



ACLS Study Guide



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As a medical graduate, medical student, or practicing physician, getting ACLS-certified is essential. ACLS {advanced cardiac life support} encompasses a set of algorithms that help healthcare professionals handle medical emergencies. These include cardiovascular emergencies, myocardial infarction, stroke, and cardiac arrests.

ACLS training includes guidelines for recognizing and managing these emergencies. It also includes training in handling team communication tactics and team dynamics. Other than physicians and medical students, ACLS training is essential for nurses, paramedics, firefighters, and emergency medical technicians.

Below are guidelines that will boost your understanding of ACLS.

2020 ACLS Guideline Changes

The current ACLS guidelines have been in use since October 2015. The AHA {American Heart Association} is meant to meet in 2020 to review these guidelines to reflect study findings and other changes. Here is a review of the changes to various elements of prior ACLS guidelines.

1. CPR and BLS quality

One of the essentials of optimizing patient outcomes in cardiac arrest remains quality CPR. To guarantee these, the following are the changes that the AHA instituted to CPR and BLS quality:

- **Compression depth:** the endorsed depth of chest compressions remains between 5cm {two inches} and 6cm {2.4 inches}. Other than the measurements, the quality changes in CPR and BLS state that you should avoid excessive chest compressions. Very deep and too many chest compressions have been shown to have adverse patient outcomes.
- **Full chest recoil:** AHA also emphasizes that rescuers should avoid leaning on a patient's chest during compressions. This ensures that you achieve full chest wall recoil. The recoil guarantees the presence of negative wall pressure that returns blood flow and reinstates myocardial circulation.
- **Minimizing interruptions:** the target for the time percentage when performing chest compressions by the AHA is not less than 60% for CPR. This is called the chest compression fraction time.
- **Healthcare provider {HCP} BLS:** HCPs are required to call for help when they find an unresponsive victim. However, it is practical to continue assessing the victim's pulse and breathing simultaneously during this time.
- **Advanced airway ventilations:** healthcare providers should provide one breath every six seconds at the same time as chest compressions.

2. Cardiac arrest medications

At times, you might be required to use cardiac medications to manage a patient in ACLS. This is why you should have a background in pharmacology to know the medications to use in an emergency. One of the notable changes to medications in ACLS is the use solely of epinephrine, rather than vasopressin plus epinephrine, to manage a cardiovascular emergency. This is because there is no evident benefit of administering vasopressin in combination with epinephrine rather than simply using epinephrine alone.

3. Post-cardiac arrest management

There are changes as regards hemodynamic goals, therapeutic hypothermia, and the use of postarrest medication in ACLS. For instance, patients should have a set temperature for some time after a cardiac arrest to prevent adverse outcomes.

4. End-tidal CO₂

The end-tidal CO₂ is a measure of someone's exhaled carbon dioxide. It is among the indicators of a patient's return to spontaneous circulation. The end-tidal CO₂ target during a cardiac arrest case is above 10mmHg. If you notice the reading is below this, then you should continue the chest compressions. The end-tidal CO₂ reading is also essential when confirming the placement of an endotracheal tube. A reading of less than 10mmHg might indicate that the tube has been popped out.

How to study

You should first pass an exam for you to be certified and re-certified in ACLS. This is, however, not so easy, even for healthcare workers who have years of experience. Here are some effective guidelines on how you can study to ace the ACLS exam:

Do an algorithm a night

You should be well-versed in the ACLS algorithms for you to ace your exam. These algorithms are simple flowcharts on how to handle different elements in a cardiovascular emergency. To have the algorithm at your fingertips, start studying early and memorize one per night.

Review case scenarios

You will encounter different case scenarios in your career. You should identify the symptoms and signs you deal with and understand the procedures you will employ to manage them. When studying for your ACLS exam, go through as many case scenarios as you can to be adequately prepared for the questions.

