

**Fast  
Response**  
School of Health Care Education



# ACLS Study Guide



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Dear ACLS Student:

**Please Read this letter carefully**

This letter is to confirm your registration in the Advanced Cardiac Life Support (ACLS) course. Thank you for choosing Fast Response. We appreciate the opportunity to provide you with your clinical and professional educational needs.

Please plan to be on time because it will be difficult for late students to catch up once we start. All classes start at 9:00 am sharp. If you are more than 15 minutes late, you may be turned away, as required by the American Heart Association (AHA). Students are expected to attend and participate in the entire course.

Be prepared to pass the adult 1-rescuer CPR with AED skills test. Please note that we do not renew your BLS card based on this CPR test, which is a requirement of the ACLS course itself. All renewal (1-day) participants must bring their current American Heart Association-issued ACLS card to class. There are no exceptions for expired cards.

ACLS cards and Continuing Education Units (CEU's) will be issued at the end of class.

**How to Get Ready**

The ACLS Course is designed to teach you the lifesaving skills required to be both a team member and a team leader in either an in-hospital or an out-of-hospital setting. Because the ACLS Course covers extensive material in a short time, you will need to prepare for the course beforehand.

The ACLS Course does not teach CPR, ECG rhythm identification, pharmacology, or ACLS algorithms. **The course format requires all students to be fully prepared prior to coming to class. If you do not review CPR, learn and understand ECG's or the pharmacology information in the Pre-course Self-Assessment, it is unlikely that you can successfully complete the ACLS Course.**

**\*\*Fast Response offers the AHA's "ECG & Pharmacology" course as a preparatory class for ACLS; please call us for more information.**



## **Pre-course Requirements**

You should prepare for the course by doing the following:

1. Complete the precourse preparation checklist that came with your ACLS Provider Manual. Bring the checklist with you to the course.
2. Review the course agenda.
3. Review and understand the information in your ACLS Provider Manual. Pay particular attention to the 10 cases in Part 5.
4. The resuscitation scenarios require that your BLS skills and knowledge are current. Review and understand all BLS 2010 guidelines. You will be tested on 1-rescuer adult CPR and AED skills at the beginning of the ACLS Provider Course. You must know this in advance, since you will not be taught how to do CPR or how to use an AED during the course.
5. Review, understand, and complete the ECG and Pharmacology Precourse Self-Assessment on the Student Website ([www.heart.org/eccstudent](http://www.heart.org/eccstudent)). You will not be taught how to read or interpret ECGs in the course, nor will you be taught details about ACLS pharmacology.
6. Print your scores for the Precourse Self-Assessment and bring them with you to class.

## **What to Bring and What to Wear**

Bring your ACLS Provider Manual to each class. You will need it during each lesson in the course. You may wish to purchase the AHA's 2010 Handbook of Emergency Cardiovascular Care for Healthcare Providers (optional), which you may bring to the course to use as a reference guide during some of the stations in the course.

Please wear loose, comfortable clothing to class. You will be practicing skills that require you to work on your hands and knees, and the course requires bending, standing, and lifting. If you have any physical condition that might prevent you from engaging in these activities, please tell an instructor. The instructor may be able to adjust the equipment if you have back, knee, or hip problems.



**Please be aware:**

### **Reschedule Policy**

- **No refunds will be issued. All registrations are final.**
- You may reschedule your course by calling us at least 2 business days prior to your scheduled course date. **You will be charged a rescheduling fee of \$5.00.**
- If you reschedule your course fewer than 2 business days prior to the course start date, **you will be charged a rescheduling fee of 50% of the course fee.**
- **If you “no show” to your scheduled class, you will be charged 50% of the course cost to reschedule.**
- Course must be rescheduled and attended within 30 days from the original start date. No additional rescheduling requests will be honored.
- Only one reschedule request will be honored per course.
- Our Administrative Offices are closed on weekends and holidays. We do not accept rescheduling requests on weekends or holidays.
- We do not accept requests left on the answering machine.

### **Cancellation Policy**

- **We do not issue refunds for course fees. All registrations are final.**
- If you cancel or do not attend the class you have registered for, you will forfeit your entire course fee.

