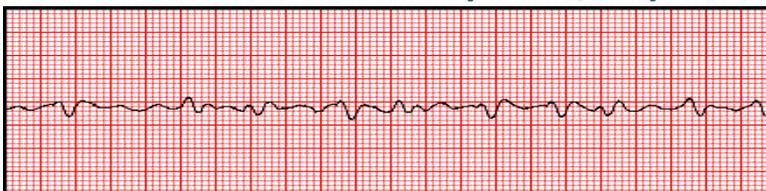
- Seek expert consultation
- Consider antiarrhythmic infusion – **Amiodarone** 150 mg over 10 minutes (Procainamide, Sotalol are other antiarrhythmic options)

UNSTABLE – showing signs of poor perfusion or shock (hypotension, ischemic chest pain, weak,

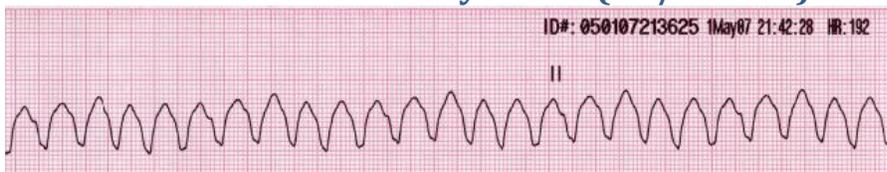
clammy, cold, ashen, faint, acute mental status changes)

- Deliver immediate synchronized cardioversion at 100 Joules
- Evaluate the rhythm post cardioversion. If continued VT with a pulse, consider a second attempt at a higher energy level

Ventricular Fibrillation (V-Fib/VF)



Pulseless Ventricular Tachycardia (VT/V-Tach)





Both V-Fib and Pulseless V-Tach require immediate defibrillation. Once you determine your patient has one of these arrhythmias (completed your BLS survey and identified the rhythm), proceed as follows:

- Initiate Code Blue and begin chest compressions
- Defibrillate asap
- Immediately resume CPR for 2 minutes
- During this 2 minute cycle:
 - Obtain IV or IO access
 - Prepare your first drug: **Epinephrine** 1 mg
 - Begin discussing reversible causes
- After 2 minutes, perform a rhythm check – if unchanged:
 - Defibrillate asap (2nd shock)
 - Resume CPR
 - Administer **Epinephrine** 1 mg
 - Prepare second drug: **Amiodarone** 300 mg
- Continue to work in 2 minute cycles. After each subsequent defibrillation:
 - If appropriate, administer the drug you have prepared
 - Prepare your next drug
 - Continue to talk about reversible causes (Hs and Ts)

Asystole – There is no electrical or mechanical activity. Asystole is a pulseless, **non-shockable** rhythm that requires immediate intervention.



Pulseless Electrical Activity (PEA) – Electrical activity without mechanical contractility. There is an organized rhythm, but the heart is not pumping. PEA is a pulseless, **non-shockable** rhythm that requires immediate intervention.



Once you determine your patient has one of the above rhythms (completed your BLS survey and identified the rhythm), proceed as follows:

- Initiate Code Blue and begin chest compressions
- Administer **Epinephrine** 1 mg
- Work in 2 minute CPR cycles
- **Epinephrine** 1 mg given every other cycle or every 3-5 minutes



Reversible Causes / Hs and Ts

A critical step to restoring a perfusing rhythm is to quickly identify the underlying, reversible causes. The most common are known as the Hs & Ts.

Hs

- Hypovolemia
- Hypoxia
- Hydrogen Ion (Acidosis)
- Hypo-/Hyperkalemia
- Hypothermia

Ts

- Tension Pneumothorax
- Tamponade, cardiac
- Thrombosis, pulmonary (PE)
- Thrombosis, cardiac
- Toxins (Drugs/Environmental)

ROSC (Return of Spontaneous Circulation) a.k.a. Post-Cardiac Arrest Care

The following are the post arrest needs that should be addressed when ROSC occurs:

- FIRST, check Airway and Breathing (C-A-B)
 - Is the patient breathing?
 - If not, intubate and begin capnography monitoring
- What is the blood pressure?
 - If less than 90 systolic, give a fluid bolus 1-2 L of Normal Saline or Lactated Ringers and/or consider a pressor, epi, dopamine
- Is the patient responding?
 - If not, initiate the targeted temperature management: 32-36C for at least 24 hours
- 12 Lead ECG
- Labs
- Chest X-Ray
- Cardiology Consult

During class you will have opportunity to get hands-on practice with each of the above rhythms and ACLS algorithms that you have just studied. If you study the content, the application in the simulation labs will pull it all together for you, and your instructors will answer any additional questions you may have.