Review advanced airway techniques and indications

Although learning to insert an advanced airway lies beyond the scope of ACLS, it's still important to review such techniques and the indications of when it may be necessary. This is because advanced airways can provide better oxygenation. Several advanced airway components exist including esophageal tracheal tubes (ET Tube), laryngeal masks, and laryngeal tubes. Only someone trained in advanced airway techniques should perform the intubation, administering one ventilation every six seconds.

Know dosage amounts

You will be needed to identify the medications to use in different ACLS case scenarios. Other than knowing the right medications, you should have their right dosages. The incorrect drug or dosage can lead to an adverse outcome in your patient (for example, know the difference between endotracheal and intravenous dosing of epinephrine). You can consider using mnemonic flashcards to remember the medications and dosages easily.

Voltages for Defibrillation and Cardioversion

Two other important components of the ACLS test is knowing the proper voltages for defibrillation and cardioversion. These voltages are measured in Joules and need to be precise based on a patient's condition and age.

Review basic electrocardiography

Electrocardiography is used to assess a patient's heartbeat. The health service provider places electrodes on a patient's chest, and the electrocardiogram records the heart's activity on a graph. You should know how to take and interpret an electrocardiography test for you to pass your ACLS exam.

Create cue cards

Creating cue cards is another great way to study for the ACLS exam and help you memorize all of the important key components, methods, and algorithms that will appear on the ACLS certification test. Additionally, there are a host of useful web resources to take advantage of, like this online ECG simulator.

The Six Algorithms of ACLS

As a part of your training, the following are some of the algorithms that you will cover.

Algorithm for suspected stroke

An acute stroke will be categorized as an ischemic or a hemorrhagic stroke. Ruptured blood vessels will cause a hemorrhagic stroke, while blockage of blood flow to the brain results in an ischemic stroke. The ACLS stroke algorithm focuses on a rescuer's rapid evaluation, identification, and intervention. It entails these steps:

- Recognizing the signs of a stroke.
- Once you identify a possible stroke, activate the EMS {emergency medical service}.
- Transporting the patient to a hospital with an equipped stroke center if possible.
- Upon hospital arrival, monitor the patient's vital signs, maintaining oxygen saturation at above 94%, and establish IV access. You should also gauge the patient's neurological status, get a brain CT scan, and consult a neurologist.
- Use an instrument like the NIH stroke scale to complete a neurological exam with the stroke team or neurologist.

Algorithm for suspected stroke:

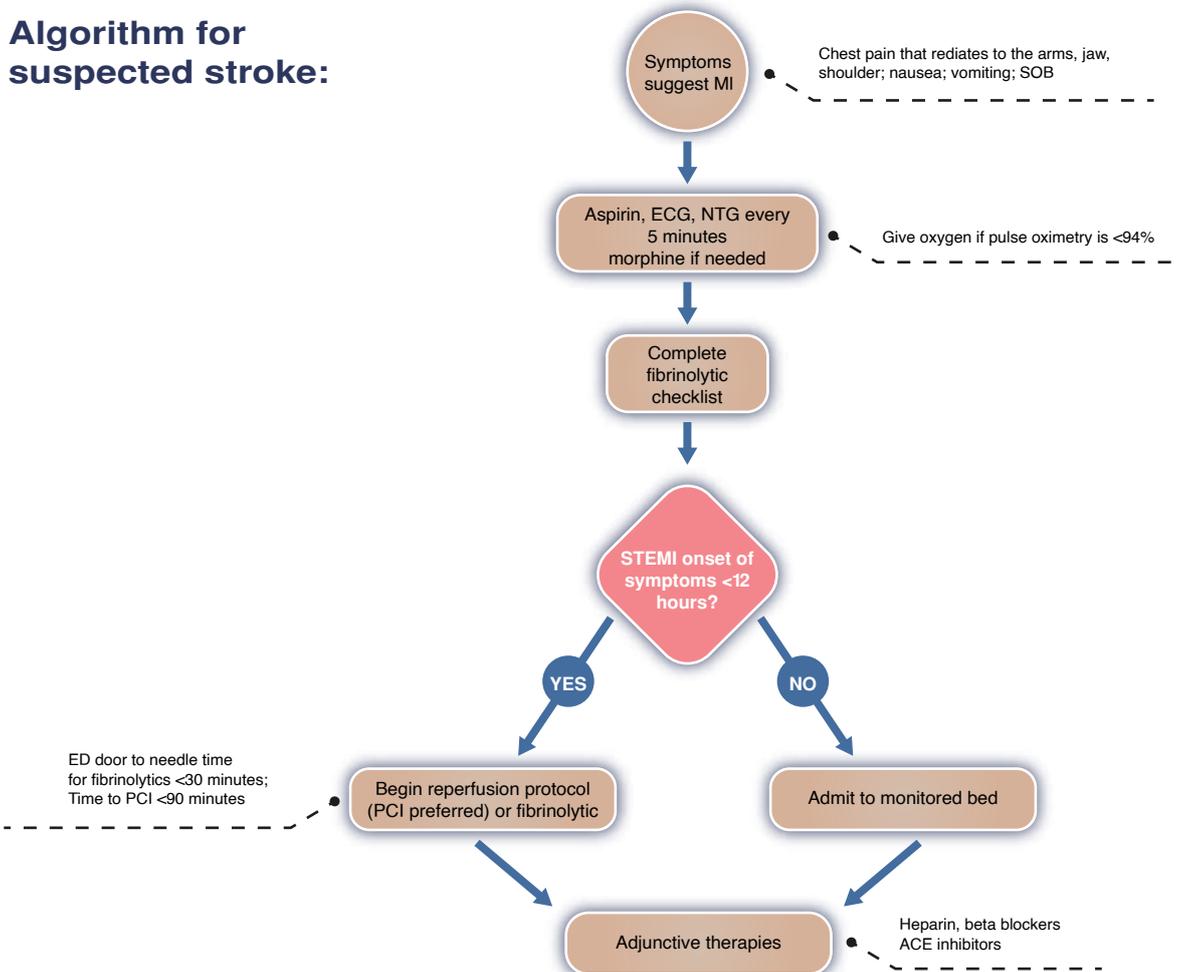


Figure 1:
ACLS ACUTE
CORONARY
SYNDROME
ALGORITHM

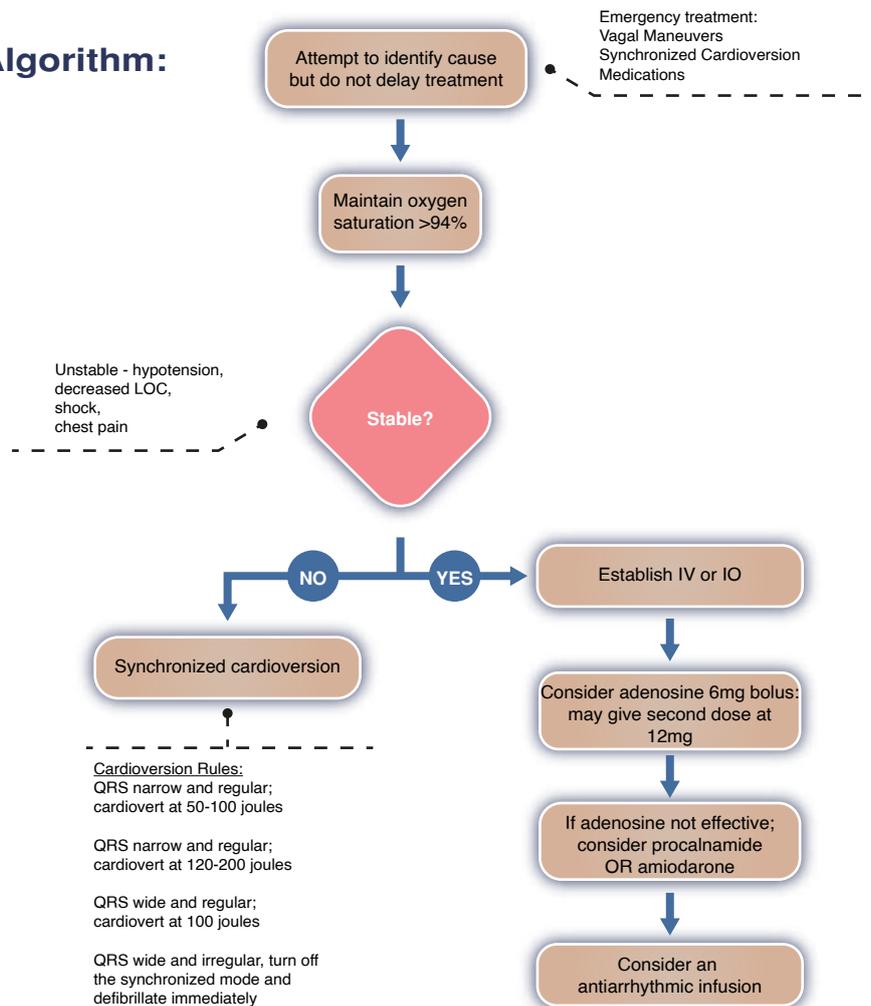
Acute coronary syndrome {ACS} algorithm

This encompasses several cardiac issues, including STEMI {ST-segment elevation myocardial infarction} and unstable angina. The ACS algorithm aims to relieve chest pain, identify the type of cardiac event, and prevent major adverse effects.

Tachycardia is a heartbeat that is above 100 bpm in adults. Bradycardia is a heartbeat of less than 60 bpm in adults (although symptoms usually develop when heart rate drops below 50 bpm). The algorithm for bradycardia and tachycardia includes:

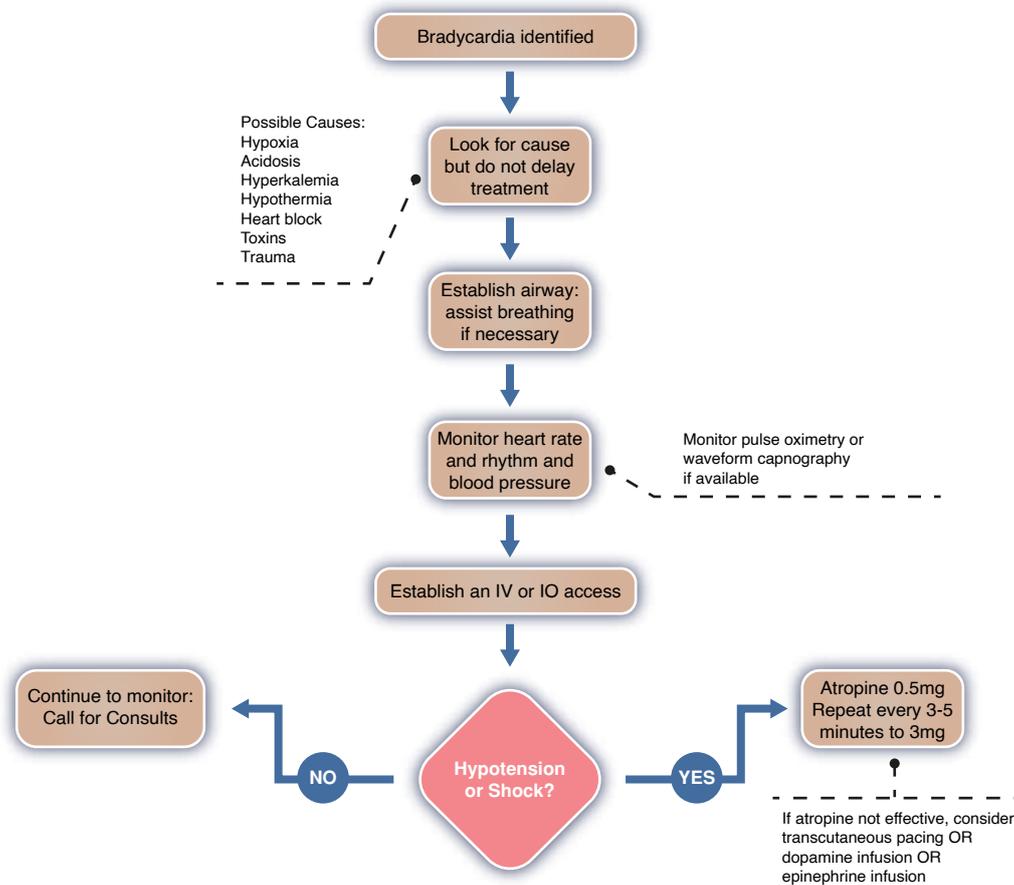
- The identification and treatment of the cause of tachycardia or bradycardia.
- Monitoring cardiac rhythm, oxygenation, and blood pressure.
- Determining the patient's stability.
- Inserting IV for medication.
- For tachycardia, administering an IV adenosine 6mg bolus. If this does not work, starting an IV procainamide 20-50mg infusion.
- For bradycardia, administering atropine 0.5mg. If this does not work, consider a dopamine or epinephrine infusion.

