

Part

6

ACLS Lesson Plans

Lessons are numbered only for labeling and convenience. Lessons 1 to 3 should be completed in order because they are the foundation of the course.

Precourse Preparation

Instructor Tips

- The time you invest in preparation is important. Prepare well, and anticipate questions and challenges
- Anticipate what could happen, and have a plan for possible challenges such as
 - Instructor does not arrive
 - Equipment fails/malfunctions
 - Batteries are dead (bring extras)

30 to 60 Days Before Class

- Determine course specifics
 - Target audience
 - Number of students
 - Special needs or equipment
- Review and reserve ACLS equipment
- Schedule the room(s) as soon as dates are determined
- Schedule additional instructors, if needed (Table 1)

Table 1. Class Size and Student-to-Instructor Ratios for Course Activities

Activity	Recommended size or ratio
Large-group interactions	The size of the group is limited by the size of the room and the number of video monitors or projection screens.
Learning stations and High-Performance Teams: Megacode Testing	6:1 up to a maximum of 8:1 The student-to-instructor ratio should be 6 students to 1 learning station, with 1 instructor for each station. In some cases, a maximum of 8 students to 1 instructor to 1 learning station may be used.

Optional

Instructors or Training Centers may consider offering an ACLS preparation course days or weeks before the ACLS Course to ensure that students understand

- ECGs (rhythm analysis)
- Pharmacology
- Airway management
- BLS skills

At Least 3 Weeks Before Class

- Confirm room reservations and setups
- Send students a precourse letter with student materials

- Ensure that students understand that precourse preparation is necessary for successful participation in the ACLS Course
- Provide students information on the precourse self-assessment and precourse work (interactive video lessons)
- Confirm additional instructors
- **Research local treatment protocols and prepare for discussion**

Day Before Class

- Set up the room
- Coordinate the plan with additional instructors, if needed for class size
- Use the Equipment List (found in Part 2 of this manual as well as in this lesson plan) as a checklist to ensure that all equipment is available and tested for operation (including feedback devices and their accessory devices, such as tablet computers and smartphones)
 - Have extra batteries on hand for equipment
- Check with your Training Center Coordinator to determine any Training Center-specific paperwork needed
- Ensure that all course paperwork is in order, such as
 - ACLS Course roster
 - Testing checklists
 - Learning station checklists

Day of Class

- Make sure all equipment is working
- Greet students as they arrive to help make them feel at ease
- Have students fill out the course roster. Rosters may vary between Training Centers; refer to CPRverify (www.CPRverify.org). Required: Make sure all students have passed the ACLS Precourse Self-Assessment and have completed all of the ACLS precourse work (except for the traditional course; see sample agenda) before entering the class

Equipment List

This table lists the equipment and supplies needed to optimally conduct this course. This includes a code cart for in-hospital providers and a jump kit and defibrillator unit for prehospital providers. The code cart or jump kit should contain the equipment and supplies listed in Table 2.

Table 2. Classroom Equipment and Supplies

Equipment and supplies	Quantity needed	Learning/testing station where equipment needed
Paperwork		
Course roster	1/class	Beginning of course
Listing of student groups	1/class	All
Name tags	1/student and instructor	All
Course agenda	1/student and instructor	All
Course completion card	1/student	End of course
<i>ACLS Provider Manual</i>	1/student and instructor	All
Handbook of ECC (optional)	1/student and instructor	All
ACLS posters	1 set/class	All
Precourse letter	1/student	Precourse
Airway Management Skills Testing Checklist	1/student	Airway Management
Adult High-Quality BLS Skills Testing Checklist	1/student	High-Quality BLS
High-Performance Teams: Megacode Testing Checklist	1/student	Megacode Testing
ACLS Provider Course exam (if not taking online)	1/student	Exam
Blank exam answer sheet (if not taking online)	1/student	Exam
Exam answer key (if not taking online)	1/class	Exam
<i>ACLS Instructor Manual</i> (including case scenarios) and ACLS Lesson Plans	1/instructor	All
Learning station checklists	1/student	High-Quality BLS; Airway Management; Preventing Arrest: Bradycardia; Preventing Arrest: Tachycardia (Stable and Unstable); High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; and High-Performance Teams: Megacode Practice
Audiovisual Equipment		

(continued)

Equipment and supplies	Quantity needed	Learning/testing station where equipment needed
Course video: TV with DVD player or computer with internet access/streaming capability and projection screen	1/station	High-Performance Teams
CPR and AED Equipment		
Adult CPR manikin with shirt	1/every 3 students	High-Quality BLS
Adult airway manikin	1/every 3 students	Airway Management
Adult manikin (airway, CPR, and defibrillation capable)	1/every 6 students	Technology Review; Preventing Arrest: Bradycardia; Preventing Arrest: Tachycardia (Stable and Unstable); High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
CPR/short board	1/station	High-Quality BLS; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Code cart or jump kit	1/station	Technology Review; Bradycardia, Tachycardia; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Stopwatch/timing device (ventilation timing or CCF)	1/instructor	Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Countdown timer	1/instructor	All
Feedback device (required)	1/station	High-Quality BLS; Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
AED trainer with adult AED training pads	1/every 3 students	High-Quality BLS

(continued)

Equipment and supplies	Quantity needed	Learning/testing station where equipment needed
Step stools to stand on for CPR	1/every 3 students	High-Quality BLS; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Ultrasound (optional)	1 every 6 students	High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Airway and Ventilation		
Bag-mask device, reservoir, and tubing	1/every 3 students	All but High-Quality BLS; Preventing Arrest: Bradycardia; and Preventing Arrest: Tachycardia (Stable and Unstable)
Oral and nasal airways	1 set/station	All but High-Quality BLS; Preventing Arrest: Bradycardia; and Preventing Arrest: Tachycardia (Stable and Unstable)
Water-soluble lubricant	1/station	All but High-Quality BLS; Preventing Arrest: Bradycardia; and Preventing Arrest: Tachycardia (Stable and Unstable)
Nonrebreathing mask	1/every 3 students	All but High-quality BLS
Waveform capnography	1/station	Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Rhythm Recognition and Electrical Therapy		
ECG simulator/rhythm generator	1/station	All but High-Quality BLS and Airway Management
Electrodes	1/station	All but High-Quality BLS and Airway Management
Monitor capable of defibrillation/ synchronized cardioversion, transcutaneous pacing	1/station	All but High-Quality BLS and Airway Management
Pacing pads, defibrillator pads, or defibrillator gel (if pads are not used)	1/station	All but High-Quality BLS and Airway Management
Spare batteries or power cord	1/station	All but High-Quality BLS and Airway Management

(continued)

Equipment and supplies	Quantity needed	Learning/testing station where equipment needed
Spare ECG paper	1/station	All but High-Quality BLS and Airway Management
Recommended Drugs, Drug Packages, or Drug Cards (Appendix)		
Epinephrine	1/station	Preventing Arrest: Bradycardia; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Atropine sulfate	1/station	Preventing Arrest: Bradycardia; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Amiodarone and/or lidocaine	1/station	Preventing Arrest: Bradycardia; Preventing Arrest: Tachycardia (Stable and Unstable); High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Adenosine	1/station	Preventing Arrest: Tachycardia (Stable and Unstable); High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Dopamine	1/station	Preventing Arrest: Bradycardia; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Saline fluid bags/bottles	1/station	All but ACS, Stroke, Airway Management, and High-Quality BLS
IV pole	1/station	All but High-Quality BLS and Airway Management
Safety		
Sharps container (if using real needles)	1/station	All but High-Quality BLS and Airway Management

(continued)

Equipment and supplies	Quantity needed	Learning/testing station where equipment needed
Advanced Airways (must choose endotracheal tube and at least 1 supraglottic device)		
Endotracheal tube and all equipment and supplies necessary for correct insertion	1/station	Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Laryngeal tube and supplies necessary for correct insertion	1/station	Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Laryngeal mask airway and supplies necessary for correct insertion	1/station	Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Regionally available supraglottic airway and all equipment and supplies necessary for correct insertion	1/station	Airway Management; High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care; High-Performance Teams: Megacode Practice; and High-Performance Teams: Megacode Testing
Cleaning Supplies for Use Between Student Practice and After Every Class		
Manikin cleaning supplies	Varies	All

Note: Consider an emergency department or intensive care unit bed and/or stretcher to place manikins on for a more realistic case-based scenario during appropriate learning stations.

Lesson START

Welcome, Introductions, and Course Administration

15 minutes

Instructor Tips

- Knowing what you want to communicate, why it's important, and what you want to have happen as a result is critical to the success of your presentation
- Be flexible: Be ready to adjust your lesson plan to students' needs and focus on what seems to be more productive rather than sticking to your original plan
- Introductions: Use a visual aid (flip chart, whiteboard) to display introduction requirements (name, occupation, specialty, place of practice)



Discussion

In a large group, with all students, do the following:

- Introduce yourself and additional instructors, if needed
- Invite students to introduce themselves and ask them to provide the following information:
 - Name
 - Occupation
 - Specialty
 - Place of practice
- As students are introducing themselves, document their occupation, specialty, etc. This information will help instructors tailor future case scenarios and lessons
- Explain that the course is interactive
 - Use of the provider manual, learning station checklists
 - Skills testing checklists
 - Hands-on learning stations
 - Explain the use of **feedback devices** (audiovisual) during the **learning and testing stations** with cardiac arrest or respiratory arrest. Also explain how **timing** is a critical component of the learning and testing stations
- Explain that parts of the course are somewhat physically strenuous
 - For example, Lesson 2 involves adult CPR, which will require students to perform 2 minutes of compressions, which could be physically strenuous
- Ask that anyone with a medical concern, such as knee or back problems, speak with one of the instructors
- Explain the layout of the building, including bathrooms and fire exits
- Advise students where an AED can be found in the building
- Tell students to silence cell phones
- If a call needs to be answered, tell students to answer it in the hallway
- Tell the students, "We are scheduled to end at ____"

Lesson 1

ACLS Course Overview and Organization

10 minutes

Instructor Tips

- Make sure to emphasize critical aspects of the course, such as the course agenda, design, and completion requirements
- Breaks: Think about how you want to manage breaks during this course. Making yourself available allows you to answer questions people might feel too embarrassed to ask in front of others. It also gives you time to create rapport and get feedback
- **In these lesson plans, items that are in boldface have greater importance**



Discussion

In a large group, with all students, do the following:

