BASIC LIFE SUPPORT

hsi Health & Safety Institute™

student book
ver. 9.0, 2021

AMERICAN SAFETY & HEALTH INSTITUTE

EMS SAFETY

Basic Life Support for Healthcare Providers and Professional Rescuers

Student Book, Version 9.0, 2021

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Basic Life Support for Healthcare Providers and Professional Rescuers Student Book

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ABOUT THIS STUDENT BOOK

HSI is in the process of transitioning all our individual health and safety training brands into a single unified one - HSI. **This Student Book consolidates the American Safety and Health Institute (ASHI) and EMS Safety Basic Life Support (BLS) training programs into a single, completely revised training program incorporating the most current guidelines and treatment recommendations.** To address the risk of confusion in the market and among regulators and others during our brand transition, HSI's BLS certification cards will continue to carry the ASHI and EMS Safety logos for a prolonged period of time until they are slowly phased out.

DISCLAIMER

HSI has used reasonable effort to provide up-to-date, accurate information that conforms to generally accepted treatment recommendations at the time of publication. These recommendations supersede recommendations made in previous HSI programs. Science and technology are constantly creating new knowledge and practice. Like any published material, this material may become out of date over time. Guidelines for safety and treatment recommendations cannot be given that will apply in all cases/scenarios as the circumstances of each incident often vary widely. Local or organizational physician-directed medical protocols may supersede treatment recommendations in this program. Alert emergency medical services (EMS) or activate your EAP immediately if you are not sure an emergency exists or when any person is unresponsive, badly hurt, looks or acts very ill, or quickly gets worse.

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***NOTICE**: This HSI Training Program has been approved by the HSI Medical Advisory Board and reviewed by the HSI Advisory Council. It reflects the latest resuscitation science and treatment recommendations of the 2020 International Consensus on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) Science with Treatment Recommendations (CoSTR) published by the International Liaison Committee on Resuscitation (ILCOR) and conforms with the 2020 American Heart Association (AHA) Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care and the annual Guidelines Update. HSI is a nationally accredited organization of the Commission on Accreditation of Pre-Hospital Continuing Education (CAPCE) and nationally approved by the Academy of General Dentistry (AGD) Program Approval for Continuing Education (PACE) as a continuing dental education (CDE) provider.*

This training program is dedicated to all front-line health care workers, first responders, and public safety professionals who have and continue to place themselves at great personal risk to provide life supporting care.

We appreciate and admire you.

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INTRODUCTION

Welcome to the Health and Safety Institute (HSI) Basic Life Support (BLS) training program! BLS is emergency medical care provided by first responders, healthcare providers, and public safety professionals to persons experiencing respiratory or cardiac arrest, or an obstructed airway. It requires knowledge and proficiency in cardiopulmonary resuscitation (CPR), use of automated external defibrillators (AEDs), and techniques to relieve airway obstruction in patients of every age.

This training program is intended for healthcare providers and other public safety professionals working in a wide variety of occupational settings—in and out of hospital—and individuals enrolled in healthcare and public safety career courses.

The purpose of this BLS training program is for participants to gain or improve knowledge and skill proficiency in high-quality CPR skills for the adult, child, and infant.

Cardiac Arrest

Cardiac arrest is among the leading causes of death in the United States and worldwide. Cardiac arrest is the loss of the heart's ability to pump blood through the body due to inadequate or absent cardiac function. The most dramatic occurrence, sudden cardiac arrest (SCA), can happen anywhere with little or no warning.

BLS providers play a key role in the resuscitation effort following cardiac arrest, both out of hospital and in hospital or clinic settings. By training and practicing, BLS providers can help ensure the links in the chain of survival are strong in any setting, for every patient.

Local Medical Protocols

Local medical protocols are Emergency Medical Service (EMS) treatment guidelines.

Approved by the local EMS medical director, local protocols outline the permissible medical treatments that may be given by EMS personnel outside the hospital to patients experiencing a medical emergency. EMS providers should always follow their local physician-directed medical protocols.

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UNIVERSAL CONCEPTS

Universal concepts cover broad principle themes that underlie and influence BLS.

Infection Control

This BLS program was developed in the midst of the global pandemic of the coronavirus disease 2019 (COVID-19), which has resulted in widespread infection and death worldwide. A great number of frontline healthcare workers and first responders all over the world have been infected and many have lost their lives. COVID-19 and similiar coronavirus variants remain an ongoing threat to both life and livelihood.

With that in mind, infection control practices cannot be overemphasized for BLS providers. Infection control practices for emergency and healthcare settings are certainly nothing new. The Occupational Safety and Health Administration (OSHA) and the Centers for Disease Control and Prevention (CDC) have published guidelines for infection control for more than two decades. Still, the highly contagious COVID-19 has reinforced the paramount importance of meticulous attention to infection control practices.

According to the CDC, standard precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where health care is delivered.[1] Hand hygiene and personal protective equipment are fundamental elements of standard precautions that must be used by healthcare workers and first responders who provide BLS to protect them from infection.

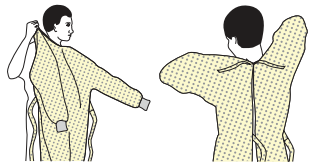
The phrase "take standard precautions" is used throughout this program as one of the first and unquestionably necessary actions before providing BLS. To take standards precautions means to use appropriate personal protective equipment (PPE) to protect against possible exposure to infectious agents.

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

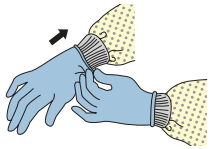
- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene

This includes but is not limited to:

- gloves
- gowns
- masks
- respirators
- eye protections (goggles/ face shield)
- bag-mask devices with HEPA filters

1 Standard Precautions for All Patient Care. Available: https://www.cdc.gov/infectioncontrol/basics/standard-precautions.html [Retrieved 2/3/2021]

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Hand hygiene should be performed immediately after removing gloves.