Tachycardia Algorithm:



**Figure 2:
ACLS
BRADYCARDIA
ALGORITHM**

Bradycardia Algorithm:



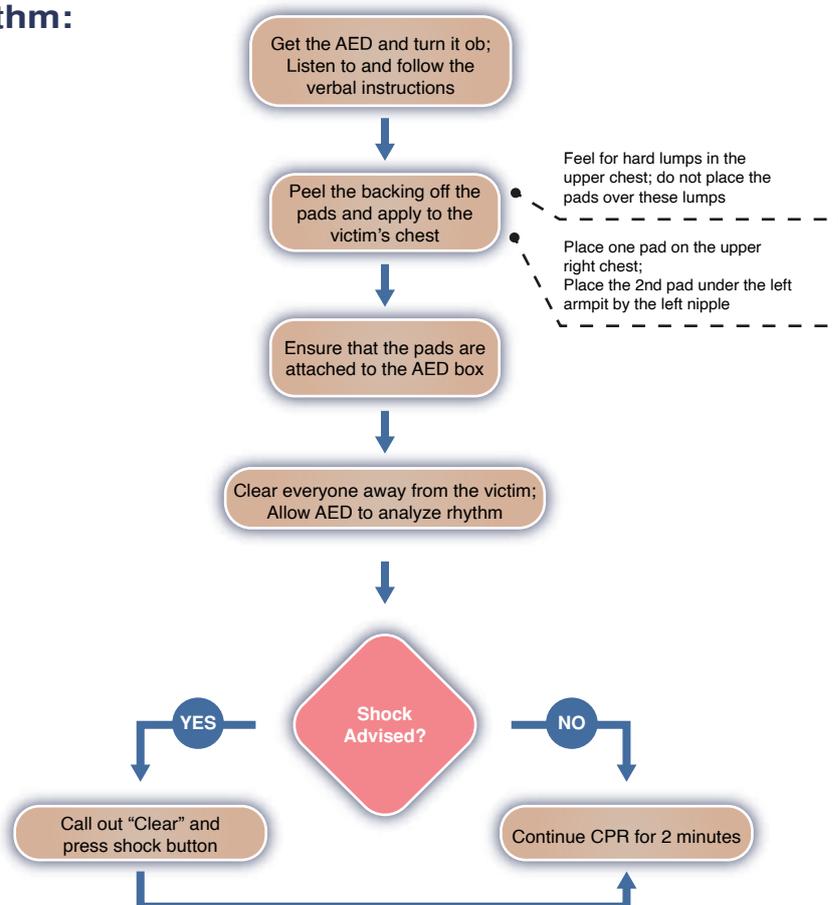
**Figure 3:
ACLS
TACHYCARDIA
ALGORITHM**