- Present the course overview
- Discuss the course agenda, design, and completion requirements
- Be certain that students understand major course concepts
 - Importance of early high-quality CPR and early defibrillation to patient survival
 - Integration of effective BLS with ACLS interventions
 - The clinical signs of patient deterioration (preventing arrest)
 - The functioning of high-performance teams relative to patient survival
 - Timing, quality, coordination, and administration
- Discuss the importance of effective team interaction and communication during a resuscitation attempt. Explain the learning stations and rotations through the stations
 - Provide an overview of how the students will move through the stations
- Answer students' questions
- **Assign students to small groups for learning stations**
 - Limit the number of students to 6 (maximum of 8 per group)
- **Tell students that they will be using their provider manuals throughout the course**
- Explain the course completion requirements, including the mandatory use of an audiovisual feedback device for all CPR practice and testing. Students must
 - Pass the Adult High-Quality BLS Skills Test
 - Pass the Airway Management Skills Test
 - Demonstrate competency in learning station skills
 - Pass the Megacode Test
 - Pass the open-resource exam with a minimum score of 84% (does not apply to HeartCode students)
 - An open-resource exam allows students to use available resources, such as the Handbook of ECC and provider manual, posters, algorithms, etc, to process information analytically but also to think independently and creatively with curriculum content
 - You should issue a course completion card immediately after a student successfully completes the course but no later than 30 days after class

Lesson 2A

Learning/Testing Station: High-Quality BLS Practice

45 minutes

Learning Objective

- Perform prompt, high-quality BLS, including prioritizing early chest compressions and integrating early AED use

Instructor Tips

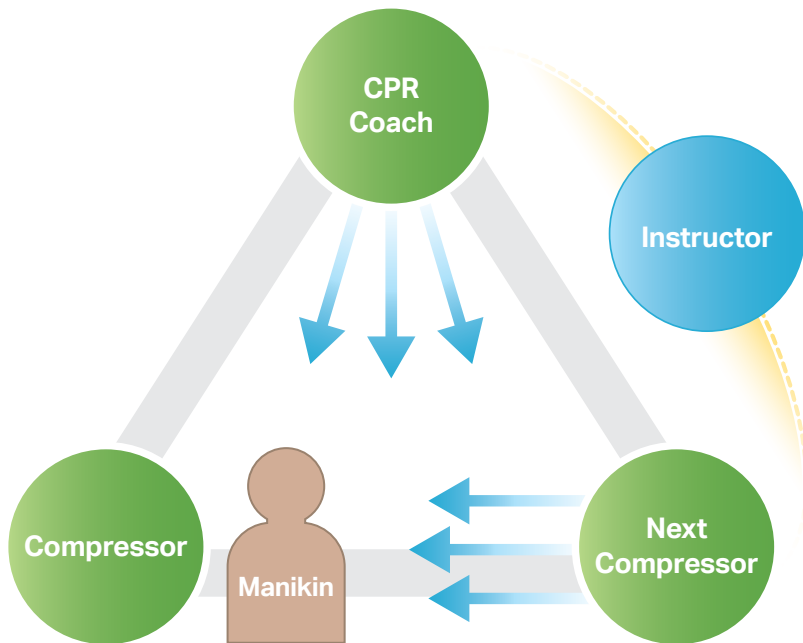
- Students should rotate through the skills station
- Tell students that the skills testing portion will happen immediately after this lesson
- Monitor the rate and depth of chest compressions with a real-time audiovisual feedback device. If possible, monitor chest recoil as well
- The students should correct their own chest compressions in response to real-time output from the feedback device
- Use peer coaching to help with feedback and to allow students to feel comfortable correcting other providers



Students Practice: Compressions

- Arrange students in groups with manikins (Figure 1)
 - 3 or fewer students per manikin
 - 1 instructor per 2 manikins

Figure 1. Positions for High-Quality BLS Learning Station with a CPR Coach.



- Students rotate through continuous compressions practice for 2 minutes on manikins, adjusting their performance according to the real-time response of the feedback device and the CPR Coach (Table 3)
 - Summarize key points
 - High-quality BLS is the foundation of resuscitation
 - High-quality CPR is the primary component in influencing survival from cardiac arrest, but there is considerable variation in monitoring, implementation, and quality improvement
 - Target CPR performance metrics include the following:
 - Push hard: Compression depth of at least 5 cm in adults
 - Push fast: Compression rate of 100 to 120/min
 - Allow complete chest recoil after each compression
 - Ideally, achieve a chest compression fraction (CCF) greater than 80%
 - Switch providers about every 2 minutes to avoid fatigue
- Be sure that students perform correct chest compressions throughout the practice session
- Monitor the rate and depth of chest compressions with an audiovisual feedback device. If possible, monitor chest recoil as well
- Have peers coach other students on the basis of data from the feedback device
- Give feedback during practice to the Compressor and the CPR Coach

Table 3. Student Rotations for CPR Coaches and Compressors Learning Station

Round 1	Round 2	Round 3
Student 1: Compressor	Student 1: CPR Coach	Student 1: Next Compressor
Student 2: Next Compressor	Student 2: Compressor	Student 2: CPR Coach
Student 3: CPR Coach	Student 3: Next Compressor	Student 3: Compressor



Students Practice: Two-Rescuer BLS

- Assign student numbers
- Practice session (small groups around a manikin): practice 1- and 2-rescuer sequence according to the skills testing checklist
- Have the skills testing checklist available (*ACLS Provider Manual*, handout, etc)
- Use Table 4 to assign students for 2-rescuer practice

Table 4. Two-Rescuer Practice Student Number Assignments

Person assessing and compressing	Person with AED
Student 1	Student 2
Student 2	Student 3
Student 3	Student 1

Lesson 2B

Learning/Testing Station: High-Quality BLS Testing—Testing Details

Instructor Tips

- Make sure you are familiar with how to use the skills testing checklist (refer to the instructor manual for information on how to use testing checklists)
- Complete a skills testing checklist for each student during this portion of the lesson
- Use an audiovisual feedback device to provide real-time feedback on compression quality



Test Students One at a Time

- Tell students who are not being tested to practice on another manikin in another room
- Test each student in a reasonably private environment
 - Each student must demonstrate the entire sequence of 2-rescuer BLS *without instructor prompting*
 - Fill out an Adult High-Quality BLS Skills Testing Checklist for each student
- Carefully observe the student you are testing
 - Monitor the speed and depth of chest compressions with an audiovisual performance monitoring device. If possible, monitor chest recoil as well
- If a student is unsuccessful, refer them for immediate remediation
 - Each student may retest 1 additional time during this station
 - A student who remains unsuccessful may require additional remediation (refer to the sections titled Exam and Remediation in Part 1 of the instructor manual)
- Summarize the importance of high-quality CPR to patient survival

Lesson 3A

Learning/Testing Station: Airway Management Practice

45 minutes

Learning Objectives

- Recognize respiratory arrest
- Perform early management of respiratory arrest

Instructor Tips

- Use a stopwatch/timer or feedback device to make sure students are ventilating at appropriate rates and volumes
- High-quality chest compressions and defibrillation are the highest priorities. As soon as enough personnel are available, initiate ventilation and oxygenation to support the resuscitation
- Make sure students are not ventilating too quickly or forcefully (about half-a-bag squeeze over 1 second)
- Healthcare providers often deliver excessive ventilation during CPR, particularly when an advanced airway is in place. Excessive ventilation is harmful because it
 - Increases intrathoracic pressure and impedes venous return and therefore decreases cardiac output, cerebral blood flow, and coronary perfusion
 - Causes air trapping, leading to increased end-expiratory lung volume
 - Increases the risk of regurgitation and aspiration in patients without an advanced airway
- For the *respiratory arrest* cases, you need to use only the lead-in and initial information to lead the student through the bag-mask ventilation and OPA/NPA skills testing. You may use the whole respiratory scenario if you want to go deeper into respiratory distress, respiratory failure, and respiratory arrest. However, to accommodate this approach, you will need to expand the airway management station



Students Practice: Airway Management

- Assign student numbers
- Practice session (small groups around a manikin): **practice OPA and NPA insertion, discuss oxygen and suction, and practice 1- and 2-rescuer bag-mask ventilation**
- Students practice 1-rescuer bag-mask ventilation as in Figure 2
- Organize students for 2-rescuer bag-mask ventilation practice as in Table 5

Figure 2. Positions for Airway Management Learning and Testing Station with a CPR Coach.

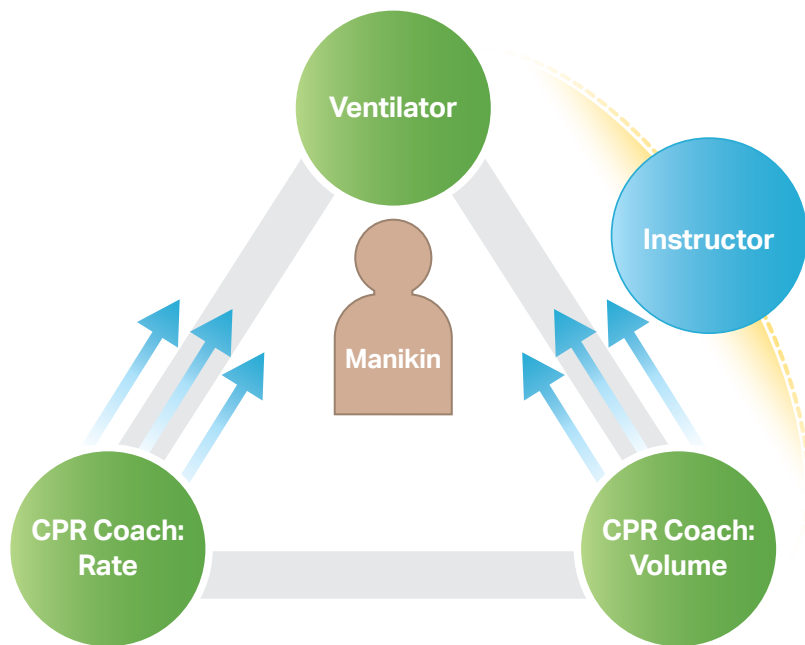


Table 5. Student Assignments for Airway Management Practice

Person squeezing the bag	Person holding the mask
Student 1	Student 2
Student 2	Student 3
Student 3	Student 1

Lesson 3B

Learning/Testing Station: Airway Management Testing—Testing Details



Test Students One at a Time

- Advise students that they will be tested on bag-mask ventilation with OPA/NPA insertion skills
- Present the respiratory case scenario (case scenarios can be found in Appendix of the instructor manual or in the Instructor Resources)
- Each student manages a complete airway case (testing session)
 - Perform a full assessment
 - Begin ventilation without delay
 - Insert an OPA or an NPA
 - Connect the bag-mask device to oxygen and adjust the flow rate to the appropriate level
 - Give bag-mask ventilation with the OPA/NPA for 1 minute (skills test)
 - Rate (once every 6 seconds)
 - Speed (squeeze the bag for 1 second)
 - Volume (about half a bag)
 - Check off student's skills on the skills testing checklist as each student demonstrates adequate management of the respiratory case
 - **Monitor ventilation with a stopwatch/timer or feedback device** to make sure students are ventilating at appropriate rates and at appropriate volumes, if that information is available

