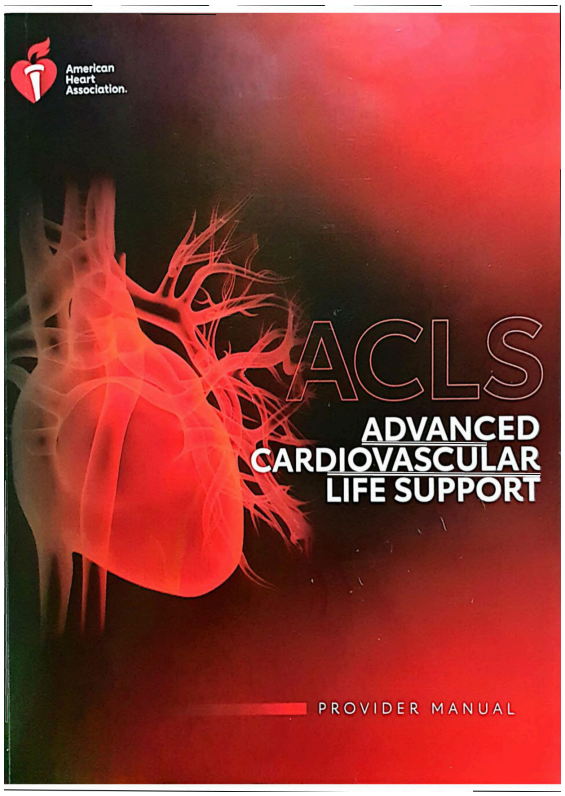


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or scan the QR code to access the digital study portal.

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Note on Medication Doses

Emergency cardiovascular care (ECC) is a dynamic science. Advances in treatment and drug therapies occur rapidly. Readers should use the following sources to check for changes in recommended doses, indications, and contraindications: the package insert product information sheet for each drug and medical device and the course updates available on www.heart.org/courseupdates.

Part 1

Overview of ACLS

Introduction

Course Description and Goal

The Advanced Cardiovascular Life Support (ACLS) Provider Course is designed for healthcare providers who either direct or participate in the management of cardiopulmonary arrest or other cardiovascular emergencies. Through didactic instruction and active participation in simulated cases, students will enhance their skills in the recognition and intervention of cardiopulmonary arrest, immediate post–cardiac arrest, acute dysrhythmia, stroke, and acute coronary syndromes (ACS).The goal of this course is to improve outcomes for adult patients of cardiopulmonary arrest and other cardiovascular emergencies through early recognition and interventions by high-performance teams.

Course Objectives

After successfully completing this course, you should be able to

- Define *systems of care*
- Apply the Basic Life Support (BLS) Assessment, Primary Assessment, and Secondary Assessment sequences for systematic evaluation of adult patients
- Discuss how using rapid response teams (RRTs) or medical emergency teams (METs) may improve patient outcomes
- Discuss early recognition and management of ACS, including appropriate disposition
- Discuss early recognition and management of stroke, including appropriate disposition
- Recognize bradycardia and tachycardia that may result in cardiac arrest or complicate resuscitation outcome
- Perform early management of bradycardia and tachycardia that may result in cardiac arrest or complicate resuscitation outcome
- Model effective communication as a member or leader of a high-performance team
- Recognize the impact of team dynamics on overall team performance
- Recognize respiratory arrest
- Perform early management of respiratory arrest
- Recognize cardiac arrest
- Perform prompt, high-quality BLS, which includes prioritizing early chest compressions and integrating early automated external defibrillator (AED) use
- Perform early management of cardiac arrest until termination of resuscitation or transfer of care, including immediate post–cardiac arrest care
- Evaluate resuscitative efforts during cardiac arrest by continually assessing cardiopulmonary resuscitation (CPR) quality, monitoring the patient's physiologic response, and delivering real-time feedback to the team

Course Design

To help you ochievo theso objectives, the ACLS Provider Course includes learning stations and a Megacodo evaluation station. The learning stations provide activities such as

- Simulated clinical scenarios
- Video or instructor demonstrations
- Discussion and role-playing
- Group practice to achieve effective high-performance teams

In these learning stations, you will practice essential skills both individually and as part of a team. Because this course emphasizes effective team skills as a vital part of the resuscitative effort, you'll practice as both a team member and as Team Leader.