BLS AED algorithm

This encompasses the steps of a basic life support {BLS} survey and the use of an AED {automated defibrillator device}. For the BLS survey, secure the scene and assess the state of the victim. The following is the algorithm for using AED for managing a cardiac arrest:

- Continue with CPR until you attach the AED pads and power the device.
- Stop CPR when the device is ready and expose the victim's dry skin and chest if necessary.
- Open the pads and stick them on the patient's chest.
- Follow the voice instructions provided by the AED.
- The AED will assess the rhythm and instruct you to defibrillate if a shockable rhythm is present.
- If there is no shockable rhythm detected, continue CPR for two minutes, then repeat the AED analysis until the EMS arrives or the victim is conscious.

BLS AED Algorithm:



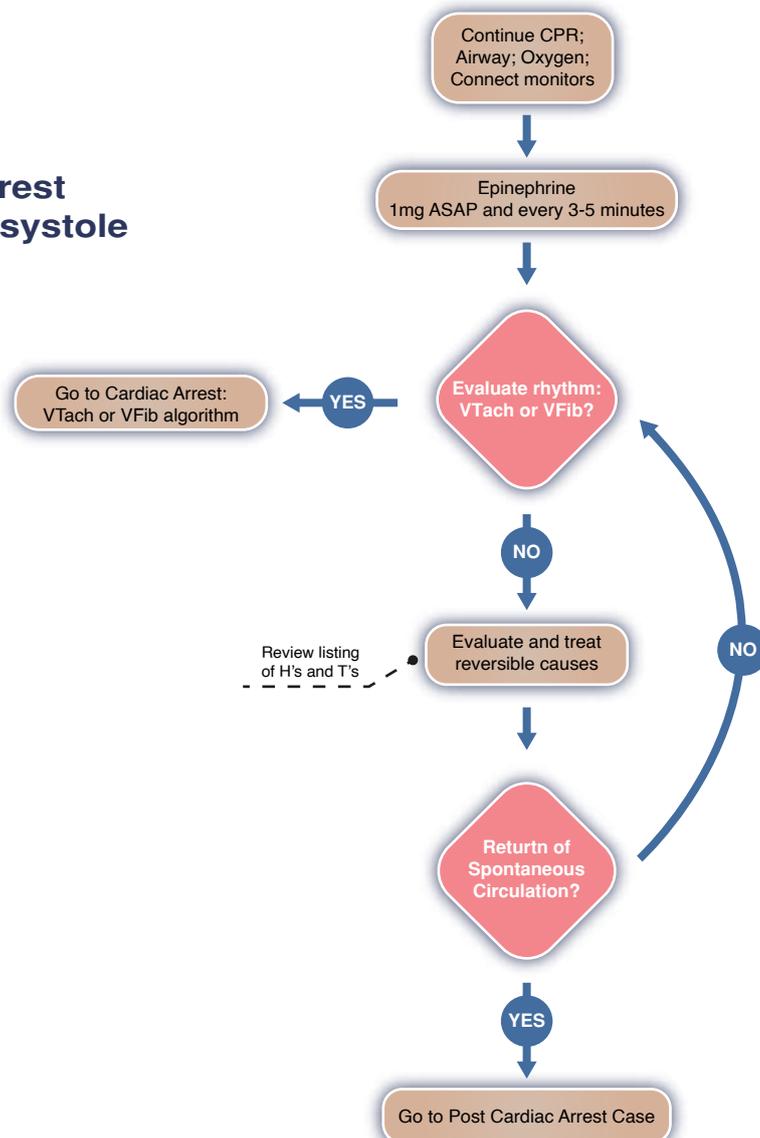
**Figure 4:
BLS AED
ALGORITHM**

ACLS cardiac arrest PEA and asystole algorithm

If BLS and AED interventions are unsuccessful, rescuers will implement the appropriate algorithm for non-shockable cardiac arrest. This is called an asystole or PEA {pulseless electrical activity} cardiac arrest. Here are the algorithms for these events:

- Continue CPR, then administer IV epinephrine 1mg, and again after 3-5 minutes if necessary.
- Stop CPR every two minutes to assess the cardiac rhythm and defibrillate if you get shockable rhythms.
- When identified, manage the cause of the asystole or PEA.
- If the patient returns to spontaneous consciousness, start on the post-cardiac arrest algorithm.

Cardiac Arrest PEA and Asystole Algorithm:



**Figure 5:
ACLS CARDIAC
ARREST PEA
AND ASYSTOLE
ALGORITHM**

ACLS cardiac arrest VTACH and VFIB algorithm

VFIB {ventricular fibrillation} and VTACH {ventricular tachycardia} are both pulseless rhythms in cardiac arrest. Here are the algorithms for their management:

- Defibrillate
- Continue with CPR for two minutes.
- Give IV epinephrine 1mg every 3-5 minutes until the return of spontaneous circulation.

Cardiac Arrest VTACH and VFIB Algorithm:

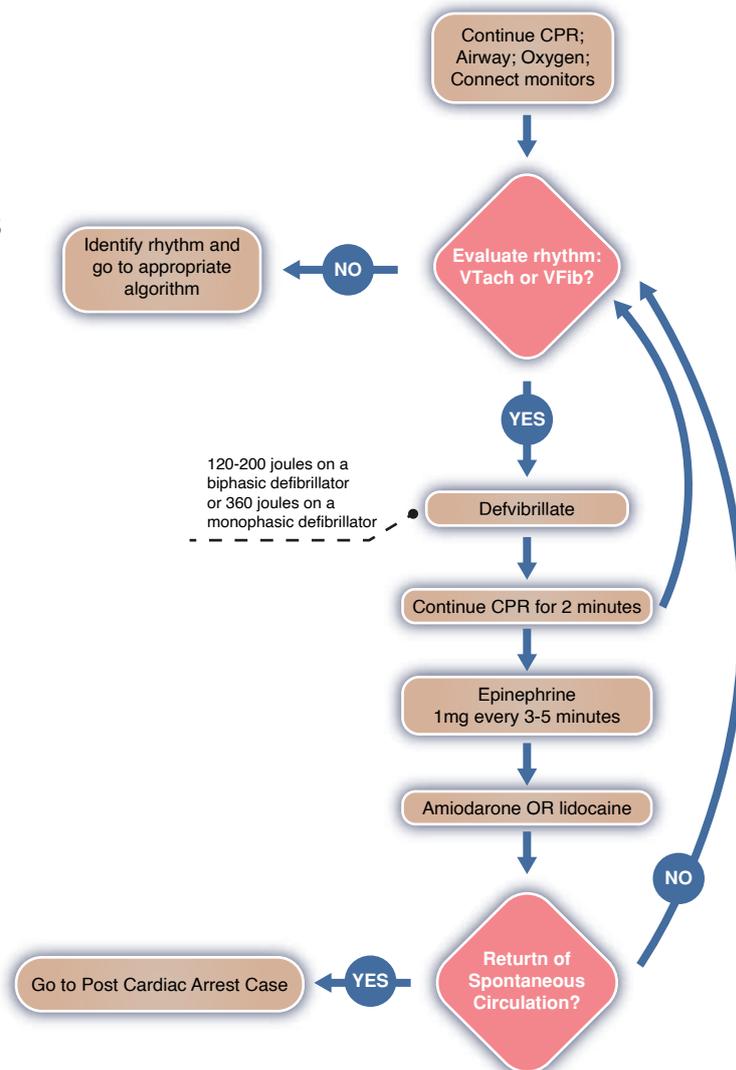


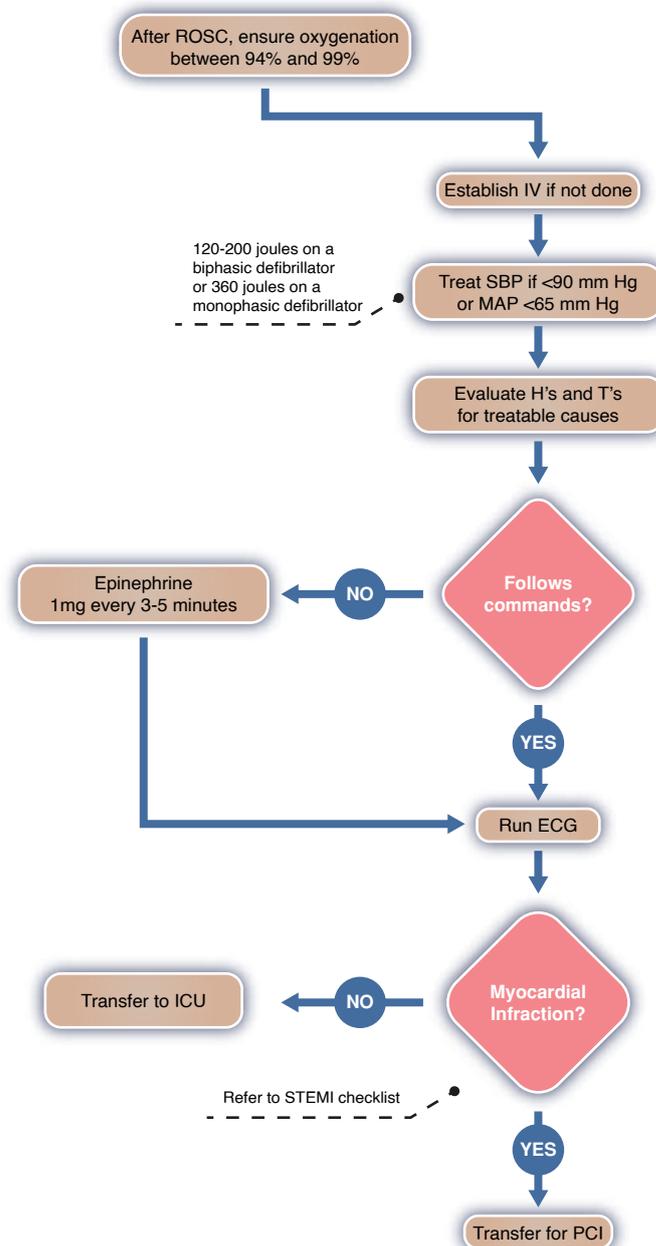
Figure 6:
ACLS
CARDIAC ARREST
VTACH AND VFIB
ALGORITHM

ACLS post-cardiac arrest care algorithm

Post-cardiac arrest care is meant to optimize positive patient outcomes. Its algorithms include:

- Management of the airways with a breath every 5-6 seconds. Maintaining oxygen saturation at 94-99%.
- Inserting IV access for medication and maintaining BP at above 90mmHg with fluids if necessary.
- Tracking the patient's mental status.
- Maintaining a temperature of 32-36 degrees Celsius for 24 hours.
- Having a 12-lead ECG to check for STEMI. Considering PCI {percutaneous coronary intervention} if there is evidence of STEMI.
- After PCI or in the absence of STEMI, transferring the patient to a coronary care unit.

Post Cardiac Arrest Care Algorithm:



**Figure 7:
ACLS
POST CARDIAC
ARREST CARE
ALGORITHM**

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With a better comprehension of what to expect in ACLS, you can now set out to find the best training institution for the same. Instead of taking a study leave and trying to fit the training into your schedule, you can settle for online classes like those offered by medtigo. There are also free PALS and ACLS certification courses for medtigo Connect members as well as board certification courses.