### **Late Arrival**

- Our classes start on time. Please plan your trip accordingly and remember to allow time for parking.
- If you are late for your scheduled class, you will not be admitted into class and you must reschedule. **You will be charged a \$5.00 rescheduling fee.**

**Lisa Dubnoff, MICP, R.N.  
ALS Program Director**



Dear Student,

In order for us at Fast Response to be able to provide you with a quality program, there are American Heart Association (AHA) guidelines we must follow. Outlined below are the Fast Response policies that enact the AHA's requirements for possession of student / provider manuals.

Each student must have the **2010 American Heart Association ACLS Provider Manual** available to them before, during, and after the course in order to comply with AHA guidelines. These books are available at [Emergencystuff.com](http://Emergencystuff.com) for a discounted rate. If you show up to your class without the required manual, there are two options:

**A:** You must purchase the book to attend the class. Books can be purchased at the reception desk. The current cost (as of July 2011) is \$48.51 + Alameda County sales tax for the Advanced Cardiac Life Support provider manual.

**B:** You may reschedule of a \$5 fee. To attend your rescheduled class, you must purchase the book. If you arrive to your rescheduled class without the book, you will be asked to purchase the book or be turned away from class.

If you are attending this class from a contracted hospital provider, you are required to obtain the ACLS Provider Manual from your education department, if possible. If you failed to do this, you will be required to purchase the book prior to being granted entrance into class.

Fast Response would like to apologize for any inconvenience this may cause, but the guidelines set forth by the AHA are very specific in how the class literature must be handled.

Thank you,  
John Greene, NREMT-P  
Director of Continuing Education  
Fast Response School of Health Care Education

## American Heart Links

There are several resources available to you on the American Heart Association website at [www.americanheart.org](http://www.americanheart.org) . Here are some helpful links:

- You can find information on cardiovascular diseases and risk factors at [http://www.heart.org/HEARTORG/Conditions/HeartAttack/UnderstandYourRiskofHeartAttack/Understand-Your-Risk-of-Heart-Attack\\_UCM\\_002040\\_Article.jsp](http://www.heart.org/HEARTORG/Conditions/HeartAttack/UnderstandYourRiskofHeartAttack/Understand-Your-Risk-of-Heart-Attack_UCM_002040_Article.jsp)
- You can access information on the warning signs of heart attack and stroke at [http://www.heart.org/HEARTORG/Conditions/HeartAttack/Heart-%C2%AD%E2%80%90Attack\\_UCM\\_001092\\_SubHomePage.jsp](http://www.heart.org/HEARTORG/Conditions/HeartAttack/Heart-%C2%AD%E2%80%90Attack_UCM_001092_SubHomePage.jsp)
- You can find out how to lead a healthy lifestyle at [http://www.heart.org/HEARTORG/GettingHealthy/GettingHealthy\\_UCM\\_001078\\_SubHomePage.jsp](http://www.heart.org/HEARTORG/GettingHealthy/GettingHealthy_UCM_001078_SubHomePage.jsp)
- American Heart Association Heart Disease and stroke statistics. [http://my.americanheart.org/professional/General/Heart-Disease-and-Stroke-Statistics-2010-Update\\_UCM\\_423970\\_Article.jsp](http://my.americanheart.org/professional/General/Heart-Disease-and-Stroke-Statistics-2010-Update_UCM_423970_Article.jsp)



## ACLS Course Agenda Provider Day 1

0900-0920	Welcome / Introductions Course overview / Organization Precourse Self-Assessment Review
0920-0940	BLS and ACLS Surveys: Video
0940-1005	Importance of CPR: Lecture
1005-1030	EKG Review: Lecture
1030-1040	Break
1040-1120	Management of Respiratory Arrest (Group 1), CPR and AED (Group 2): Learning Stations
1120-1200	Management of Respiratory Arrest (Group 2), CPR and AED (Group 1): Learning Stations
1200-1300	Lunch
1300-1335	Stroke: Video and Discussion
1335-1410	The Megacode and Resuscitation Team Concept: Video and Discussion
1410-1420	Break
1420-1700	Cardiac Arrest (VF / Pulseless V-Tach): Learning Station