This training program is intended to reinforce infection prevention practices. It is not an infection control training curriculum. It is not intended for meeting any occupational licensing regulations or requirements for infection control training and should not be used for that purpose.

Comprehensive training in standard precautions is vital to help healthcare workers and first responders make appropriate decisions in their occupational setting and to comply with infection control practices and local medical protocols.

> ***NOTE:*** *In order to clearly demonstrate high-quality skills, BLS providers in this book may not always be shown wearing appropriate personal protective equipment.*

High-Quality Cardiopulmonary Resuscitation (HQ-CPR)

High-quality cardiopulmonary resuscitation (HQ-CPR) is foundational to both basic and advanced life support and is a proven technique to improve cardiac arrest outcomes.[2] CPR skills can vary greatly, depending on experience, frequency of practice, physical ability, and available resources. It is normal for there to be a gap between expertly performed CPR skills and typically performed skills. An important goal of BLS training is to narrow that gap as much as possible.

HQ-CPR includes the following:

- Beginning CPR compressions within 10 seconds of determining cardiac arrest.
- Compressing fast, at a rate of 100-120 times per minute.
- Compressing hard, at least 2 inches [5 cm] on an adult, and at least 1/3 the depth of the chest for children and infants.
- Allowing for complete chest recoil at the top of each compression (not leaning on the chest between compressions).
- Minimizing any interruptions to compressions to less than 10 seconds.
- Achieving a chest compression fraction (CCF) of at least 60% (ideally 80%).
- Giving effective rescue breaths that create a visible chest rise but no more (adult: 1 breath every 6 seconds, over 1 second; infants and children: 1 breath every 2-3 seconds, over 1 second).

Hands-off Time & Chest Compression Fraction (CCF)

Time spent during a resuscitation attempt without chest compression (hands-off time) should be kept as short as possible. Hands-off time includes assessing the patient, checking the pulse, AED operation, and other activities.

$$\text{CCF} = \frac{\text{DURATION OF COMPRESSIONS}}{\text{DURATION OF CPR ATTEMPT}}$$

Chest compression fraction (CCF) is the proportion of time that chest compressions are performed during a cardiac arrest resuscitation effort. Higher CCF percentages are associated with high-quality CPR and greater rates of survival. A CCF of at least 60% is recommended, but higher percentages are both desirable and achievable. A CCF of at least 80% has been associated with higher rates of return of spontaneous circulation (ROSC). Signs of ROSC include breathing, coughing, or movement and a palpable pulse or a measurable blood pressure.[3]

CCF can be measured from data provided by a real-time CPR feedback device or by using two stopwatches. The first stopwatch is used to time the entire resuscitation attempt, from beginning to end. The second stopwatch is used to measure the chest compression time. The second stopwatch is started each time compressions begin and is stopped when compressions are interrupted.

CCF is calculated by dividing the duration of chest compression by the total duration of the resuscitation attempt.

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2 Meaney, PA et al. Cardiopulmonary Resuscitation Quality: Improving Cardiac Resuscitation Outcomes Both Inside and Outside the Hospital © 2013 American Heart Association®, Inc. Circulation Volume 128, Issue 4, 23 July 2013, Pages 417-435 Available: https://doi.org/10.1161/CIR.0b013e31829d8654 [Retrieved 2/3/2021]

3 Uppiretla AK, G M G, Rao S, Don Bosco D, S M S, Sampath V. Effects of Chest Compression Fraction on Return of Spontaneous Circulation in Patients with Cardiac Arrest; a Brief Report. Adv J Emerg Med. 2019 Jun 6;4(1):e8. doi: 10.22114/ajem.v0i0.147. PMID: 31938777; PMCID: PMC6955024.

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Teamwork in High-Performance Resuscitation

High-quality CPR (HQ-CPR) is an essential part of high-performance resuscitation. The other necessary element is teamwork. Uncoordinated actions during resuscitation increase interruptions in compressions. Teamwork in high-performance resuscitation is similar to the orchestrated actions of individual pit crew members in a car race. An effective high-performance resuscitation team

- has clearly defined roles,
- uses clear and effective communication,
- anticipates next actions,
- minimizes interruptions in compressions, and
- consistently measures its performance and commits significant resources to improve it.

Understanding all the roles within the team is important because each team member may rotate through several of the roles.

Figure 1 represents a practicable team arrangement. Positions, roles, and responsibilities are described in **Table 1**. These differ between in-hospital and out-of-hospital settings, between agencies and institutions, and must be adjusted to be consistent with local practices and protocols.