Lesson 3C

Learning/Testing Station: Airway Management—Student Practice Details (Optional)

Instructor Tips

- This portion of the lesson is optional
 - Whether or not you teach this lesson will depend on the makeup of your class. That is why it is important to ask students at the beginning of the class to introduce themselves and provide information about their occupations



Students Practice: Advanced Airway Insertion (Optional, Based on Students' Scope of Practice)

Students practice performing ventilations with a simulated advanced airway in place (depending on manikin limitations, instructors may use a standard manikin with a bag-mask device rather than a bag connected to a simulated airway tube)

- Rotate through all students performing ventilation
- Optional advanced airway device modules
 - Laryngeal Tube
 - Laryngeal Mask Airway
 - Endotracheal Tube

Lesson 4

Technology Review

15 minutes

Instructor Tips

- If there are 2 instructors, this activity can be done in 2 smaller groups. For 1 instructor, keep the class in 1 large group
- It is important that students get hands-on experience with the equipment they will be responsible for using during the learning stations and testing stations
- Ideally, equipment would be the same as would be used in a real emergency
 - Advise students that the equipment may be different in their workplace



Discussion



- **Demonstrate** and review monitor/defibrillator functions, buttons, and connections (features of your equipment may vary)
 - Power button
 - Transcutaneous pacing
 - Synchronized cardioversion
 - Blood pressure
 - PETCO₂
 - Pulse oximetry
 - Pad connections
 - ECG connections and lead placement (3-lead, 4-lead, 5-lead)
 - Optional 12-lead placement and right-sided 12-lead placement
- Review crash cart/jump kit supply locations
- Explain the use of **feedback devices** (audiovisual) during the **learning and testing stations** involving CPR and ventilations. Also explain how **timing** and objective measures are critical components of the learning and testing stations

Lesson 5A

Learning Station:

Preventing Arrest: Bradycardia

60 minutes

Learning Objectives

- Recognize bradycardias that may result in cardiac arrest or complicate resuscitation outcome
- Perform early management of bradycardias that may result in cardiac arrest or complicate resuscitation outcome

Instructor Tips

- Students often have difficulty differentiating between the heart block rhythms. Focus more on the treatments for stable vs unstable bradycardia than on detailed analysis of specific rhythms
- For in-hospital case scenarios only, students should request RRT/MET response
- When debriefing students:
 - Ask open-ended questions to engage group discussion and allow for greater detail
 - When answering a question, acknowledge the individual with eye contact, and then answer to the entire room, coming back to the questioner periodically



Optional: Play Bradycardia Algorithm Video

- Address what students will learn from the video
- Play the video
- Answer students' questions



Discussion

- Monitor/defibrillator technology review, if needed
 - Apply limb leads to patient so that pacing can be achieved through pacer pads
- Signs of clinical deterioration
- Stable vs unstable patients
- Definition of unstable signs and symptoms
- First-degree AV block
- Second-degree type I AV block
- Second-degree type II AV block
- Third-degree (complete block)
- Junctional rhythms (slow)
- Idioventricular rhythm
- H's and T's
- Local protocol

Lesson 5B

Learning Station:

Preventing Arrest: Bradycardia—Rotations

Instructor Tips

- This learning station is designed to allow 3 of the 6 students to be a Team Leader during this lesson and the other 3 to be a Team Leader in Lesson 6: Tachycardia
- When students have to rotate roles during practice, provide enough space for rotation to allow for effective observation and monitoring of student performance
- To ensure incorporation of knowledge into practice, make sure the students actually perform the skills of defibrillation, synchronized cardioversion, and transcutaneous pacing



Students Practice



Student Rotations in Learning Station Cases According to Team Roles

- The **Team Leader** will direct the actions of the other team members. For example, the Team Leader will coach the Airway team member if the performance of bag-mask ventilation is not making the chest rise
- **Team members** will perform interventions as directed by the Team Leader. This is an opportunity for students to practice skills and receive feedback from the Team Leader. Students will demonstrate effective team behaviors (eg, closed-loop communication, clear messages)
- **For bradycardia:** The **Timer/Recorder** will check off critical action boxes on the Bradycardia Learning Station Checklist



Students Practice

- Select 3 cases for 3 students to manage individually in this station (Table 6)
- Students will run scenarios (individually) and perform debriefing for all 3 cases (case scenarios can be found in the Appendix of the instructor manual or in the Instructor Resources)



Discussion

- Provide feedback on students' debriefing (Table 7)
 - Use the gather-analyze-summarize debriefing process described here
- What was challenging?
- What worked well in this case?

Table 6. Student Rotations for Bradycardia Learning Station

Team Role	Case 1 (10 minutes)	Case 2 (10 minutes)	Case 3 (10 minutes)
Team Leader	Student 6	Student 1	Student 2
Airway	Student 1	Student 2	Student 3
IV/IO/Medications	Student 2	Student 3	Student 4
Monitor/Defibrillator	Student 3	Student 4	Student 5
Compressor (if needed)	Student 4	Student 5	Student 6
Timer/Recorder	Student 5	Student 6	Student 1

Table 7. Structured and Supported Debriefing Process for Bradycardia Learning Station

Phase	Goal	Actions
Gather	Ask what happened during the case to develop a shared mental model of the events. Listen to students to understand what they think and how they feel about the simulation	<ul style="list-style-type: none"> • Request a narrative from the Team Leader • Request clarifying or supplementary information from the high-performance team
Analyze	Facilitate students' reflection on and analysis of their actions	<ul style="list-style-type: none"> • Review an accurate record of events • Report observations (both correct and incorrect steps) • Assist students in thoroughly reflecting on and examining their performance during the simulation as well as in reflecting on their perceptions during the debriefing • Direct and/or redirect students during the debriefing to ensure continuous focus on session objectives
Summarize	Facilitate identification and review of the lessons learned that can be taken into actual practice	<ul style="list-style-type: none"> • Summarize comments or statements from students • Have students identify positive aspects of their high-performance team or individual behaviors • Have students identify areas of their high-performance team or individual behaviors that require change or correction

Lesson 5C

Learning Station:

Preventing Arrest: Bradycardia—

Details for Case Rotations



Students Practice

Use Table 8 to determine case rotations for this learning station.

Table 8. Timing and Tasks for Bradycardia Learning Station

Case rotations (3 rotations, 10 minutes each)	Directions for case rotations (Instructors must conduct the scenario in real time)
Start case scenario(s) (6 minutes)	<ul style="list-style-type: none"> • Review assigned team roles from the rotation chart for this case <ul style="list-style-type: none"> – Ensure that students understand the expectations for their assigned roles (eg, “Your role is to use the bag-mask device to give ventilations that cause the chest to rise”) • Introduce the case by reading the case scenario • Set the timer to 6 minutes • Ask the Team Leader to begin managing the case • Advise the Team Leader to observe and coach while being mindful of the case timing • Students may use the Handbook of ECC, pocket cards, or crash cart cards • Observe and coach <ul style="list-style-type: none"> – Effective team performance – Appropriate case management – High-quality skills performance, including high-quality CPR, when needed, throughout the scenario • Guide the Team Leader through management of the case • Stop the case after 6 minutes
Case debriefing (4 minutes)	<ul style="list-style-type: none"> • Set the timer to 4 minutes • Conduct a debriefing at the end of the case (refer to Debriefing Tools in the instructor manual) • Ask the Team Leader to gather, analyze, and summarize the case, roles of team members, and areas for improvement • Ask the Timer/Recorder to critique the case • Give a summary of key concepts of the case <ul style="list-style-type: none"> – Differentiating between signs and symptoms that are caused by the slow rate vs those that are unrelated – Correctly recognizing the presence and type of AV block – Using atropine as the drug intervention of first choice – Deciding when to start transcutaneous pacing – Deciding when to start epinephrine or dopamine to maintain heart rate and blood pressure – Knowing when to call for expert consultation about complicated rhythm interpretation, drugs, or management decisions

Repeat for each of the remaining cases.

Lesson 6A

Learning Station:

Preventing Arrest: Tachycardia (Stable and Unstable)

60 minutes

Learning Objectives

- Recognize tachycardias that may result in cardiac arrest or complicate resuscitation outcome
- Perform early management of tachycardias that may result in cardiac arrest or complicate resuscitation outcome

Instructor Tips

- Begin with the end in mind: knowing what you want to communicate, why it's important, and what you want to have happen as a result is critical to the success of your lesson
- Emphasize the need for rapid treatment (ie, electrical therapy) in patients with unstable tachycardia
- For in-hospital case scenarios only, students should request RRT/MET response
- To ensure incorporation of knowledge into practice, make sure the students actually perform the skills for defibrillation, synchronized cardioversion, and transcutaneous pacing



Optional: Play Tachycardia Algorithm Video

- Address what students will learn from the video
- Play the video
- Answer students' questions



Discussion

- Monitor/defibrillator technology review if needed
- Review tachycardias
 - Stable vs unstable patient
 - Sinus tachycardia
 - Reentry supraventricular tachycardia
 - Atrial fibrillation
 - Atrial flutter
 - Junctional rhythms (fast)
 - Monomorphic ventricular tachycardia (with pulse)
 - Polymorphic ventricular tachycardia (with pulse)
 - Torsades de pointes
 - Wide-complex tachycardia of uncertain type
 - Discuss local protocol

Lesson 6B

Learning Station: Preventing Arrest: Tachycardia (Stable and Unstable)—Rotations

Instructor Tips

- This learning station is designed to allow 3 of the 6 students to be a Team Leader during this lesson and the other 3 to be a Team Leader in Lesson 5: Bradycardia
- Other assigned student roles may vary depending on the number of students at the station
- Cases may be run in a different order, but assigned student roles should not be changed
- If students rotate roles during practice, provide enough space for rotation to allow for effective observation and monitoring of student performance



Students Practice



Student Rotations in Learning Station Cases According to Resuscitation Team Roles

- The **Team Leader** will direct the actions of the other team members. For example, the Team Leader will coach the Airway team member if performance of bag-mask ventilation is not making the chest rise
- **Team members** will perform interventions as directed by the Team Leader. This is an opportunity for students to practice skills and receive feedback from the Team Leader. Students will demonstrate effective team behaviors (eg, closed-loop communication, clear messages)
- The **Timer/Recorder** will check off critical action boxes on the Tachycardia Learning Station Checklist



Students Practice

- Select 3 cases for 3 students to manage individually in this station (Table 9)
- Run the scenario and perform the debriefing for all 3 cases (case scenarios can be found in the Appendix of the instructor manual or in the Instructor Resources)



Discussion

- Provide feedback on the students' debriefing
 - What was challenging?
 - What worked well in this case?