In the Megacode evaluation station at the end of the class, you will participate in a simulated cardiac arrest scenario to evaluate your

- Integration of core material and skills
- Application of algorithms
- Interpretation of arrhythmias
- Use of appropriate ACLS drug therapy
- Performance as an effective leader and member of a high-performance team
- Achieving objective measures such as chest compression fraction (CCF)

Course Prerequisites and Preparation

The American Heart Association (AHA) limits enrollment in this course to healthcare providers who

- Direct or participate in the resuscitation of patients in or out of hospital
- Have the basic knowledge and skills to participate actively with the instructor and other students

Before class, read the *ACLS Provider Manual,* complete the mandatory precourse work in ACLS Student Resources (accessed via eLearning.heart.org), identify any gaps in your knowledge, and remediate those gaps by studying the applicable content in the *ACLS Provider Manual* or other supplementary resources, including ACLS Student Resources. You must pass the Precourse Self-Assessment with a minimum score of 70%. You may retake the self-assessment as often as needed to pass. Print your certificate of completion and score report and bring them with you to the course.

You will need the following knowledge and skills to successfully complete the course:

- BLS skills
- Electrocardiogram (ECG) rhythm interpretation for core ACLS rhythms
- Knowledge of airway management and adjuncts
- Basic ACLS drug and pharmacology knowledge
- Practical application of ACLS rhythms and drugs
- Effective high-performance team skills

BLS Skills

Strong BLS skills form the foundation of ACLS, so you must pass the high-quality BLS Testing Station to complete this course. *Make sure that you are proficient in BLS skills before attending the class.*

ECG Rhythm Interpretation for Core ACLS Rhythms

The basic cardiac arrest and periarrest algorithms require students to recognize these ECG rhythms:

- Sinus rhythm
- Atrial fibrillation and flutter
- Sinus bradycardia
- Sinus tachycardia
- Supraventricular tachycardia
- Atrioventricular blocks
- Asystole
- Pulseless electrical activity (PEA)
- Ventricular tachycardias (VTs)
- Ventricular fibrillation (VF)

The ACLS Precourse Self-Assessment contains an ECG rhythm identification section. Use your self-assessment score and feedback to help you identify your areas of strength and weakness before attending the class. You must be able to identify and interpret rhythms during course practice sessions and the final Megacode evaluation station.

Basic ACLS Drug and Pharmacology Knowledge

You must know the drugs and doses used in the ACLS algorithms. You will also need to know when to use which drug based on the clinical situation.

The ACLS Precourse Self-Assessment contains pharmacology questions. Use your self-assessment score and feedback to help you identify areas of strength and weakness before attending the class.

Course Materials

Course materials consist of the *ACLS Provider Manual,* ACLS Student Resources, and 3 reference cards.



The computer icon directs you to additional supplementary information in the ACLS Student Resources (accessed via eLearning.heart.org).

ACLS Provider Manual

The *ACLS Provider Manual* contains the basic information you will need to participate in the course, including the systematic approach to a cardiopulmonary emergency, information about effective high-performance team communication, and the ACLS cases and algorithms. Review this manual before attending the class, and bring it with you to the class. Students using the eBook version should download the manual to their device's eReader app and bring it with them, in case there is no internet connection.

The *ACLS Provider Manual* also contains important information presented in *Critical Concepts* and *Caution* callout boxes that require your attention:



Critical Concepts

These boxes contain the most important information you must know, including specific risks associated with certain interventions and additional background on key topics this course covers.

Caution

Caution boves emphasire ***specific risks*** *associated* ***with*** *Interventions.*

ACLS Student Resources



ACLS Student Resouices (nccesseil via **eLoarnIng.heart.org**) contain mandatory precoutse preparation and supplementary materials.

- Precourse Self-Assessment (passing score 70% or greater)
- Precourse work (complete interactive video lessons)

Use the following website resources to supplement basic concepts in the ACLS Course. Some information is supplementary; other areas provide additional information for interested students or advanced providers.

- Precourse Preparation Checklist (used to ensure that students are ready to attend the class).
- ACLS Supplementary Material
  - Basic Airway Management
  - Advanced Airway Management
  - ACLS Core Rhythms
  - Defibrillation
  - Access for Medications
  - Acute Coronary Syndromes
  - Human, Ethical, and Legal Dimensions of ECC and ACLS
- Optional Videos
  - Intraosseous Access
  - Coping With Death

Reference Cards

The 3 stand-alone reference cards included with the *ACLS Provider Manual* (and sold individually packaged) provide quick reference for training in real emergencies on the following topics:

- Cardiac arrest, arrhythmias, and their treatment
  - Adult Cardiac Arrest Algorithms
  - Table with drugs and dosage reminders
  - Adult Post–Cardiac Arrest Care Algorithm
  - Adult Bradycardia Algorithm
  - Adult Tachycardia With a Pulse Algorithm
- ACS and stroke
  - Acute Coronary Syndromes Algorithm
  - Fibrinolytic Contraindications for STEMI
  - Adult Suspected Stroke Algorithm
  - Emergency Medical Services Acute Stroke Routing
  - Hypertension Management in Acute Ischemic Stroke

- Cardiac arrest in select special situations and neuroprognostication
  - Opioid-Associated Emergency tor Healthcare Providers Algorithm
  - Adult Ventricular Assist Device Algorithm
  - Cardiac Arrest in Pregnancy In-Hospital ACLS Algorithm
  - Neuroprognostication diagram

Use these cards as a reference when you are preparing for class, during the loarnlng stations, and during real emergencies. You may refer to them during the Megacodo and the cognitive exam.