Figure 1: Team Member Positions in High-Performance Resuscitation

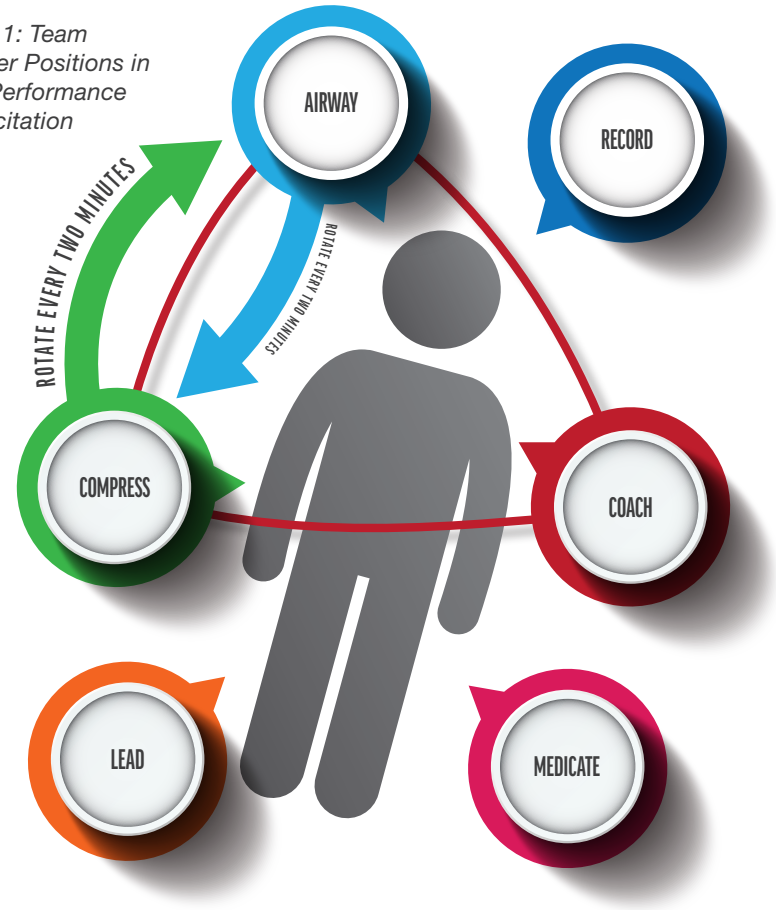

Table 1: Team Member Positions in High-Performance Resuscitation

	Resuscitation Triad. These three team members remain in the triangle unless it becomes unsafe.		
	This team member assesses the patient, performs compressions, and rotates with the person in the airway position every 2 minutes or sooner if tired.		This team member leads the resuscitation team, assigning roles, making treatment decisions and providing feedback to the team as needed.
	This team member brings, places, and operates the AED/monitor/defibrillator and acts as the CPR Coach, providing real-time verbal feedback of CPR performance about compressions and ventilations.		This team member obtains vascular access and administers medications (ALS provider role).
	This team member opens and maintains the airway, inserts airway adjuncts and provides bag-mask ventilation. This team member rotates with the person performing compressions every 2 minutes or sooner if tired.		This team member records the time of interventions and medications, records the frequency and duration of interruptions in compressions, and communicates these to the team members.

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The CPR Coach

The "CPR Coach" is a relatively new role in many high-performance resuscitation teams. It is designed to optimize psychomotor performance. In addition to bringing, placing, and operating the AED/monitor/defibrillator, the role of CPR Coach is to encourage the team members performing chest compressions and ventilations to provide HQ-CPR. This permits the Team Lead to focus on higher level problem-solving necessary to properly manage the patient.[4] Ideally the CPR Coach is positioned directly across from the person performing chest compressions.

Minimally, the CPR Coach prompts the other two team members in the resuscitation triad (or triangle) to perform high-quality chest compressions, give effective rescue breaths, switch out compressors efficiently, and perform rapid defibrillation with minimal interruption. When resources permit, the CPR Coach may also provide prompting and guidance on chest compression metrics (depth, rate, etc.) based on data displayed by a CPR feedback device or the defibrillator/monitor.

Teamwork in high-performance resuscitation is mentally and physically challenging. It requires a substantial commitment to performance improvement through training and retraining. It requires effective communication, respect, collaboration, problem-solving, and managing conflicts to improve outcomes around a shared mission and common goal, which is neurologically intact survival from cardiac arrest.

Effective Communication in High-Performance Resuscitation

Teamwork in high-performance resuscitation requires the use of clear and effective communication. Create a professional atmosphere that promotes the flow of knowledge. Every team member may share situational observations as the resuscitation attempt proceeds. Encouraging feedback and collaboration can make the team more effective and efficient.

Resuscitation attempts can be intense. Demonstrate respect for all team members, regardless of their role, experience, or skill level. Speak calmly and confidently, in a considerate, helpful manner. Briefly and audibly recap the overall progress of the resuscitation attempt and reevaluate the situation when new information becomes available or the patient's condition changes.

Use Closed Loop Communication to reduce miscommunication. There are three steps:

1. The sender (S) transmits a message (M).
2. The receiver (R) accepts the message (M) and acknowledges its receipt.
3. The sender (S) verifies that the message (M) has been received and interpreted correctly, closing the loop.

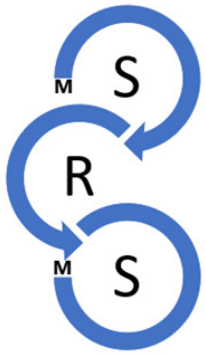

Figure 2: Closed Loop Communication

For example, Andre, the CPR Coach, says, "One more ventilation, Jordan, then switch positions with Malia." Jordan acknowledges the message with, "Got it. One more ventilation, then switch with Malia." Andre verifies the message was received with, "That's correct," closing the loop.

Debriefing

Debriefing is a widely used form of feedback that focuses on improving teamwork skills. The goal of debriefing is to learn by reviewing and reflecting on team performance. Evidence demonstrates that teams that debrief perform more than 20% better than those that do not. Creating and maintaining a safe and comfortable sharing environment is essential to learning and improving teamwork skills via debriefing. Consider input from each team member equally, regardless of their role on the team. Be open and honest with each other, but not judgmental.

BLS providers may experience emotional or psychological effects after caring for a cardiac arrest patient. Consider errors, interpersonal conflicts, and deficiencies as opportunities to improve. The goal of debriefing is to learn, not to lay blame.