Table 9. Student Rotations for Tachycardia Learning Station

Team Role	Case 1 (10 minutes)	Case 2 (10 minutes)	Case 3 (10 minutes)
Team Leader	Student 3	Student 4	Student 5
Airway	Student 4	Student 5	Student 6
IV/IO/Medications	Student 5	Student 6	Student 1
Monitor/Defibrillator	Student 6	Student 1	Student 2
Compressor (if needed)	Student 1	Student 2	Student 3
Timer/Recorder	Student 2	Student 3	Student 4

Lesson 6C

Learning Station:

Preventing Arrest: Tachycardia

(Stable and Unstable)—Details for Case Rotations



Students Practice

Use Table 10 to determine case rotations for this learning station.

Table 10. Timing and Tasks for Tachycardia Learning Station

Case rotations (3 rotations, 10 minutes each)	Directions for case rotations (Instructors must conduct the scenario in real time)
Start case scenario (6 minutes)	<ul style="list-style-type: none">• Review assigned team roles from the rotation chart for this case<ul style="list-style-type: none">– Ensure that students understand the expectations for their assigned roles (eg, “Your role is to use the bag-mask device to give ventilations that cause the chest to rise”)• Introduce the case by reading the case scenario• Set the timer to 6 minutes• Ask the Team Leader to begin managing the case• Students may use the Handbook of ECC, pocket cards, or crash cart cards• Observe and coach<ul style="list-style-type: none">– Effective team performance– Appropriate case management– High-quality skills performance– Guide the Team Leader through management of the case• Stop the case after 6 minutes
Case debriefing (4 minutes)	<ul style="list-style-type: none">• Set the timer to 4 minutes• Conduct a debriefing at the end of the case<ul style="list-style-type: none">– Refer to Debriefing Tools in the instructor manual• Ask the Team Leader to summarize the case, the roles of team members, and areas for improvement• Ask the Timer/Recorder to critique the case• Give a summary of key concepts of the case<ul style="list-style-type: none">– Begin with the end in mind: knowing what you want to communicate, why it’s important, and what you want to have happen as a result is critical to the success of your lesson– Discuss differentiating between signs and symptoms that are caused by a rapid rate vs those that are unrelated– Emphasize the need for rapid treatment (ie, electrical therapy) in patients with unstable tachycardia– For in-hospital case scenarios only, students should request RRT/MET response– Discuss defibrillation, synchronized cardioversion, and transcutaneous pacing

Repeat for each of the remaining cases (Stable and Unstable Tachycardia).

Lesson 7

High-Performance Teams

30 minutes

Learning Objectives

- Model effective communication as a member or leader of a high-performance team
- Recognize the impact of team dynamics on overall team performance

Instructor Tips

- Clearly communicate the objectives of this lesson to help the students gain a better understanding of the lesson
- This team dynamics section is a great way to further engage the students
- Change the inflection in your voice and also change your pace to help change the energy level in the room



Play High-Performance Teams

Video (In-hospital, Out-of-Hospital, or Both)

- Ask students to open the *ACLS Provider Manual* to Part 3 (High-Performance Teams)
- Address what students will learn from the video
- Play the video



Discussion

- Ask students what questions they have about high-performance teams
 - What behaviors did they observe?
 - Discuss **timing** and **measurement** in relationship to impact on survival
 - Discuss the H's and T's that can help providers to arrive at a diagnosis in this case
 - Experienced providers may consider conducting an ultrasound analysis, although its usefulness has not been well established

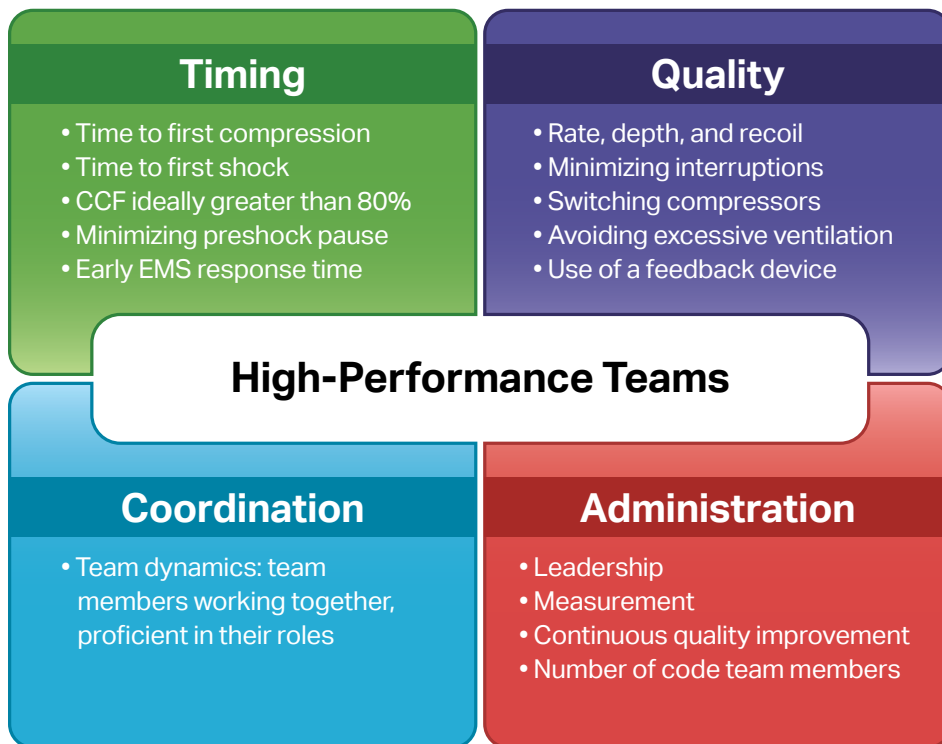


Review/Summarize Key Points

- Team dynamics are critical during a code or resuscitation attempt
- The interaction among team members has a profound impact on the effectiveness of each individual as well as on the patient's overall survival
- The better you work as a team (timing, quality, coordination, and administration), the better the potential outcome for your patient
- That's why it's so important that you understand not just what to do in a resuscitation attempt but how to communicate and perform as an effective team, regardless of your role as team member or Team Leader

- The ability to follow and move through multiple algorithms is important
- Emphasize the importance of understanding the choreography of a resuscitation attempt as a team and the impact on timing
- Discuss the integration of high-quality BLS and ACLS care
- Remind students that they will be functioning as Team Leaders and as different members in the learning and testing stations and will need to apply these concepts
- Review critical aspects of high-performance teams (Figure 3)

Figure 3. Key areas of focus for high-performance teams to increase survival rates.



Lesson 8A

Learning Station:

High-Performance Teams:

Cardiac Arrest and Post-Cardiac Arrest Care

148 minutes

Learning Objectives

- Model effective communication as a member or leader of a high-performance team
- Recognize the impact of team dynamics on overall team performance
- Recognize cardiac arrest
- Perform early management of cardiac arrest until termination of resuscitation or transfer of care, including post-cardiac arrest care
- Evaluate resuscitative efforts during a cardiac arrest through continuous assessment of CPR quality, monitoring the patient's physiologic response, and delivering real-time feedback to the team

Instructor Tips

- This activity can be performed with 6 students and 1 instructor
 - If you have fewer than 6 students, you can assign multiple roles to individual students or substitute other instructors for those roles
- Transitional language: After showing the videos, be sure to provide a recap of what the video covered and what is next
- Encourage students to use their provider manual, pocket reference cards, or Handbook of ECC early on during the cases but to become less reliant on those resources as the cases progress
- The instructor should have working knowledge of all vasopressors associated with the students' workplace
- Conduct **prebriefing** before starting the case
 - Team should discuss the plan for managing each case including **objective timing goals**
- **Conduct learning station cases in real time**
- If possible, use real equipment in a realistic setting for your students
- Monitor rate and depth of chest compressions along with CCF by using an audiovisual feedback device with real-time feedback. In addition, monitor chest recoil if possible and ventilations
- High-quality CPR should be performed with real-time feedback throughout the cardiac arrest case-based scenario
- When debriefing students:
 - Ask open-ended questions to engage group discussion and allow for greater details
 - Discuss **prebriefing** goals (eg, CCF 82%,) vs actual results, with reflection on how they can perform better for the next case
 - When answering a question, acknowledge the individual with eye contact, and then answer to the entire room, coming back to the questioner periodically



Optional: Play Cardiac Arrest Algorithm Video and Post-Cardiac Arrest Algorithm Video

- Address what students will learn from the video
- Play the video
- Answer students' questions



Discussion

- Monitor/defibrillator technology review if needed
- Review team roles, responsibilities, and assignments for each case (refer to Lesson Plans 8B and 8C)
 - Case scenarios can be found in the Appendix of the instructor manual or in the Instructor Resources
- Students may use the Handbook of ECC, pocket reference cards, posters, or crash cart cards
- To show the continuum of care, all VF case scenarios must achieve ROSC
- 4 cases will be VF/pVT resulting in ROSC (post-cardiac arrest care)
- 2 cases will be split between PEA and asystole
- Ask students to recall the post-cardiac arrest care priorities
 - Maximize oxygenation and ventilation
 - Maximize hemodynamics
 - Obtain a 12-lead ECG; move to the cath lab if ST-segment elevation myocardial infarction (STEMI) is present
 - Implement targeted temperature management
- For post-cardiac arrest care, ensure that students address
 - Oxygenation and ventilation
 - Hemodynamic optimization (blood pressure, 12-lead, glycemic control)
 - Targeted temperature management
 - Criteria for percutaneous coronary intervention
- Advise that students will perform debriefing
 - Refer to Debriefing Tools in the instructor manual
- Select cases for each student to demonstrate appropriate management
- Discuss local protocol
- Highlight effective patient management through the Adult Post-Cardiac Arrest Care Algorithm

Lesson 8B

Learning Station: High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care—Rotations

Instructor Tips

It is important that every student have a role in each case

- Student role assignments may vary depending on the number of students at the station. However, every student must function as the Team Leader for 1 case
- Cases may be run in a different order, but ensure that no single student always goes first in subsequent learning stations
- Any additional students may be given roles as additional recorders



Students Practice



Student Rotations in Learning Station Cases According to Resuscitation Team Roles

- The **Team Leader** will direct the actions of the other team members. For example, the Team Leader will coach the Airway team member if performance of bag-mask ventilation is not making the chest rise
- **Team members** will perform interventions as directed by the Team Leader. This is an opportunity for students to practice skills and receive feedback from the Team Leader. Students will demonstrate effective team behaviors (eg, closed-loop communication, clear messages)
- The **Timer/Recorder** will use a stopwatch to time 2-minute intervals for case management, announce each 2-minute interval for switching roles, and record critical action times on the ACLS Code Timer/Recorder Sheet (in the Appendix of the instructor manual or in the Instructor Resources) or on a whiteboard



Students Practice

- Select the cases for the students to manage individually in this station (Table 11)
- Run the scenario and perform the debriefing for all cases (case scenarios can be found in the Appendix of the instructor manual or in the Instructor Resources)



Discussion

- Provide feedback on the students' debriefing (Table 12)
 - What was challenging?
 - What worked well in this case?