## ACLS Course Agenda Provider Day 2

0900-0935	Acute Coronary Syndromes: Video and Discussion
0935-1035	PEA / Asystole / Bradycardia, Tachycardia - Stable and Unstable: Learning Station



1035-1045	Break
1045-1145	Megacode Practice: Learning Station
1145-1245	Lunch
1245-1445	Megacode; Testing
1445-1500	ACLS Review: Jeopardy Game
1500-1700	Written Exam: Testing

## ACLS Course Agenda Renewal

0900-0915	Welcome / Introductions Course overview / Organization Precourse Self-Assessment Review
0915-0940	ACLS Science Update: Video
0940-1010	Importance of CPR: Lecture
1010-1020	Break
1020-1100	Management of Respiratory Arrest (Group 1), CPR and AED (Group 2): Learning Stations
1100-1140	Management of Respiratory Arrest (Group 2), CPR and AED (Group 1): Learning Stations
1140-1200	Stroke: Video
1200-1300	Lunch
1300-1330	The Megacode and Resuscitation Team Concept: Video and Discussion
1330-1430	Megacode Practice: Learning Station
1430-1440	Break
1440-1540	Megacode: Testing
1540-1600	ACLS Review: Jeopardy game
1600-1700	Written Exam: Testing

## Patient Assessment

In ACLS, the specific treatment of a given dysrhythmia or condition depends on the patient's hemodynamic status. In general, patients can be divided into four categories to determine treatment priorities:

- **Asymptomatic**
- **Symptomatic – Stable**
- **Symptomatic – Unstable**
- **Pulseless**

Asymptomatic patients do not receive treatment, but should be monitored for changes in condition. Any patient with symptoms (even apparently mild symptoms such as palpitations) should be assessed to determine if they are Stable or Unstable. Determination of a patient's level of hemodynamic compromise can include several factors:

- **General Appearance:** The first indication of hemodynamic status comes from a patient's general appearance, including skin signs, level of activity, and work of breathing. If a patient shows signs of compensation (such as pale, cool, or diaphoretic skin) or acute distress, they are unstable.
- **Level of Consciousness:** Interaction with the patient allows the provider to evaluate the patient's level of consciousness based on the patient's activity, awareness of their surroundings, and ability to provide information. If a patient shows any level of mental deficit, family or friends should be consulted to determine if this state differs from the patient's baseline. If the mental deficit is acute, the patient should be considered unstable.
- **Vital signs:** Vital signs provide a diagnostic evaluation of the patient. Blood pressure is the primary indicator. A systolic blood pressure above 90 mm usually indicates that the patient is stable (although the provider should be alert for changes in blood pressure that might indicate an unstable patient even if blood pressure is normal). Other vital signs may be useful; however, the provider should remember that various conditions (CO<sub>2</sub> poisoning) can mask changes in blood oxygen levels, and that a high O<sub>2</sub> saturation may be present in unstable patients (those in shock). Additionally, heart rate is of no use in determining if a patient is stable or unstable – a patient with a heart rate of 80 can be severely unstable, while a patient with a heart rate of 210 can be stable if they are still perfusing well.

If a patient's **General Appearance, Level of Consciousness, and Vital Signs** are all normal, the patient is stable. If possible, treatment should be rendered starting with the least invasive **that is appropriate for that patient's hemodynamic status**. In ACLS, the preferential treatment for symptomatic, but stable patients is generally medications. The preferential treatment for unstable patients is generally Electrical Therapy.

Once treatment is rendered, **the provider must reassess the patient**. If the patient remains symptomatic, the appropriate treatment (medications or electricity) should be given again depending on the patient's heart rhythm and current hemodynamic status. Thus, if a patient was stable before, but becomes unstable after administration of a drug, the patient should receive electrical therapy to continue treating the dysrhythmia rather than additional doses of a medication.