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4 Hunt EA, Jeffers J, McNamara L, Newton H, Ford K, Bernier M, Tucker EW, Jones K, O'Brien C, Dodge P, Vanderwagen S, Salamone C, Pegram T, Rosen M, Griffis HM, Duval-Arnould J. Improved Cardiopulmonary Resuscitation Performance With CODE ACES2: A Resuscitation Quality Bundle. J Am Heart Assoc. 2018 Dec 18;7(24):e009860. doi: 10.1161/JAHA.118.009860. PMID: 30561251; PMCID: PMC6405605. [Retrieved 1/4/2021]

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Adult BLS Continuum

When a person's heartbeat unexpectedly stops, anyone can (and everyone should) provide the person a chance for successful resuscitation and meaningful life. However, what is done for the person and how it is done often exist on a continuum, "a set of things on a scale, which have a particular characteristic to different degrees."[5]

The continuum in Adult BLS can be represented by a linear scale on two axes. On the horizontal axis is equipment and resources. On the vertical axis is training (Figure 2). Each axis begins at "none or limited" and scales up to "considerable."

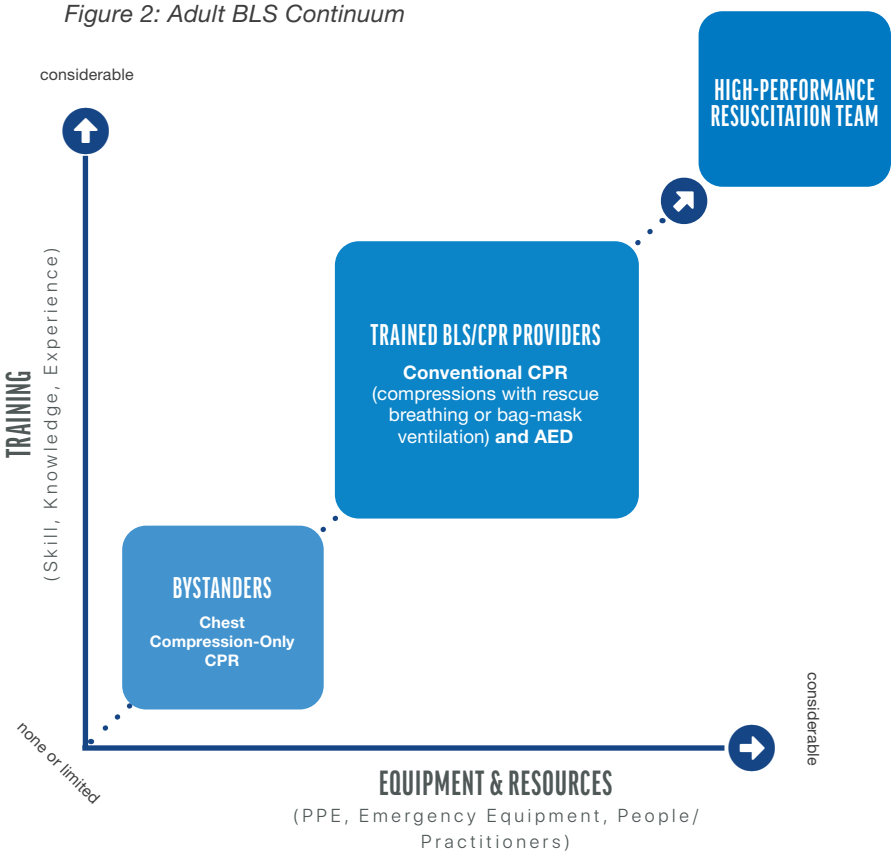
As a model example of how the continuum might be viewed, imagine a person, who merely by chance, witnesses an adult suddenly collapse. Alone, completely unfamiliar with CPR, and without anyone nearby to help, this person's only equipment consists of a mobile phone. This is one end of the continuum: the untrained layperson bystander. This person has little or no skill, knowledge, or experience in CPR; no PPE, no emergency equipment, no one else to ask for help. Even so, this person becomes the critical link in the cardiac arrest chain of survival by calling 911 to activate EMS and then by following the dispatcher's instructions.

After verifying with the untrained layperson bystander that the person is unresponsive and not breathing normally, the 911 dispatcher (also called a telecommunicator) sends EMS to the scene while encouraging the untrained layperson bystander to provide chest compression-only CPR — pushing hard and fast in the middle of the person's chest.

Early activation of the EMS system and chest compression-only CPR can double or triple an adult cardiac arrest victim's chance of survival (though providing effective ventilation is important for resuscitation of children).

At the same time, the dispatcher activates a network of community volunteers using a smartphone application. Two nearby volunteers who are trained BLS/CPR providers receive the alert and respond to the scene. They have appropriate PPE, but no AED. They find

Figure 2: Adult BLS Continuum



the bystander giving chest compressions with verbal coaching by the dispatcher. After advising the dispatcher they have arrived, and after performing a quick assessment to verify the person has no pulse and is not breathing, the BLS providers begin HQ-CPR.

After a few cycles of chest compressions with bag-mask ventilation, another trained volunteer BLS/CPR provider responding to the smartphone alert arrives at the scene with an AED. To minimize interruption in compressions, the AED is attached with chest compressions in progress. The patient is "cleared" while the AED analyzes the heart rhythm. The AED advises a shock. The BLS/CPR providers stay clear of the patient and deliver one shock. CPR is immediately resumed.

5 https://www.collinsdictionary.com/us/dictionary/english/continuum [Retrieved 1/5/2021]

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These BLS/CPR providers represent the middle ground of the continuum (and the primary focus of this training program). A couple minutes later, a fire engine and ambulance with a high-performance EMS resuscitation team arrives.

Communicating calmly and clearly, one of the team members announces that she is the CPR Coach. She gives the BLS/CPR providers positive reinforcement, specifically acknowledging the good depth and rate of chest compressions and effective ventilation. The team takes over with expertly performed CPR, orchestrating a high-performance resuscitation.

A couple minutes later and following another shock, the patient moans and starts moving. The patient is transferred to the ambulance and transported to an appropriate hospital with a comprehensive post–cardiac arrest treatment system of care.

Though facing a long recovery with some mild neurologic impairments, this patient has done something few do: survived sudden cardiac arrest.