Table 11. Student Rotations for Cardiac Arrest and Post-Cardiac Arrest Care Learning Station

Team role	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Team Leader	Student 1	Student 2	Student 3	Student 4	Student 5	Student 6
Airway	Student 2	Student 3	Student 4	Student 5	Student 6	Student 1
IV/IO/Medications	Student 3	Student 4	Student 5	Student 6	Student 1	Student 2
Monitor/ Defibrillator/ CPR Coach	Student 4	Student 5	Student 6	Student 1	Student 2	Student 3
Compressor	Student 5	Student 6	Student 1	Student 2	Student 3	Student 4
Timer/Recorder	Student 6	Student 1	Student 2	Student 3	Student 4	Student 5

Table 12. Structured and Supported Debriefing Process for Cardiac Arrest and Post-Cardiac Arrest Care Learning Station

Phase	Goal	Actions
Gather	Ask what happened during the case, to develop a shared mental model of the events. Listen to students to understand what they think and how they feel about the simulation	<ul style="list-style-type: none"> • Request a narrative from the Team Leader • Request clarifying or supplementary information from the high-performance team
Analyze	Facilitate students' reflection on and analysis of their actions	<ul style="list-style-type: none"> • Review an accurate record of events • Report observations (both correct and incorrect steps) • Assist students in thoroughly reflecting on and examining performance during the simulation as well as in reflecting on their perceptions during the debriefing • Direct and/or redirect students during the debriefing to ensure continuous focus on session objectives
Summarize	Facilitate identification and review of the lessons learned that can be taken into actual practice	<ul style="list-style-type: none"> • Summarize comments or statements from students • Have students identify positive aspects of their high-performance team or individual behaviors • Have students identify areas of their high-performance team or individual behaviors that require change or correction

Lesson 8C

Learning Station: High-Performance Teams: Cardiac Arrest and Post-Cardiac Arrest Care—Details for Case Rotations



Students Practice

Use Table 13 to determine case rotations for this learning station

Table 13. Timing and Tasks for Cardiac Arrest and Post-Cardiac Arrest Care Learning Station

Case rotation (6 rotations, 25 minutes each)	Directions for case rotations (Instructors must conduct the scenario in real time)
Case prebriefing (Figure 4) (5 minutes)	<ul style="list-style-type: none">• Set timer to 5 minutes• Set case plan and goals including objective timing goals
Start case scenario (10 minutes)	<ul style="list-style-type: none">• Review assigned team roles from the rotation chart for this case<ul style="list-style-type: none">– Ensure that students understand the expectations for their assigned roles (eg, “Your role is to use the bag-mask device to give ventilations that cause the chest to rise”)• Introduce the case by reading the case scenario• Set the timer to 10 minutes• Ask the Team Leader to begin managing the case• Observe and coach<ul style="list-style-type: none">– Effective team performance– Appropriate case management– High-quality skills performance, including high-quality CPR in real time throughout the scenario with real time audiovisual feedback on CPR quality• Guide the Team Leader through management of the case• Stop the case after 10 minutes
Case debriefing (10 minutes)	<ul style="list-style-type: none">• Set the timer to 10 minutes• Conduct a team debriefing at the end of the case<ul style="list-style-type: none">– Refer to Debriefing Tools in the instructor manual

Repeat for each of the remaining 5 cases.

Figure 4. Prebriefing and structured debriefing tasks: a flow chart.



Lesson 9A

Learning Station: High-Performance Teams: Megacode Practice

138 minutes

Instructor Tips

- Organize into stations of 6 students each, with 1 instructor per station
- **Conduct learning station cases in real time (do not skip through the case)**
- Each scenario should last 10 minutes, with prebriefing lasting 5 minutes and debriefing should take place for 10 minutes
- Learning can be achieved just as effectively during structured debriefing as during the scenario



Discussion

- Highlight effective patient management through several algorithms
- **Demonstrate a Megacode case as a Team Leader**
- Review team roles, responsibilities, and assignments for each case (refer to Lesson Plans 9C and 9D)
 - Case scenarios can be found in the Appendix of the instructor manual or in the Instructor Resources
- Present a Megacode practice case for each student to manage (refer to Lesson Plan 9C)
- Students may use the Handbook of ECC, pocket reference cards, or crash cart cards
- Conduct **prebriefing** before starting the case
 - Team should discuss the plan for managing each case including **objective timing goals**
- If possible, use real equipment in a realistic setting for your students
- Monitor the rate and depth of chest compressions along with CCF by using an audiovisual feedback device with real time feedback. In addition, monitor chest recoil if possible and ventilations
- High-quality CPR should be performed with feedback throughout the cardiac arrest case-based scenario
- Advise students that they will perform **structured debriefing**

Lesson 9B

Learning/Testing Station: High-Performance Teams: Megacode Practice—Instructor Demo

Instructor Tips

When debriefing students:

- Ask your audience open-ended questions that focus on their perspectives to engage their minds and increase energy focus
- When answering a question, acknowledge the individual with eye contact, and then answer to the entire room, coming back to the questioner periodically



Students Practice

Use Table 14 to determine timing and tasks for this learning station

Table 14. Timing and Tasks for Instructor Case Scenario Demonstration

Demonstrate a case scenario with you as Team Leader and students playing team roles	
Case prebriefing (5 minutes)	<ul style="list-style-type: none">• Set timer to 5 minutes• Set case plan and goals, including objective timing goals
Start demonstration of a case scenario (10 minutes)	<ul style="list-style-type: none">• Introduce the case• Assign a Team Leader• Assign team member roles to students• Set the timer to 10 minutes• Begin the case• Students should demonstrate case management, showing<ul style="list-style-type: none">– Effective team performance– Appropriate application of algorithm– High-quality skills performance, including high-quality CPR in real time throughout the scenario• Stop the case after 10 minutes
Case debriefing (10 minutes) Total time for case demonstration: 25 minutes	<ul style="list-style-type: none">• Set the timer to 10 minutes• Go over the Megacode Practice Learning Station Checklist• Discuss prebriefing goals vs actual results• Discuss applying learning to the next case• Summarize the case, emphasizing proper roles of Team Leader and team members

Lesson 9C

Learning Station: High-Performance Teams: Megacode Practice—Practice Cases

Instructor Tips

- **Make sure students understand their roles and responsibilities in managing a Megacode case**
- This is the last opportunity to facilitate learning before the Megacode Testing. Use this time to address critical areas where students may still be weak



Students Practice

Present Megacode practice cases for each student, one at a time, 25 minutes each (5-minute prebriefing, 10-minute case, 10-minute debriefing)



- Determine the Team Leader for the first case (refer to rotations on the next lesson plan)
- Team Leader organizes other students into team roles
- Perform case prebriefing: set goals for the case, including objective timing goals
- Provide the team with an individual case
- Students may use the Handbook of ECC, pocket reference cards, or emergency crash cart cards
- Team Leader assigns and directs the team through the entire Megacode case
- Rotate through all students practicing as Team Leader for remaining 5 cases, depending on the number of students
- Timer/Recorder announces 2-minute intervals and checks off critical actions on the Megacode Testing Checklist
- Give feedback and answer questions
- Perform structured debriefing and have students apply learning to the next case

Lesson 9D

Learning Station: High-Performance Teams: Megacode Practice—Rotations

Instructor Tips

- Cases may be run in a different order, but assigned Team Leader roles should not be changed
- Each student must have the opportunity to run a complete Megacode case as a Team Leader
- When students have to rotate roles during practice, be sure to designate areas of the room to which students can move to have more space during practice and that allow the instructor to clearly observe and monitor student performance



Students Practice

Use Table 15 to determine case rotations for this learning station

Table 15. Student Rotations for High-Performance Teams Learning Station

Team role	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Team Leader	Student 2	Student 3	Student 4	Student 5	Student 6	Student 1
Airway	Team Leader assigns other students to each team role					
IV/IO/Medications						
Monitor/Defibrillator/ CPR Coach						
Compressor						
Timer/Recorder						

Testing Details and Testing Station Setups (T1)

Instructor Tips

- Organize students into 2 groups of 6 for the Megacode Testing Stations, depending on the number of students and instructors in the class
- In this station, the focus changes from facilitating learning to evaluating student performance. Students must perform the test from beginning to end. Do not interrupt students while they are completing the test. Address any deficiencies during remediation
- **Conduct testing station cases in real time**

Megacode Testing Stations and Exam (Open-Resource Exam)

- Explain the testing rotation for the Megacode Test and exam
- Remind students that the passing grade for the open-resource exam is 84%

Recommended Testing Station Setup

- 2 Megacode stations, 2 instructors, 6 students each (consider 2 instructors per station to optimize student assessment)
- Other testing setups are permissible as long as
 - All students are given the opportunity to be tested as a Team Leader 1 time in Megacode
 - The open-resource exam is proctored and secure
 - The open-resource exam is not interrupted to move a student to the Megacode Test

High-Performance Teams: Megacode Testing and Megacode Testing Details (T2-T4)

12 to 75 minutes



Megacode Testing Stations

- Provide Megacode case scenario
- Use the Megacode Testing Checklist to test the team until they pass
- **You must conduct the scenario in *real time***
- **Monitor CPR quality with audiovisual feedback device(s) with real-time feedback**
- Students may use the Handbook of ECC, pocket reference cards, or emergency crash carts, with restrictions (refer to the instructor manual)
- Timer/Recorder announces 2-minute intervals
- Take no longer than 10 minutes to test and give students feedback on their performance (pass or fail)
- Do not give hints or provide coaching during the test
- Refer students for remediation as needed

Megacode Test Rotations

Students may be tested in any order, but each student should have the opportunity to run a complete case as a Team Leader. Use Table 16 to determine case rotations for this test.

Table 16. Student Rotations for High-Performance Teams Testing

Team role	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Team Leader	Student 5	Student 6	Student 1	Student 2	Student 3	Student 4
Airway	Team Leader assigns other students to each team role					
IV/IO/Medications						
Monitor/Defibrillator/ CPR Coach						
Compressor						
Timer/Recorder						

Exam and Exam Details (T5, T6)

45 minutes



Exam

- Exams are administered online, though there may be an occasional need to administer a paper exam. Refer to the Instructor Network for more information about delivering exams
- Collect and score any paper exams
- Review the answers with the students



Exam Details

- The exam is an open-resource exam
 - Resources could include the provider manual, either in printed form or as an eBook on a personal device, any notes the student took during class, the Handbook of ECC, the latest *AHA Guidelines for CPR and ECC*, posters, etc. Open resource does not mean open discussion with other students or the instructor
- Students may not talk to each other during the exam
- When a student completes the paper exam, grade the exam
- Refer to the annotated answer key to discuss questions answered incorrectly
- Answer any questions
- Students who scored less than 84% need immediate remediation
 - Make sure the student understands the errors and corrects the answers
 - Give a second test or have the student orally go over each item that he or she answered incorrectly, showing understanding of those incorrect items

Do not interrupt the exam to have a student go to the Megacode Testing Station

Remediation (REM)

Instructor Tip

- For Megacode retesting, the instructor may play multiple team member roles, or other available students may be team members



Exam

The information below applies primarily to online and paper exams and does not apply to HeartCode students.