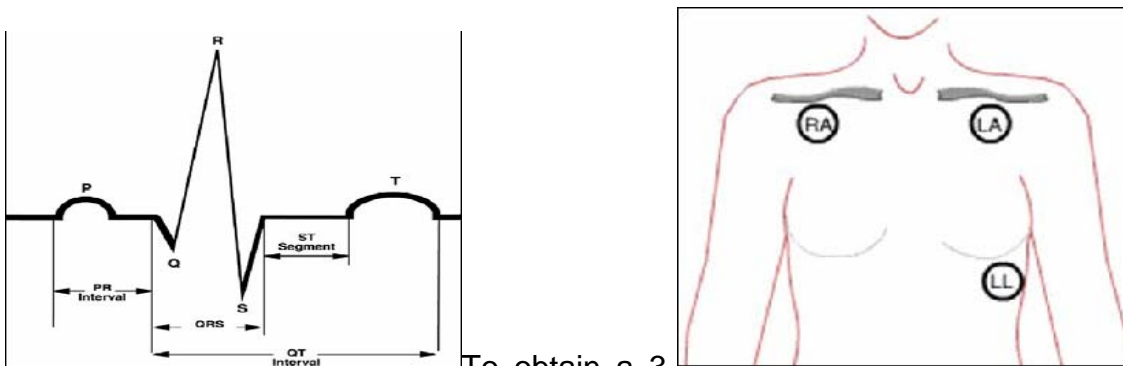
If a patient's General Appearance indicates they may be unconscious, you should check for responsiveness. If the patient is **Unresponsive**, get help (send someone to call 911 and bring back an AED, call a code, etc.). Then assess Circulation by checking for a pulse. If the patient has a pulse, assess breathing next. If the patient is not breathing, or breathing inadequately, rescue breathing should be initiated. If the patient is pulseless, rescuers should begin CPR.

Once you determine that a patient is **Pulseless**, an AED or EKG monitor should be attached as soon as possible. CPR should be continued with minimal interruptions. After each rhythm check, the patient should be defibrillated if appropriate (rhythm Ventricular Fibrillation or Pulseless Ventricular Tachycardia). Regardless of the heart rhythm, medications should be given as soon as possible after CPR is resumed. The specific medication should be determined by the patient's exact status and heart rhythm.

**Remember: Treat the patient not the monitor!!**

## EKG and Electrical Therapy Review

The EKG tracing represents electrical activity through the heart. The **P wave** represents depolarization of the atria; the **QRS complex** represents depolarization of the ventricles; and the **T wave** represents the repolarization of the ventricles. The interval from the first deflection of the P wave to the beginning of the QRS complex is the P-R Interval (PRI), and should be between 0.12 and 0.20 seconds. A patient's QRS complex has duration of 0.12 seconds or less; a longer duration (*wide QRS*) indicates delayed conduction through the ventricles, often as the result of a ventricular pacemaker focus. The horizontal axis of the EKG strips measures time. Each large box represents 0.20 seconds; each small box represents 0.04 seconds.



To obtain a 3-lead EKG tracing, place the white (RA) electrode on the right chest just below the clavicle; the black electrode (LA) on the left chest just below the clavicle; and the red electrode (LL) laterally on the lower left abdomen. Pacer pads generally are applied to the anterior/posterior positions; however, defibrillation pads can either be applied in the traditional location of sternum and apex, or they can also be placed in the anterior/posterior positions.

**Rhythm Disturbances: Treat the patient, not the dysrhythmia.** Always assess your patient for pulses, perfusion, and level of consciousness – is the patient *Stable*, *Unstable*, or *Pulseless*? Next, assess the rhythm: Is it fast or slow? Is it life threatening? As you treat the patient, try to discover the cause of the dysrhythmia – for many patients, their only chance of survival is if you can identify and treat a **reversible cause**. There are many possible causes of rhythm disturbances, especially bradycardia or PEA. Although lab draws can be useful, a history of the patient and the current event obtained from a parent or caregiver is often more useful.