Critical, key elements of the out-of-hospital Chain of Survival have each played a role in that outcome: early EMS activation, dispatcher-assisted bystander chest compressions, HQ-CPR/AED by trained BLS providers, and a high-performance EMS resuscitation team.

Starting and Stopping CPR

Starting and Withholding CPR

Out-of-hospital BLS providers should immediately start high-quality CPR when no pulse is felt and the patient is not breathing normally or only gasping because delaying CPR dramatically decreases the chance of survival. However, there are exceptions to this rule. CPR may be withheld in the following circumstances:

1. The scene is not safe and BLS providers are at risk of serious injury or death.
2. BLS providers are presented with a valid physician's order in the form of a state approved document, bracelet, or necklace instructing health care providers not to provide CPR for cardiac arrest, also known as Do Not Attempt Resuscitation (DNAR), Do Not Resuscitate Order (DNRO), Allow Natural Death (AND), Physician Orders for Life-Sustaining Treatment (POLST), or similar (Figure 3).
3. The patient is obviously dead (decomposition, decapitation, transection, rigor mortis, dependent lividity, incineration, massive trauma to the head or chest with obvious organ destruction, etc.).

As in the out-of-hospital setting, a physician's order is necessary to withhold CPR in-hospital. In the absence of a valid DNAR order, all patients who suffer in-hospital cardiac arrest should have resuscitative attempts begun unless the patient is obviously irreversibly dead. BLS providers should follow their local medical protocols for determining when to withhold CPR in any circumstance.

Figure 3: Sample POLST Form

HIPAA PERMITS DISCLOSURE TO HEALTH CARE PROFESSIONALS & ELECTRONIC REGISTRY AS NECESSARY FOR TREATMENT

Physician Orders for Life-Sustaining Treatment (POLST)

Follow these medical orders until orders change. Any section not completed implies full treatment for that section.

Patient Last Name: | Patient First Name: | Patient Middle Name: | Last 4 SSN:

Address: (street / city / state / zip): | Date of Birth: (mm/dd/yyyy) ____ /____ /____ | Gender: ☐ M ☐ F

A (Check One) — **CARDIOPULMONARY RESUSCITATION (CPR):** *Unresponsive, pulseless, & not breathing.*

☐ **Attempt Resuscitation/CPR**
☐ **Do Not Attempt Resuscitation/DNR**

If patient is not in cardiopulmonary arrest, follow orders in **B** and **C**.

B (Check One) — **MEDICAL INTERVENTIONS:** *If patient has pulse and is breathing.*

☐ **Comfort Measures Only**. Provide treatments to relieve pain and suffering through the use of any medication by any route, positioning, wound care and other measures. Use oxygen, suction and manual treatment of airway obstruction as needed for comfort. ***Patient prefers no transfer to hospital*** *for life-sustaining treatments. Transfer if comfort needs cannot be met in current location.* **Treatment Plan: Provide treatments for comfort through symptom management.**

☐ **Limited Treatment**. In addition to care described in Comfort Measures Only, use medical treatment, antibiotics, IV fluids and cardiac monitor as indicated. No intubation, advanced airway interventions, or mechanical ventilation. May consider less invasive airway support (e.g. CPAP, BiPAP). ***Transfer*** *to hospital if indicated. Generally avoid the intensive care unit.* **Treatment Plan: Provide basic medical treatments.**

☐ **Full Treatment**. In addition to care described in Comfort Measures Only and Limited Treatment, use intubation, advanced airway interventions, and mechanical ventilation as indicated. ***Transfer to hospital*** *and/or intensive care unit if indicated.* **Treatment Plan: All treatments including breathing machine.**

Additional Orders: _____

C (Check One) — **ARTIFICIALLY ADMINISTERED NUTRITION:** *Offer food by mouth if feasible.*

☐ Long-term artificial nutrition by tube.
☐ Defined trial period of artificial nutrition by tube.
☐ No artificial nutrition by tube.

Additional Orders (e.g., defining the length of a trial period): _____

D (Must Fill Out) — **DOCUMENTATION OF DISCUSSION: (REQUIRED)** *See reverse side for add'l info.*

☐ Patient (If patient lacks capacity, must check a box below)

☐ Health Care Representative (legally appointed by advance directive or court)

☐ Surrogate defined by facility policy or Surrogate for patient with developmental disabilities or significant mental health condition (Note: Special requirements for completion- see reverse side)

Representative/Surrogate Name: _____ Relationship: _____

E — **PATIENT OR SURROGATE SIGNATURE AND OREGON POLST REGISTRY OPT OUT**

Signature: ***recommended*** | This form will be sent to the POLST Registry unless the patient wishes to opt out, if so check opt out box: ☐

F (Must Print Name, Sign & Date) — **ATTESTATION OF MD / DO / NP / PA (REQUIRED)**

By signing below, I attest that these medical orders are, to the best of my knowledge, consistent with the patient's **current** medical condition and preferences.

Print Signing MD / DO / NP / PA Name: ***required*** | Signer Phone Number: | Signer License Number: *(optional)*

MD / DO / NP / PA Signature: ***required*** | Date: ***required*** | Office Use Only

SEND FORM WITH PATIENT WHENEVER TRANSFERRED OR DISCHARGED
SUBMIT COPY OF BOTH SIDES OF FORM TO REGISTRY IF PATIENT DID NOT OPT OUT IN SECTION E

© CENTER FOR ETHICS IN HEALTH CARE, Oregon Health & Science University. 2014

Continuing CPR

Out-of-hospital BLS providers who start high-quality CPR should continue CPR until one of the following occurs:

1. Return of spontaneous circulation (ROSC).
2. Care is transferred to ALS providers.
3. The BLS provider is unable to continue CPR due to exhaustion.
4. The scene becomes unsafe, putting the BLS providers at risk of serious injury or death.
5. Criteria for termination of resuscitation (TOR) are met.