Course Completion Requirements

To successfully complete the ACLS Provider Course and obtain your course completion card, you must

- Pass the Adult High-Quality BLS Skills Test
- Pass the Airway Management Skills Test, including oropharyngeal airway/ nasopharyngeal airway insertion
- Demonstrate competency in learning station skills
- Pass the High-Performance Teams: Megacode Test
- Pass the open-resource exam with a minimum score of 84%

Advanced Cardiovascular Life Support

ACLS providers face an important challenge: functioning as a team that implements basic and advanced life support to save a person's life. The *2020 AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care* reviewed evidence that in both in-hospital and out-of-hospital settings, many cardiac arrest patients do not receive high-quality CPR, and most do not survive. One study of in-hospital cardiac arrest (IHCA) showed that CPR quality was inconsistent and did not always meet guidelines recommendations.[1] Over the years, however, patient outcomes after cardiac arrest have improved. Table 1 shows the recent survival trends in both IHCA and out-of-hospital cardiac arrest (OHCA) in the United States.[2]

Table 1. Recent Cardiac Arrest Survival Data

statistical update	OHCA incidence, n	OHCA bystander CPR (overall), %	OHCA survival rate* (overall), %	IHCA incidence,t n	IHCA survival rate* (Adults), %
2020	356 461	41.6	10.4	209 000	25.8
2019	356 461	46.1	10.4	209 000	25.6
2018	347 322	46.1	11.4	209 000	25.8
2017	356 500	45.7	11.4	209 000	23.8
2016	356 500	46.1	12.0	209 000	24.8
2015	326200	45.9	10.6	209 000	25.5
2014	424 000	40.8	10.4	209000	22.7
2013	359 400	40.1	9.5	209 000	23.9
2012	382 800	41.0	11.4	209 000	23.1
Baseline		31.0	7.9		19.0

*Survival to hospital discharge.
tExtrapolated incidence based on the same 2011 Get With The Guidelines®-Resuscitation study.

Multiple evidence reviews have focused on the essentials of CPR, the links in the Chain of Survival, and the integration of BLS with ACLS. Minimizing the interval between stopping chest compressions and delivering a shock (ie, minimizing the preshock pause) improves the chances of shock success[3] and patient survival.[4] Experts believe that high survival rates from both in-hospital and out-of-hospital sudden cardiac death are possible with strong systems of care.

Several factors have been associated with improved survival in patients with cardiac arrest:

- Training healthcare providers to become more knowledgeable about what improves survival rates
- Proactive planning and simulation of cardiac arrest to provide the opportunity for a healthcare provider to practice and improve responding to cardiac arrest
- Rapidly recognizing sudden cardiac arrest
- Immediately providing high-quality CPR
- Defibrillating immediately, as soon as a defibrillator is available
- Providing goal-directed, time-sensitive post–cardiac arrest care

Rapid intervention by skilled people working within a strong system of care leads to the best outcomes.

Critical Concepts: Optimizing ACLS

Team Leaders can optimize ACLS by integrating high-quality CPR and minimal interruption of chest compressions with advanced life support strategies (eg, defibrillation, medications, advanced airway).

Studies have shown that reducing the interval between compressions and shock delivery can increase predicted shock success. Limit the number of interruptions in compressions to critical interventions (rhythm analysis, shock delivery, intubation, etc), and minimize the duration of necessary interruptions to 10 seconds or less.

Continuous Quality Improvement

Every emergency medical services (EMS) system and hospital system should assess its resuscitation interventions and outcomes through continuous quality improvement (CQI) with a defined process of data collection and review. The current consensus on the best way to improve both in-hospital and out-of-hospital survival after sudden cardiac arrest is to modify the standard quality improvement model according to the Chain of Survival metaphor. Each link in the chain comprises structural, process, and outcome variables that systems can examine, measure, and record. System managers can quickly identify gaps between observed processes and outcomes and local expectations or published standard Individuals and teams who regularly review their performance in actual resuscitations will, on average, improve their performance in subsequent resuscitation events. Therefore, it is important for resuscitation teams to find the time to debrief themselves at some time after every resuscitation, either immediately or later.