## Defibrillation (Unsynchronized Shock)

Fibrillation is a disorganized rhythm that, if present in the ventricles, is life threatening. Immediate CPR combined with early defibrillation is critical to survival from sudden cardiac arrest. Defibrillation terminates all electrical activity in the pulseless heart in the hopes it will resume beating in a coordinated fashion. A shock should be delivered about once every 2 minutes if the patient remains in Ventricular Fibrillation. With a monophasic defibrillator, the recommendation is to deliver the first shock at 360 joules. If a biphasic defibrillator is used, the recommended dosage is machine dependent and should appear on the front of the machine. If optimal shock dosage is not known, the default setting is 200 joules.

## Synchronized Cardioversion

In stable patients with **narrow-complex** tachycardia (i.e., SVT), attempt vagal maneuvers first and then administer adenosine. For stable patients experiencing **wide-complex** tachycardia, consider adenosine if the rhythm is regular and monomorphic. For any unstable tachycardia (characterized by hypotension, acute alteration of mental status, shock, etc.), synchronized cardioversion is the treatment of choice. This is especially true in the absence of an IV / IO. If an IV / IO is available, and the tachycardia consists of regular narrow complexes, adenosine can be considered. If the patient is conscious, consider sedation prior to cardioversion; however, **synchronized cardioversion should not be delayed while waiting for sedation** in severely symptomatic patients.

With a biphasic monitor, the initial dose is delivered at 120 to 200 joules for atrial fibrillation. Cardioversion of atrial flutter and other SVT's generally require less energy; an initial energy of 50 joules to 100 joules is often sufficient. Deliver additional shocks in stepwise fashion. Monomorphic V-Tach with a pulse responds well to initial energies of 100 joules. Polymorphic V-Tach should be treated like V-Fib. That is, deliver a high energy unsynchronized shock.

## Transcutaneous Pacing (TCP)

External cardiac pacing may be useful for the treatment of symptomatic bradycardia, especially for unstable patients who do not respond to Atropine. If the patient is conscious, consider sedation. However, **pacing should not be delayed while waiting for sedation**. A common pacing protocol is to begin pacing at zero milliamps, slowly increasing until capture is achieved. Then set the rate at 20 beats per minute (bpm) above the monitored heart rate, with a minimum rate of 50 bpm.

### Normal Sinus Rhythm



Rhythm	Regular
Rate	60 – 100
P waves	Normal configuration & direction; one P wave precedes each QRS
PRI	Normal (0.12 – 0.20 seconds)
QRS	Normal (0.12 seconds or less)

### Sinus Bradycardia



Rhythm	Regular
Rate	40 - 60
P waves	Normal configuration & direction; one P wave precedes each QRS
PRI	Normal (0.12 – 0.20 seconds)
QRS	Normal (0.12 seconds or less)

### Supraventricular Tachycardia



Rhythm	Regular
Rate	150 – 250 +
P waves	Unable to discern (usually hidden in preceding T wave).
PRI	Not measurable
QRS	Normal (0.12 seconds or less)

### Sinus Tachycardia



Rhythm	Regular
Rate	100 - 160
P waves	Normal configuration & direction; one P wave precedes each QRS
PRI	Normal (0.12 – 0.20 seconds)
QRS	Normal (0.12 seconds or less)

### Atrial Flutter



Rhythm	Regular or irregular (depends on AV conduction ratio)
Rate	<u>Atrial Rate:</u> 250-400 <u>Ventricular Rate:</u> Varies, however slower than atrial rate.
P waves	V-shaped flutter waves (F waves) with a "sawtooth" appearance
PRI	Not measurable
QRS	Normal (0.12 seconds or less)

### Atrial Fibrillation (A-Fib)



Rhythm	irregular (often grossly irregular)
Rate	<u>Atrial Rate:</u> 350 <u>Ventricular Rate:</u> Varies, however slower than atrial rate.
P waves	Irregular fibrillatory waves; sinus P waves usually not present
PRI	Not measurable
QRS	Normal (0.12 seconds or less)

### Junctional Escape Rhythm



Rhythm	Regular
Rate	40 – 60
P waves	Usually inverted in Lead II; may occur before or after the QRS complex or be hidden within the QRS complex
PRI	Usually short(0.10 seconds or less); not measurable if P wave within or after QRS
QRS	Normal (0.12 seconds or less)