BLS Termination of Resuscitation (TOR) Rule

In adult patients where their chance of survival is considered small, termination-of-resuscitation efforts in the out-of-hospital setting should be considered according to local medical protocol. The rule recommends TOR when all the following criteria apply:

1. The cardiac arrest was not witnessed by EMS providers or first responders.
2. There was no return of spontaneous circulation (ROSC) after 3 full rounds of CPR and automated external defibrillator (AED) analysis; and
3. No AED shocks were delivered.[6]

Termination-of-resuscitation protocols for children may also be covered in local medical protocols, and include children that are victims of blunt and penetrating trauma where there is an EMS-witnessed cardiac arrest and at least 30 minutes of unsuccessful resuscitative efforts, including CPR.[7] In the hospital, the decision to terminate resuscitative efforts rests with the treating physician and is based on consideration of many factors, including witnessed versus unwitnessed arrest, time to CPR, initial arrest rhythm, time to defibrillation, the patient's prearrest disease state, and whether there was ROSC at some point during the resuscitative efforts.

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6 Morrison LJ, et al. Part 3: ethics: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2010;122(suppl 3):S665–S675. (Circulation. 2010;122[suppl 3] S677.) © 2010 American Heart Association®, Inc.

7 American College of Surgeons Committee on Trauma; American College of Emergency Physicians Pediatric Emergency Medicine Committee; National Association of Ems Physicians; American Academy of Pediatrics Committee on Pediatric Emergency Medicine, Fallat ME. Withholding or termination of resuscitation in pediatric out-of-hospital traumatic cardiopulmonary arrest. Pediatrics. 2014 Apr;133(4):e1104-16. doi: 10.1542/peds.2014-0176. Epub 2014 Mar 31. PMID: 24685948.

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section one

ADULT BLS

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SUDDEN CARDIAC ARREST

Sudden cardiac arrest occurs when the normal electrical impulses in the heart cause it to beat too quickly, inefficiently, or in an unsynchronized manner. When the lower chambers of the heart beat too quickly or quiver, the heart cannot pump blood. These abnormal heart rhythms, or dysrhythmias, are known as pulseless ventricular tachycardia (VT) and ventricular fibrillation (VF). Blood flow to the body, along with the oxygen it carries, abruptly stops. Within minutes, brain cell death starts to occur from the lack of oxygen. A victim of SCA may suddenly collapse. Occasionally, SCA victims will experience 10-20 seconds of seizure activity when the brain stops receiving oxygen. Normal breathing stops. Abnormal gasping may last for several minutes.

CPR and Defibrillation

CPR is the immediate treatment for suspected SCA. CPR can restore limited oxygen to the brain and other vital organs through a combination of chest compressions, an open airway, and rescue breaths. However, CPR alone is not enough. The most effective way to end pulseless VT and VF is defibrillation, using a defibrillator and electrode pads adhered to the chest. An electrical shock passed through the chest can restore the heart's normal contractions.

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ADULT CHAINS OF SURVIVAL

Immediate, high-quality CPR and early defibrillation with an AED can more than double the likelihood for survival. These two elements are parts of the adult "chain of survival," a series of six interdependent links that describe the best approach to cardiac arrest care. Each link in the chain is essential for the most positive outcome. If a single link is missing, the chances for survival are greatly reduced. There are two adult chains of survival. The links in the chain differ slightly depending on the cardiac arrest setting.

Out-of-Hospital Chain of Survival

The chain of survival for pre-hospital or out-of-hospital cardiac arrest (Figure 4) consists of:

- Early recognition of cardiac arrest and prompt activation of EMS,
- Immediate high-quality CPR beginning with chest compressions,
- Early defibrillation with an AED (when indicated),
- Effective advanced life support treatment,
- Effective post-cardiac arrest care at a hospital, and
- Recovery.

The adult out-of-hospital chain of survival includes continued resuscitation by EMS and transportation to the hospital for all patients with a chance of survival.

In-Hospital Chain of Survival

Cardiac arrest inside a hospital or facility usually occurs when a known medical condition worsens, so the in-hospital chain of survival focuses on how resuscitation fits into ongoing medical care.

The chain of survival for in-facility cardiac arrest (Figure 5) includes:

- Monitoring, prevention, and treatment of prearrest conditions, and early recognition of cardiac arrest,
- Prompt activation of the EAP and response by teams of medical professionals,
- Immediate high-quality CPR beginning with chest compressions,
- Prompt defibrillation,
- Effective post-cardiac arrest care, and
- Recovery.

How Strong Links Help

The greatest chance for survival exists when all the links of the chain of survival are strong. The majority of cardiac arrests happen at home or in the workplace.

- Early recognition of SCA and activation of EMS and/or EAP gets help coming right away.
- Immediate high-quality CPR improves the victim's chance of survival by providing oxygen to the heart and brain. After activating EMS, an untrained layperson should provide chest compression-only CPR, ideally with their phone on speaker mode and with the assistance of an EMS dispatcher.
- Attaching an AED as soon as it becomes available speeds up time to defibrillation, if indicated.
- Effective advanced life support treatment, with a focus on ROSC, and transport to a hospital for all patients with a chance of survival supports the most favorable outcome.
- Effective post-cardiac care, including monitoring and the use of medication, helps prevent the return of cardiac arrest and improves the likelihood of long-term survival.
- Recovery supports the patient's physical and emotional needs that are ongoing after hospital discharge.