- Review course material for each student who needs remediation
- Retest students as necessary
- Give feedback
- Evaluate competency

Lesson VAS

Learning Station: Vascular Access (Optional)

Instructor Tip

- Participation in this lesson is not required to complete the ACLS Course



Play Intraosseous Access Video

- Address what students will learn from the video
- Play the video
- Answer students' questions



Students Practice

- Have students practice IO insertion skills on appropriate manikins
- Ensure that each student can prepare equipment to administer an IO bolus rapidly
- Have students verbalize the correct adult drug dose
- Ensure that each student can perform IO access correctly and confirm when the needle has reached the marrow cavity
- Ensure that each student can prepare equipment to administer an IO bolus, including 3-way stopcock and syringes
- Observe each student; provide corrective feedback

Lesson COP

Learning Station: Coping With Death (Optional)

Instructor Tips

- Remind students that if they have recently experienced the loss of a loved one, this video might be difficult to view
- **Participation in this lesson is not required to complete the ACLS Course**
- Students may choose not to view this video, at their discretion



Play Coping With Death Video

- Address what students will learn from the video
- Play the video (video will automatically pause)
- Answer students' questions



Discussion

- Discuss how the news of the death of the patient could be delivered more effectively
 - Family was not allowed in the room during the resuscitation attempt
 - Family was not informed that they had a choice about whether to stay in the room
 - News was delivered in the hallway, with no privacy
 - Vague terms were used to describe the death
 - The words *dead* or *died* were never used
 - Physician left family for "another emergency"
 - Physician left family with no support and no one to answer their questions
- Ask if there are any questions



Resume Coping With Death Video

- Play the video
- Answer students' questions

Lesson ACLS-HeartCode P1

Learning Station: HeartCode ACLS Practice 198 minutes

Instructor Tips

- This is a time where you can bridge the gap for students who have taken the HeartCode ACLS Course and help them develop their skills
- Make sure to set aside enough time to allow these students to practice on the manikins
- The use of required feedback devices should help students improve the quality of their compressions
- Make sure that each student has been offered adequate practice to feel comfortable testing
- **Conduct learning station cases in real time (do not fast-forward the video)**



Students Practice

- High-quality BLS: Follow ACLS Lessons 2A and 2B
- Airway management with OPA/NPA insertion: Follow ACLS Lessons 3A and 3B
- Megacode practice: Follow ACLS Lessons 9A through 9D

Lesson ACLS-HeartCode T1

Testing Station: HeartCode ACLS

Competency Testing

12 to 75 minutes

Instructor Tips

- This section provides a great way to further engage the students
- Change the inflection in your voice and also change your pace to help change the energy level in the room
- Allow students to work together, and be prepared to answer questions
- Make sure that each student has successfully mastered all of the skills before you move forward with the skills test
- **Conduct testing station cases in real time (do not skip the case scenario)**



Skills Test

- Conduct high-quality BLS skills testing, airway management with OPA/NPA insertion skills testing, and Megacode Testing
- Follow ACLS Lesson Plans T2 through T4
- Testing details:
 - Test each student on high-quality BLS and airway management with OPA/NPA insertion
 - Test each student with a team (at least 3 students) for Megacode
 - Each student must demonstrate the entire sequence for high-quality BLS, airway management with OPA/NPA insertion, and Megacode without instructor prompting
 - Carefully observe the student during testing
 - Do not coach or give hints during the test
 - Fill out the Adult High-Quality BLS and Airway Management Skills Testing Checklists and the Megacode Testing Checklist
 - Refer the student for remediation if the test is unsuccessful
- If necessary, retest student(s) 1 additional time; if a student does not pass the test the second time, refer them for remediation

Lesson ACLS-Traditional 2*

Systems of Care

10 minutes

Learning Objective

- Define *systems of care*

Instructor Tips

- Ask students to use the provider manual in this section to help further engage them and help with retention of information
- Make sure not to interrupt the video if you have any comments to add; write them down and discuss them at the end of the video. Students do not learn well when they are trying to listen to 2 things at once



Play Systems of Care Video

- Ask students to open the provider manual to Part 1
- Play the video



Discussion

- Answer students' questions from the video
- Review and define Systems of Care
 - Discuss benefits and ways to improve
- Discuss the AHA Chain of Survival in relation to local protocol
- Highlight that a victim's survival depends on the entire systems of care working together in a timely fashion.

*Optional lesson plans for use with the Sample Agenda for ACLS Traditional Course. **These lessons must be added if using the ACLS Traditional Course agenda.**

Lesson ACLS-Traditional 3

Learning Station: The Science of Resuscitation

15 minutes

This video lesson focuses on the key science that drives increased patient survival

Instructor Tips

- Transitional language: After showing the video, be sure to provide language that helps students with the transition back to teaching, such as a recap of what the video covered and what is next
- When reviewing the material presented in the video with students, ask leading questions to help facilitate discussion; avoid lecturing



Play Science of Resuscitation Video

In a large group or small groups:



- Introduce the video The Science of Resuscitation
- Play the video
- Discuss high-quality BLS and feedback devices
- Answer questions
- Review/summarize key points

Lesson ACLS-Traditional 4

Systematic Approach

15 minutes

Learning Objective

- Apply the BLS, Primary and Secondary Assessment sequence for a systematic evaluation of adult patients

Instructor Tips

- Ask students to use the provider manual in this section to help further engage them and help with retention of information
- Make sure not to interrupt the video if you have any comments to add; write them down and discuss them at the end of the video. Students do not learn well when they are trying to listen to 2 things at once



Play Systematic Approach Video

- Ask students to open the provider manual to Part 1
- Play the video



Discussion

- Answer students' questions from the video
- Remind students that they will be functioning as Team Leader and different members as they rotate through the learning and testing stations
- Review and summarize key points (See Tables 17 and 18)

Table 17. BLS Assessment

Assessment	Assessment technique and action
Check for responsiveness.	<ul style="list-style-type: none"> • Tap and shout, "Are you OK?"
Shout for nearby help/activate the emergency response system and get the AED/defibrillator.	<ul style="list-style-type: none"> • Shout for nearby help. • Activate the emergency response system. • Get an AED if one is available, or send someone to activate the emergency response system and get an AED or defibrillator.
Check breathing and pulse.	<ul style="list-style-type: none"> • To check for absent or abnormal breathing (no breathing or only gasping), scan the chest for rise and fall for at least 5 but no more than 10 seconds. • Check the pulse for at least 5 but no more than 10 seconds. • Perform the pulse check simultaneously with the breathing check within 10 seconds to minimize delaying CPR. • If you find no breathing and no pulse within 10 seconds, start CPR, beginning with chest compressions. • If you find a pulse, start rescue breathing at 1 breath every 6 seconds. Check pulse about every 2 minutes.
Defibrillate.	<ul style="list-style-type: none"> • If pulse is not felt, check for a shockable rhythm with an AED/defibrillator as soon as it arrives. • Provide shocks as indicated. • Follow each shock immediately with CPR, beginning with compressions.

Table 18. Primary Assessment

Assessment	Assessment technique and action
Airway <ul style="list-style-type: none"> • Is the patient's airway patent? • Is an advanced airway indicated? • Have you confirmed proper placement of the airway device? • Is the tube secured, and are you reconfirming placement frequently and with every transition? 	<ul style="list-style-type: none"> • Maintain an open airway in unconscious patients by using a head tilt–chin lift, an oropharyngeal airway, or a nasopharyngeal airway. • Use advanced airway management if needed (eg, laryngeal mask airway, laryngeal tube, endotracheal tube). <ul style="list-style-type: none"> – Weigh the benefits of placing an advanced airway against the adverse effects of interrupting chest compressions. If bag-mask ventilation is adequate, you may defer inserting an advanced airway until the patient does not respond to initial CPR and defibrillation or until ROSC. Advanced airway devices such as a laryngeal mask airway, a laryngeal tube, or an esophageal-tracheal tube can be placed while chest compressions continue. – If using advanced airway devices: <ul style="list-style-type: none"> ▪ Confirm the proper integration of CPR and ventilation ▪ Confirm the proper placement of advanced airway devices by physical examination and quantitative waveform capnography ▪ Secure the device to prevent dislodgment ▪ Monitor airway placement, effectiveness of CPR, and ROSC with continuous quantitative waveform capnography

Assessment	Assessment technique and action
Breathing <ul style="list-style-type: none"> Are ventilation and oxygenation adequate? Are quantitative waveform capnography and oxyhemoglobin saturation monitored? 	<ul style="list-style-type: none"> Give supplemental oxygen when indicated. <ul style="list-style-type: none"> For cardiac arrest patients, administer 100% oxygen. For others, adjust the oxygen administration to achieve oxygen saturation of 95% to 98% by pulse oximetry (90% for ACS and 92% to 98% for post-cardiac arrest care). Monitor the adequacy of ventilation and oxygenation by <ul style="list-style-type: none"> Clinical criteria (chest rise and cyanosis) Quantitative waveform capnography Oxygen saturation Avoid excessive ventilation
Circulation <ul style="list-style-type: none"> Are chest compressions effective? What is the cardiac rhythm? Is defibrillation or cardioversion indicated? Has intravenous (IV)/intraosseous (IO) access been established? Is ROSC present? Is the patient with a pulse unstable? Are medications needed for rhythm or blood pressure? Does the patient need volume (fluid) for resuscitation? 	<ul style="list-style-type: none"> Monitor CPR quality. <ul style="list-style-type: none"> Quantitative waveform capnography (if the partial pressure of CO₂ in exhaled air at the end of the exhalation phase, or P_{ETCO₂}, is less than 10 mm Hg, attempt to improve CPR quality). Waveform capnography should be as high as possible with improved CPR quality. Continuous quantitative waveform capnography provides an indirect measure of cardiac output during chest compressions because the amount of carbon dioxide exhaled is associated with the amount of blood that passes through the lungs. An ETCO₂ less than 10 mm Hg during chest compressions rarely results in ROSC. A sudden increase in ETCO₂ to more than 25 mm Hg may indicate ROSC. Intra-arterial pressure (if relaxation phase [diastolic] pressure is less than 20 mm Hg, attempt to improve CPR quality). Inter-arterial pressure should be as high as possible with improved CPR quality. If intra-arterial pressure monitoring is available, strive to optimize blood pressure. Relaxation phase (diastolic) pressures less than 20 during chest compressions rarely results in ROSC. Attach monitor/defibrillator for arrhythmias or cardiac arrest rhythms (eg, VF, pVT, asystole, PEA). Provide defibrillation/cardioversion. Obtain IV/IO access. Give appropriate drugs to manage rhythm and blood pressure. Give IV/IO fluids if needed. Check glucose and temperature. Check perfusion issues.
Disability	<ul style="list-style-type: none"> Check for neurologic function. Quickly assess for responsiveness, levels of consciousness, and pupil dilation. AVPU: Alert, Voice, Painful, Unresponsive
Exposure	<ul style="list-style-type: none"> Remove clothing to perform a physical examination. Look for obvious signs of trauma, bleeding, burns, unusual markings, or medical alert bracelets.