This content is not intended to replace your ACLS Provider Manual. You are highly encouraged to utilize the manual in preparation for and while attending class.



ACLS Pharmacology

Drugs for Bradycardia

Atropine: 0.5mg IV/IO IV Push followed by a flush; repeat every 3-5 minutes. Max total dose: 3 mg (6 doses)

-First-line drug for symptomatic bradycardia

Dopamine drip: 2-20 mcg/kg/min as an IV Infusion

-Titrate to patient response

-Second-line drug for symptomatic bradycardia

Epinephrine drip: 2-10 mcg/min as an IV Infusion

-Titrate to patient response

-Second-line drug for symptomatic bradycardia

Drugs for SVT

Adenosine: 6 mg rapid IV Push followed by an immediate 20 ml flush; may repeat with a 12 mg dose if needed.

-Fast push and fast acting drug that results in a short period of asystole

Drugs for Stable Wide Complex VT

Antiarrhythmic Options:

Amiodarone: 150 mg IV over 10 min. May repeat every 10 min. prn

Procainamide: 20-50 mg/min. IV until symptoms subside or max dose: 17 mg/kg

Sotalol: 100 mg (1.5 mg/kg) IV over 5 min.

Lidocaine: 0.5-0.75 mg/kg and up to 1-1.5 mg/kg IV. May repeat every 5-10 min. Max total dose: 3 mg/kg

Drugs for Pulseless Arrest - VF/VT

Epinephrine (1:10,000 concentration): 1 mg IV/IO Push followed by a flush; repeat throughout code every 3-5 minutes. There is no max total dose.

Amiodarone: 300 mg IV/IO Push followed by a flush. Second dose (if needed) 150 mg. Max total dose: 450 mg

(Lidocaine is an alternative to Amiodarone, though Amio is recommended.. The dose of Lidocaine is 1-1.5 mg/kg)

Magnesium Sulfate is recommended for use in cardiac arrest only if torsades de pointes or suspected hypomagnesemia is present. The dose of Mag Sulfate is 1-2 grams diluted and administered over 5 to 60 minutes.

Drugs for Pulseless Arrest - Asystole/PEA

Epinephrine (1:10,000 concentration): 1mg IV/IO Push followed by a flush; repeat throughout code every 3-5 minutes. There is no max total dose.



Drugs for ACS (Acute Coronary Syndromes): MONA

M = Morphine

O = Oxygen (for oxygen saturation less than 90%)

N = Nitrates

A = Aspirin

Morphine: Initial dose is 2 to 4 mg IV over 1 to 5 min. May repeat 2-8 mg every 5-15 min.

-May administer to patients with suspected ischemic pain unresponsive to nitrates

-Contraindications:

- Hypotension

-Re-evaluate patient between doses

Nitroglycerin: 1 tablet (0.3-0.4 mg) sublingually; may be repeated every 5 min. up to a total of 3 doses **OR** 1-2 sprays (over 0.5-1 second) sublingually – max 3 sprays within 15 minutes

-First-line drug for suspected ischemic chest pain in ACS

-Vasodilator - improves blood flow and reduces ischemic chest discomfort

-Contraindications:

- Hypotension
- Bradycardia
- Tachycardia
- RV Infarction
- Use of phosphodiesterase inhibitors in past 24-48 hrs

Aspirin: 160 mg to 325 mg given/chewed; non-coated baby or adult aspirin

-Indications — Standard therapy for all patients with symptoms suggestive of ACS

-May use rectal suppository for patients who cannot take orally

-Inhibits platelet aggregation (stops clot formation)

-Contraindications:

- Allergy to aspirin
- Active GI Bleed

References

Advanced Cardiac Life Support Provider Manual, (2016). Dallas, Texas: American Heart Association.

2015 Handbook of Emergency Cardiovascular Care for Healthcare Providers, (2015), American Heart Association.

ACLS Acute Coronary Syndromes and Stroke Pocket Card, (2016), American Heart Association.

ACLS Cardiac Arrest, Arrhythmias, and Their Treatment Pocket Card, (2016), American Heart Association.