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Figure 4: Out-of-Hospital Chain of Survival

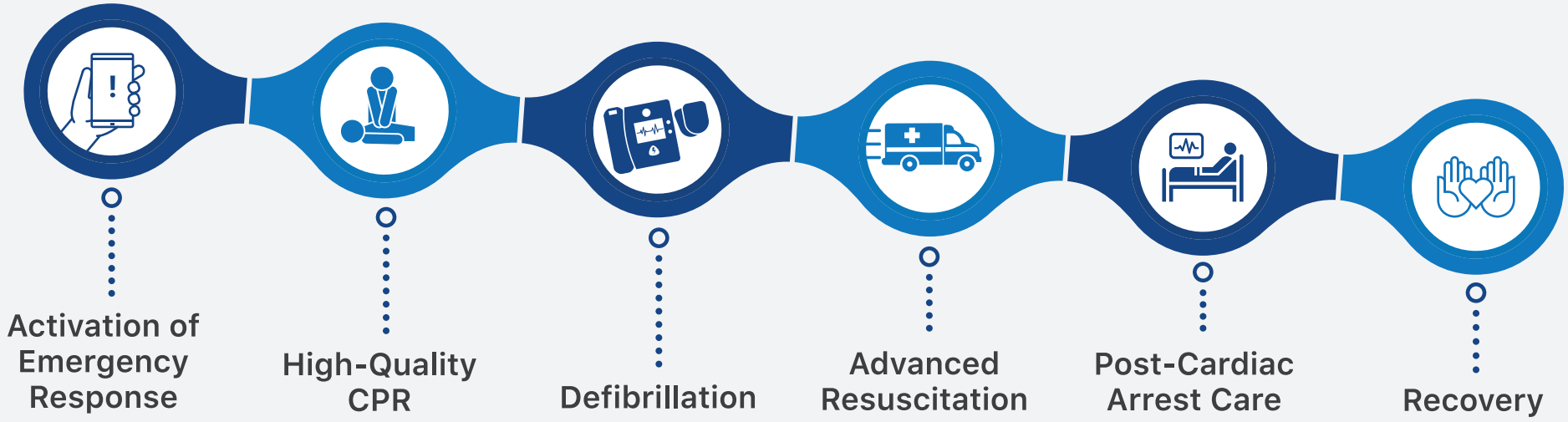
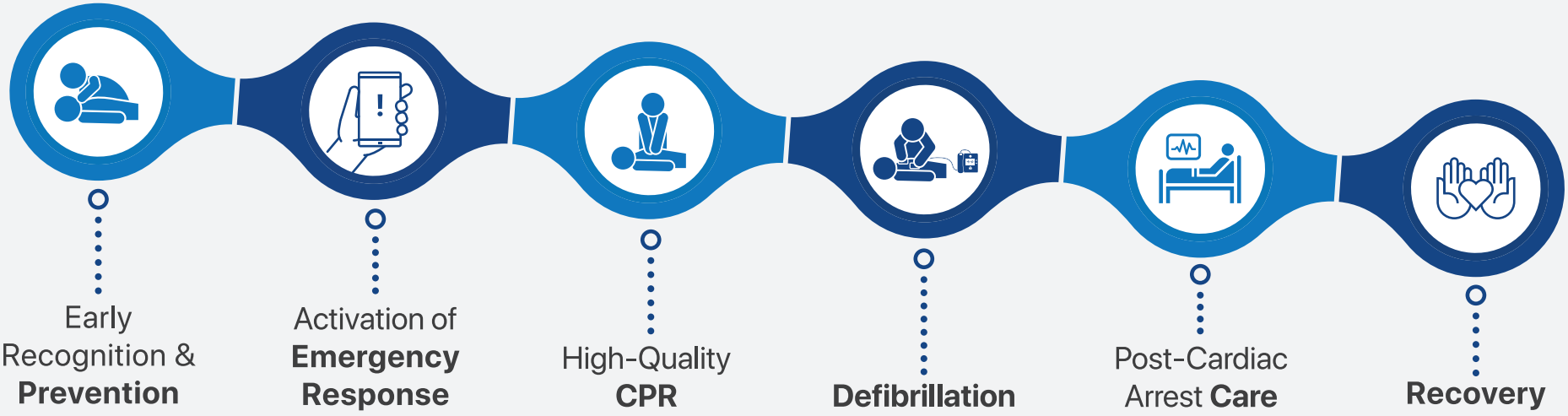


Figure 5: In-Hospital Chain of Survival



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ADULT BLS PROCEDURE

BLS providers should follow the adult BLS procedure, a step-by-step guide for responding to a potential adult cardiac arrest.

The adult BLS procedure is a process composed of tasks that can be performed in a step-by-step manner by a single BLS provider or performed simultaneously by multiple providers working as a team.

There are three main elements of the adult BLS procedure:

- Assessment of the scene and patient,
- Actions based the presence or absence of normal breathing and a pulse, and
- Use of an AED.

Assess Scene Safety

As a single BLS provider, first assess scene safety. Upon arrival and before anything else, pause to make sure the scene is safe for you and the victim. If the scene is not safe, do not enter it until hazards have been minimized or eliminated. This includes taking standard precautions.

Take Standard Precautions

In this program, "take standard precautions" means "use appropriate personal protective equipment (PPE)," to protect against possible exposure to infectious agents. Appropriate PPE may include gloves, goggles or face shields, surgical masks, gowns, respirators, CPR masks, and bag-mask devices. Experience putting on and taking off PPE, also called donning and doffing, is critical for your safety and to minimize potential delays in emergency treatment. Train and practice according local medical protocol or your healthcare facility's established PPE procedures.

Assess Responsiveness

If the scene is safe, assess responsiveness. Tap the victim and ask loudly, "Are you okay?"

Activate EMS and/or EAP

If the patient is unresponsive, call 911 to activate EMS using a mobile device or activate your facility's emergency action plan (EAP). After activating, get an AED and your emergency response equipment, or if someone else is available, send them to get it.