Secondary Assessment

- Focused medical history (SAMPLE)
- H's and T's

Lesson ACLS-Traditional 5

CPR Coach

10 minutes

Instructor Tips

- Ask students to use the provider manual in this section to help further engage them and help with retention of information
- Make sure not to interrupt the video if you have any comments to add; write them down and discuss them at the end of the video. Students do not learn well when they are trying to listen to 2 things at once



Play CPR Coach Video

- Ask students to open the provider manual to Part 3
- Play the video



Discussion

- Answer students' questions from the video
- Remind students that they will be functioning as a CPR Coach during the CPR and Airway Management stations throughout the class
- Review and summarize key points (See *ACLS Provider Manual*)

Lesson ACLS-Traditional 6

Learning Station: Recognition: Signs of Clinical Deterioration

10 minutes

This video lesson focuses on preventing arrest

Instructor Tips

- Transitional language: After showing the video, be sure to provide language that helps students with the transition back to teaching, such as a recap of what the video covered and what is next
- When reviewing the material presented in the video with students, ask leading questions to help facilitate discussion; avoid lecturing



Play Recognition: Signs of Clinical Deterioration

In a large group or small groups:

- Introduce the video Recognition: Signs of Clinical Deterioration
- Play the video



Discussion

- Review and define MET/RRT for in-hospital cardiac arrest (optional for EMS)
- Answer questions
- Review/summarize key points

Lesson ACLS-Traditional 7A

Learning Station: Acute Coronary Syndromes— Video Discussion 1

30 minutes

Learning Objective

- Discuss early recognition and management of acute coronary syndromes, including appropriate disposition

Instructor Tips

- Allow students to work together to answer questions and allow for self-discovery
- When summarizing what the video has covered, be sure to allow students to lead this discussion at times by asking for what they observed/learned during the video segment
- Students are often hesitant to answer questions at first. Before this lesson, write down additional leading questions to help prompt discussion. These video-based lessons are designed to allow you to challenge students, whether they are novice or experienced providers. Adjust the difficulty of your questions based on the knowledge level of the students in the course



Play ACS Video

- Address what students will learn from the video
- Play the video (automatically pauses)
 - Address pause 1 questions 1, 2, and 3
- Refer to Part 2 of the provider manual
- Lead the discussion with the group



Discussion

- Advise students to refer to Part 2, ACS in the *ACLS Provider Manual*. Capture key concepts from the discussion



Pause 1

1. What is the difference between stable angina, unstable angina, and myocardial infarction?

Angina is a tightness or discomfort (not a sharp pain) in the center of the chest and/or the surrounding area. The onset of discomfort associated with stable angina is often predictable; in many cases, it begins during exertion or with strong emotions. It is a symptom, not a diagnosis of coronary artery disease or acute ischemic symptoms. While often associated with myocardial ischemia, chest discomfort may have other causes. In the presence of coronary disease, the most common cause of angina is an obstructing or disrupted coronary plaque.

Angina may be stable and predictably produced by exertion or emotion. At rest, a fixed coronary plaque generally allows enough blood supply. However, blood flow is insufficient during stress. When a plaque becomes unstable, ACS occurs. Due to a sudden reduction in the cross-sectional area of the blood vessel, blood flow is insufficient. This causes a clinical presentation called *unstable angina*, which is characterized by prolonged anginal pain that occurs at rest or with minimal effort. When the lack of blood flow is severe enough to cause damage to the heart muscle, a myocardial infarction is said to occur. This event often correlates with angina episodes of 15 minutes or longer.

2. This patient is having chest discomfort. What are the possible causes of chest discomfort that may be life threatening?

Although most *life-threatening* chest discomfort is due to ACS, the initial emergency diagnosis may include several other disorders. When a diagnosis of ACS is uncertain, the following possible diagnoses should be considered in the initial evaluation as well as the continuing assessment:

- Aortic dissection
- Pulmonary embolism
- Acute pericarditis with effusion and tamponade
- Spontaneous pneumothorax
- Esophageal rupture

3. What are the classic symptoms of acute ischemic chest discomfort?

The predominant symptom in most patients with ischemic syndromes is chest discomfort. This discomfort is often not described as a pain. Brief episodes of chest discomfort may be due to ischemia and may or may not progress to infarction. However, when symptoms are constant (ie, last for more than 15 to 20 minutes), myocardial infarction may be present. Symptoms suggestive of ACS include

- Uncomfortable pressure, fullness, squeezing, or pain in the center of the chest lasting several minutes (infarction: usually more than 15 minutes)
- Pain spreading to the shoulders, neck, arms, or jaw, or pain in the back or between the shoulder blades
- Chest discomfort with light-headedness, fainting, sweating, or nausea
- Shortness of breath with or without chest discomfort
- Denial that they are having chest pain/discomfort and minimizing severity

Lesson ACLS-Traditional 7B

Learning Station: Acute Coronary Syndromes—Video Discussion 2



Play ACS Video

- Address what students will learn from the video
- Play the video (automatically pauses)
 - Address pause 2 questions 1, 2, and 3
- Refer to Part 2 in the provider manual
- Lead the discussion with the group



Discussion

- Advise students to refer to Part 2, ACS in the *ACLS Provider Manual*. Capture key concepts from the discussion



Pause 2

1. Half of ACS patients do not arrive at the hospital by EMS.

Why is early EMS dispatch important for patients with ACS?

Patients with a STEMI have a complete occlusion of a coronary artery. Early opening of the artery reduces mortality and the size of infarction. In many cases, EMS can begin symptom-stabilizing care before the patient arrives at the hospital, which will permit earlier reperfusion therapy. *Early opening of the artery reduces mortality and the size of infarction.* Patients arriving by EMS receive earlier reperfusion. EMS providers should consider the risk of VF in the early hours after a STEMI.

What are the most important components of a community ACS recognition program?

ACS is the most common cause of cardiac arrest in adults. Every community should develop a program to respond to cardiac arrest and identify patients with possible ACS. Components of this program include

- Recognizing symptoms of ACS
- Activating the EMS system
- Providing early CPR
- Providing defibrillation with AEDs available through lay rescuer CPR and defibrillation programs

2. What are the goals of therapy for patients with ACS?

Improving systems of care enables early initiation of reperfusion therapy for patients with possible ACS and increases the likelihood of target goal achievement. These goals (discussed in detail in the ACS video) are

- Relief of ischemic chest discomfort
- Prevention of major adverse cardiac events, such as death, nonfatal myocardial infarction (MI), and the need for postinfarction urgent revascularization

- Treatment of acute, life-threatening complications of ACS, such as VF/pulseless VT, symptomatic bradycardia, and unstable tachycardia

Reperfusion therapy opens an occluded coronary artery with either drugs or mechanical means. “Clot buster” drugs are called *fibrinolytics*—a more accurate term than *thrombolytics*. Percutaneous coronary intervention (PCI) is a procedure used to open blocked or narrowed coronary (heart) arteries. PCI, performed in the heart catheterization suite following coronary angiography, allows balloon dilation and/or stent placement for an occluded coronary artery. PCI performed as the initial reperfusion method is called primary PCI.

3. What role does aspirin play in ACS? What are the indications and contraindications?

The most common cause of ACS is the rupture of a lipid-laden plaque with a thin cap. After rupture, a monolayer of platelets covers the surface of the ruptured plaque (platelet adhesion). Additional platelets are recruited (platelet aggregation) and activated. Aspirin irreversibly binds to platelets and partially inhibits platelet function.

Studies have shown that aspirin reduces mortality during MI. The recommended dose is 162 to 325 mg. Aspirin is indicated in all patients with possible ACS.

Contraindications include true aspirin allergy and recent or active gastrointestinal bleeding.

Lesson ACLS-Traditional 7C

Learning Station: Acute Coronary Syndromes—

Video Discussion 3



Play ACS Video

- Address what students will learn from the video
- Play the video (automatically pauses)
 - Address pause 3 questions 1, 2, and 3
- Refer to Part 2 in the provider manual
- Lead the discussion with the group



Discussion

- Advise students to refer to Part 2, ACS in the *ACLS Provider Manual*. Capture key concepts from the discussion



Pause 3

1. **Let's review. What is the initial drug therapy for ACS? We have already discussed aspirin.**

Other initial agents may include oxygen (to keep the saturation 90% or greater), nitroglycerin, and opiates (eg, morphine).

What are the doses and indications/contraindications/cautions for nitroglycerin?

Nitroglycerin is administered via the sublingual route, either in a tablet or spray form. Three doses may be administered after repeating assessments of blood pressure and heart rate. Conditions where nitroglycerin administration should be used with caution or withheld in patients with ACS include

- **Inferior MI and right ventricular (RV) infarction:** Use nitroglycerin with caution in patients with known inferior wall STEMI. For these patients, perform a right-sided ECG to assess the degree of RV involvement. If RV infarction is confirmed by right-sided precordial leads or clinical findings by an experienced provider, nitroglycerin and other vasodilators (morphine) or volume-depleting drugs (diuretics) are contraindicated. Patients with acute RV infarction are very dependent on RV-filling pressures (preload) to maintain cardiac output and blood pressure.
- **Hypotension, bradycardia, or tachycardia:** Avoid use of nitroglycerin in patients with hypotension (systolic blood pressure less than 90 mm Hg), extreme bradycardia (less than 50/min), or marked tachycardia.
- **Recent use of phosphodiesterase inhibitor (often used for erectile dysfunction):** If the patient has recently taken a phosphodiesterase inhibitor (eg, sildenafil or vardenafil within 24 hours; tadalafil within 48 hours), nitrates may cause severe hypotension refractory to vasopressor agents.

2. **What are the possible ECG groups that help triage initial ACS? What are they called?**

Analysis of the ECG ST segment allows triage of ACS patients into 1 of 2 diagnostic and treatment groups: STEMI and NSTEMI-ACS (high-risk unstable angina/non-ST-segment elevation MI and normal or nondiagnostic ECG). (Refer to the ACS Algorithm.)

Why is it recommended that EMS send advance notification of the ECG to the receiving facility?