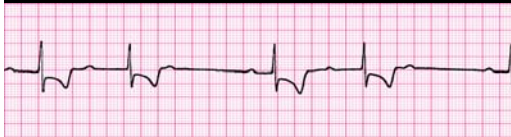
### First-Degree AV Block



Rhythm	Regular
Rate	Heart rate is that of the underlying rhythm (usually sinus); both Atrial and ventricular rates will be the same
P waves	Normal in configuration & direction; one P wave precedes each QRS
PRI	Prolonged (> 0.20 seconds); remains constant
QRS	Normal (0.12 seconds or less)



### Second-Degree AV Block Type I



Rhythm	Irregular (may be Regularly Irregular)
Rate	Depends on the underlying rhythm; Ventricular rate is less than atrial rate
P waves	Normal in configuration & direction; one P wave precedes each QRS until a P wave occurs with no following QRS complex
PRI	Progressively lengthens until a QRS is dropped, then the cycle begins again
QRS	Normal (0.12 seconds or less)

### Second-Degree AV Block Type II



Rhythm	Irregular (may be Regularly Irregular, depending on the location and severity of the block)
Rate	<u>Atrial</u> : Rate of underlying rhythm <u>Ventricular</u> : Rate depends on conduction through AV node; less than the atrial rate
P waves	Normal in configuration & direction; some P waves not followed by QRS complexes
PRI	May be normal or prolonged; remains constant
QRS	Can be Normal or Wide (depending on location of block)

### Third-Degree AV Block



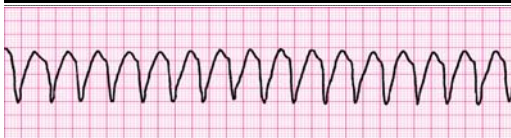
Rhythm	Irregular (atrial and ventricular rhythms are each regular, but are dissociated)
Rate	<u>Atrial</u> : varies (often 60-100) <u>Ventricular</u> : varies (often 20-40)
P waves	Usually normal in configuration & direction; P waves and QRS complexes have no relationship
PRI	N/A (because QRS complexes and P waves are completely dissociated)
QRS	Can be normal but are often wide (>0.12 seconds)

### Premature Ventricular Contractions (PVC's)



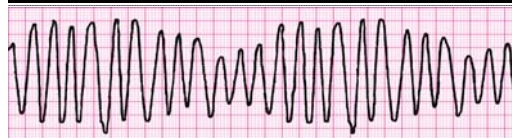
Rhythm	Underlying is usually regular. PVC's may be unifocal (same shape) or multifocal (different shape).
Rate	Dependent on the underlying rhythm. Maybe fast or slow
P waves	Normal for the underlying rhythm. PVC may not have one
PRI	Normal for the underlying rhythm. PVC N/A
QRS	Underlying rhythm normal. Wide in PVC (>0.12 seconds)

### Ventricular Tachycardia



Rhythm	Usually regular
Rate	>100n(usually 140 to 250)
P waves	SA node often still beats; however, the P wave is usually hidden in the QRS
PRI	N/A
QRS	Wide (0.12 seconds or greater)

### Polymorphic V-Tach



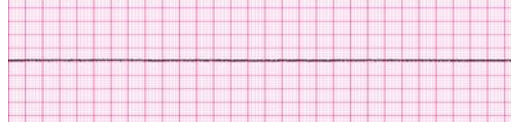
Rhythm	Usually regular
Rate	>100n(usually 140 to 250)
P waves	SA node often still beats; however, the P wave is usually hidden in the QRS
PRI	N/A
QRS	Wide (0.12 seconds or greater)

### Ventricular Fibrillation



Rhythm	Irregular; the baseline is totally chaotic.
Rate	Cannot be determined (no discernible waves or complexes).
P waves	There are no discernible waves.
PRI	N/A
QRS	There are no discernible complexes

### Asystole



Rhythm	Regular
Rate	None
P waves	Usually absent, but may be present
PRI	N/A
QRS	Absent