Time is a critical factor in producing a positive outcome for an ACS patient, especially for STEMI patients. The American Heart Association recommends that EMS systems implement 12-lead ECG programs to assist in the early recognition of those patients who could benefit most from treatment at a specialty cardiac center. EMS providers who lack training in advanced ECG interpretation can still acquire and transmit the 12-lead ECG to the emergency department for interpretation there. With an ECG diagnostic for STEMI, EMS providers should activate the local STEMI response plan at the earliest opportunity.

Early ECG interpretation and notification of the receiving hospital speeds the time to reperfusion therapy, saves heart muscle, and may reduce mortality.

3. Why is STEMI special and the focus of this case?

Reperfusion therapy for STEMI is perhaps the most important advance in the treatment of cardiovascular disease in cardiovascular therapy. Early fibrinolytic therapy or direct catheter-based reperfusion has been established as a standard of care for patients with acute myocardial infarction.

Reperfusion therapy reduces mortality and saves heart muscle. The shorter the time to reperfusion, the greater the benefit. For example, a 47% reduction in mortality was noted when fibrinolytic therapy was provided in the first hour after onset of symptoms.

Guidelines have set goals for first medical contact to balloon inflation within *90 minutes*. STEMI systems of care (EMS systems and emergency department initial triage) have a major impact on these goals.

Lesson ACLS-Traditional 8A

Learning Station: Acute Stroke—

Video Discussion 1

30 minutes

Learning Objectives

- Discuss early recognition and management of stroke, including appropriate disposition

Instructor Tips

- Allow students to work together to answer questions and allow for self-discovery
 - Encourage student-to-student interaction
- These video-based lessons are designed to allow you to challenge students, whether they are novice or experienced providers. Adjust the difficulty of your questions based on the knowledge level of the students in the course



Play Stroke Video

- Address what students will learn from the video
- Play the video (automatically pauses)
 - Address pause 1 questions 1, 2, and 3
- Refer to Part 2 in the provider manual
- Lead the discussion with the group



Discussion

- Advise students to refer to Part 2, Acute Stroke in the *ACLS Provider Manual*. Capture key concepts from the discussion



Pause 1

1. What signs and symptoms is this patient having?

Students should recognize that the patient is having difficulty speaking and moving. These are some of the warning signs of stroke. Ask students what some other warning signs or symptoms of stroke are.

How are they typical of stroke?

The signs and symptoms of a stroke may be subtle. They can include

- Sudden weakness or numbness of the face, arm, or leg, especially on one side of the body
- Sudden confusion
- Trouble speaking or understanding
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking
- Dizziness or loss of balance or coordination
- Sudden severe headache with no known cause

2. What are the major types of stroke?

The major types of stroke are

- **Ischemic stroke:** Accounts for 87% of all strokes and is usually caused by an occlusion of an artery to a region of the brain
- **Hemorrhagic stroke:** Accounts for 13% of all strokes and occurs when a blood vessel in the brain suddenly ruptures into the surrounding tissue. Fibrinolytics are contraindicated in this type of stroke

In addition:

- **Transient ischemic attack:** Transient ischemic attack is a transient episode of neurologic dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction

Is there any treatment that can reduce disability?

Stroke is a general term. It refers to acute neurologic impairment that follows interruption in blood supply to a specific area of the brain. Although expeditious care for stroke is important for all patients, this case emphasizes reperfusion therapy for acute *ischemic* stroke because rapid therapy with a fibrinolytic agent can reduce the disability from stroke.

3. If this patient is having a stroke, what are some goals for stroke care?

The goal of stroke care is to minimize brain injury and maximize the patient's recovery. The Stroke Chain of Survival described by the AHA and the American Stroke Association is similar to the Chain of Survival for sudden cardiac arrest. It links actions to be taken by patients, family members, and healthcare providers to maximize stroke recovery. These links are

- Rapid recognition and reaction to stroke warning signs
- Rapid activation of the EMS system
- Rapid EMS-system transport to and prearrival notification of the receiving hospital
- Rapid diagnosis and treatment in the hospital

Lesson ACLS-Traditional 8B

Learning Station: Acute Stroke—Video Discussion 2



Play Stroke Video

- Address what students will learn from the video
- Play the video (automatically pauses)
 - Address pause 2 questions 1, 2, and 3
- Refer to Part 2 in the provider manual
- Lead the discussion with the group



Discussion

- Advise students to refer to Part 2, Acute Stroke in the *ACLS Provider Manual*. Capture key concepts from the discussion



Pause 2

1. What are the critical EMS assessments and actions to provide the best outcome for this patient with a potential stroke?

- **Identify signs:** Define and recognize the signs of transient ischemic attack and stroke.
- **Assess ABCs:** Administer oxygen if the oxygen saturation is 94% or less or the oxygen saturation is unknown.
- **Complete stroke assessment:** Perform a rapid out-of-hospital stroke assessment and stroke severity score.
- **Establish time:** Determine when the patient was last known to be at neurologic baseline. This represents time zero. If the patient wakes from sleep and is found with symptoms of stroke, time zero is the last time the patient was seen to be normal.
- **Transport:** Transport the patient to a stroke center on the basis of stroke assessment, stroke severity score, and local stroke protocols. Consider bringing a witness, family member, or caregiver with the patient to confirm time of onset of stroke symptoms.
- **Alert hospital:** Provide prehospital notification to the receiving hospital so they can activate their stroke team.
- **Check glucose:** During transport, support cardiopulmonary function, monitor neurologic status, and, if authorized by medical control, check blood glucose.

2. What type of hospital is appropriate for this patient?

A stroke center has the capability to rapidly triage and treat patients by using a multidisciplinary approach.

Why is advance notification so important?

Evidence indicates a favorable benefit when stroke patients are triaged directly to designated stroke-prepared centers (primary/comprehensive centers).

Advance notification allows activation of the facility stroke plan and team, minimizing delay in evaluation and treatment.

3. What stroke screen was used in the video?

Cincinnati Prehospital Stroke Scale (CPSS)

What are the 3 important physical findings?

The CPSS identifies stroke on the basis of 3 physical findings:

- Facial droop (have the patient smile or try to show teeth)
- Arm drift (have the patient close eyes and hold both arms out)
- Abnormal speech (have the patient say, "You can't teach an old dog new tricks")

Using the CPSS, medical personnel can evaluate the patient in less than 1 minute.

The presence of 1 finding on the CPSS indicates a 72% probability of stroke.

The presence of all 3 findings indicates that the probability of stroke is greater than 85%.

Lesson ACLS-Traditional 8C

Learning Station: Acute Stroke—Video Discussion 3



Play Stroke Video

- Address what students will learn from the video
- Play the video
 - Address pause 3 questions 1, 2, and 3
- Lead the discussion with the group



Discussion

- Advise students to refer to Part 2, Acute Stroke in the *ACLS Provider Manual*. Capture key concepts from the discussion



Pause 3

1. Let's review. What is the initial emergency department assessment and stabilization?

- **Assess ABCDs:** Assess the ABCDs and evaluate baseline vital signs.
- **Provide oxygen:** Provide supplemental oxygen if the patient is hypoxemic, ie, oxygen saturation is 94% or less , or in patients with an unknown oxygen saturation value.
- **Establish IV access and obtain blood samples:** Establish IV access and obtain blood samples for baseline blood count, coagulation studies, and blood glucose, but do not let this delay obtaining a CT scan of the brain.
- **Check glucose:** Promptly treat hypoglycemia.
- **Perform neurologic screening:** National Institutes of Health Stroke Scale or Canadian Neurological Scale.
- **Activate stroke team:** Activate the stroke team or arrange consultation with a stroke expert.
- **Order CT brain scan:** Order an emergent CT scan of the brain and have it read promptly by a radiologist.
- **Obtain 12-lead ECG:** Obtain a 12-lead ECG, which may identify a recent acute myocardial infarction or arrhythmias (eg, atrial fibrillation) as a cause of embolic stroke. Life-threatening arrhythmias can follow or accompany stroke, particularly intracerebral hemorrhage. If the patient is hemodynamically stable, treatment of non-life-threatening arrhythmias (bradycardia, VT, and atrioventricular conduction blocks) may not be necessary. This should not delay getting the CT scan of the brain.

2. What are the possible outcomes of the CT scan?

Emergent CT or magnetic resonance imaging scans of patients with suspected stroke should be promptly interpreted by an expert. The presence of hemorrhage versus no hemorrhage determines the next steps in treatment and whether the patient is a candidate for fibrinolytic therapy.

Which test result makes the patient a candidate for fibrinolytic therapy?

No, hemorrhage is not present.

If the CT scan shows no evidence of hemorrhage, the patient may be a candidate for fibrinolytic therapy.

Yes, hemorrhage is present.

If hemorrhage is noted on the CT scan, the patient is **not** a candidate for fibrinolytics. Consult a neurologist or neurosurgeon and consider transfer for appropriate care.

3. What does fibrinolytic therapy do for patients with ischemic stroke?

Several studies have demonstrated a higher likelihood of good-to-excellent functional outcome when alteplase was given to adults with acute ischemic stroke within 3 hours of symptom onset. These results occurred only when alteplase was given by physicians in hospitals with a stroke protocol that rigorously adhered to the eligibility criteria and therapeutic regimen of the National Institute of Neurological Disorders and Stroke protocol. Evidence from prospective randomized studies in adults also documents a greater likelihood of benefit when treatment begins earlier.

Studies have also shown improved clinical outcome in carefully selected patients when fibrinolytic administration occurred between 3 and 4.5 hours after symptom onset, although the degree of benefit was smaller than seen in the group receiving treatment at 3 hours or more.

Lesson ACLS-Traditional 8D

Learning Station: Acute Stroke—Review of 8 D's

Instructor Tip

- Advise students to refer to Part 2 in the *ACLS Provider Manual*. Capture key concepts from the discussion



Discussion

In a large group, with all students, discuss the following:

- Patients with acute ischemic stroke have a time-dependent benefit for fibrinolytic therapy similar to that of patients with ST-segment elevation MI, but this time-dependent benefit is much shorter
- The critical time period for administration of IV fibrinolytic therapy begins with the onset of symptoms
 - **Detection:** Rapid recognition of stroke signs and symptoms
 - **Dispatch:** Early activation and dispatch of EMS by phoning the local emergency number
 - **Delivery:** Rapid EMS stroke identification, management, triage, transport, and prehospital notification
 - **Door:** Urgent emergency department triage to a high-acuity area and immediate assessment by the stroke team
 - **Data:** Rapid clinical evaluation, laboratory testing, and brain imaging
 - **Decision:** Establishing stroke diagnosis and determining optimal therapy selection
 - **Drug/Device:** Administration of fibrinolytic and/or endovascular therapy if eligible
 - **Disposition:** Rapid admission to the stroke unit or critical care unit, or emergency interfacility transfer for endovascular therapy