Assess Breathing and Pulse

Simultaneously assess breathing and pulse. Look at the patient's chest and face for signs of normal breathing. Normal breathing is effortless, quiet, and regular. Weak, irregular gasping, snorting, snoring, or gurgling sounds are known as agonal breaths. This is not normal breathing. It is a sign of cardiac arrest.

At the same time, check the carotid pulse. Place two or three fingers in the groove on the patient's neck, between the trachea and the muscles at the side of the neck. Take no longer than 10 seconds to simultaneously assess breathing and pulse.

Take Action Based on Findings

Take action based the presence or absence of normal breathing and pulse.

- If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping, immediately start CPR, beginning with chest compressions.
- If the pulse is *definitely* felt and the unresponsive patient is not breathing normally, provide rescue breathing or bag-mask ventilation.
- If the pulse is *definitely* felt and the unresponsive patient is breathing normally, maintain an open airway.

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PROCEDURE FOR ADULT BASIC LIFE SUPPORT

PERFORM AN ASSESSMENT

- Assess scene safety.
- Take standard precautions.[8]
- Assess responsiveness.
- Activate EMS and/or EAP.[9]
- Get an AED and emergency response equipment (or send someone else to).

ASSESS BREATHING & PULSE AT THE SAME TIME. IS THE PULSE DEFINITELY FELT WITHIN 10 SECONDS?

Unresponsive, pulse felt. BREATHING normally.

MAINTAIN AN OPEN AIRWAY

- Regularly reassess responsiveness, airway, breathing, and pulse until another BLS or ALS provider takes over.
- To help protect the airway, place an unresponsive, uninjured patient on their side in the recovery position.

Unresponsive, pulse felt. NOT BREATHING normally.

PROVIDE RESCUE BREATHING OR BAG-MASK VENTILATION

- Adult or child with signs of puberty: Give 1 breath every 6 seconds.
- Give naloxone if opioid overdose possible.[10]
- Check carotid pulse every 2 minutes.
- If no pulse, start CPR.

Unresponsive, no pulse felt. NOT BREATHING normally or only gasping.

START CPR

- Position patient on a firm, flat surface.
- Perform cycles of 30 high-quality chest compressions and 2 rescue breaths.

USE THE AED AS SOON AS IT IS AVAILABLE. APPLY PADS TO PATIENT'S BARE CHEST.
CONTINUE HIGH-QUALITY CPR WHILE AED CHARGES. FOLLOW AED PROMPTS.

SHOCK ADVISED?

Yes	No
Give 1 shock. Immediately resume CPR. Follow AED prompts.	Immediately resume CPR. Follow AED prompts.

CONTINUE CPR AND AED UNTIL OTHER BLS OR ALS PROVIDERS TAKE OVER OR PATIENT STARTS RESPONDING (BREATHING, MOVING, REACTING).

CPR TASKS FOR TWO BLS PROVIDERS: ADULT PATIENT

BLS PROVIDER 1: GIVE COMPRESSIONS	BLS PROVIDER 2: GIVE BREATHS
Position yourself at patient's side. Perform cycles of 30 high-quality chest compressions. Count out loud. Push hard and fast at a rate of 100-120 compressions per minute. Compress the chest at least 2 inches (5cm). Allow the chest to recoil completely after each compression. Do not lean on the chest between compressions. Switch task of giving compressions every 2 minutes (when the AED is analyzing, or sooner if tired). Minimize interruptions in chest compressions. Try to limit switches to <5 seconds.	Position yourself at the patient's head. Maintain an open airway with head tilt–chin lift or jaw thrust. Give 2 rescue breaths. Each breath should cause visible chest rise. Avoid excessive ventilation (too many breaths or too much volume). Encourage the compressor to compress hard and fast, and allow for complete recoil.

8 Use appropriate personal protective equipment (PPE) to protect against possible exposure to infectious agents (gloves, gowns, masks, respirators, bag-mask device with HEPA filter and goggles/face shield). Perform hand hygiene immediately after removing gloves.

9 Call 911 to activate Emergency Medical Services (EMS) using a mobile device (if appropriate) and/or activate your EAP (EAP).

10 Per local protocol/standing orders.

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ADULT CHEST COMPRESSIONS

High-quality CPR is the primary influence on survival from cardiac arrest. High-quality chest compressions are the foundation of high-quality CPR. External compression of the chest increases pressure inside the chest and directly compresses the heart, forcing blood to move from the chest to the lungs, heart, brain, and the rest of the body. When chest compressions stop, blood flow decreases significantly. When compressions start again, it takes several compressions to restore blood flow. The more times chest compressions are interrupted and the longer the interruption, the less blood flow to the brain, heart and other organs. Minimal interruption improves blood flow.

If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping, immediately start CPR, beginning with chest compressions. CPR should be performed where victim is found as long as it is safe to do so.

To deliver adult chest compressions:

- Position the patient face up on a firm, flat surface.
  - If the patient is face down, carefully roll them over.
- Position yourself at the patient's side, kneeling close to one side of the chest.
- Place the heel of one hand on the center of the chest, on the lower half of the breastbone. Place the heel of the other hand on top of and parallel to the first. Interlock your fingers if necessary, to keep them off the chest.
  - Alternatively, you can place one hand on the center of the chest and use your other hand to grasp your wrist for support.
- Position your shoulders directly above your hands and straighten your arms to lock your elbows.
  - Push hard and deep, straight down, using your upper body weight to compress the chest at least 2 inches (5 cm).
  - Chest compressions are most often performed too shallow.
- At the end of each compression, lift all your weight off the patient's chest, allowing it to completely recoil, or rebound, to its normal position, but do not lose contact with the chest.
  - Avoid leaning on the chest between compressions. Complete chest recoil allows the heart to refill.
- Push fast. Compress the chest at a rate of 100-120 compressions per minute.

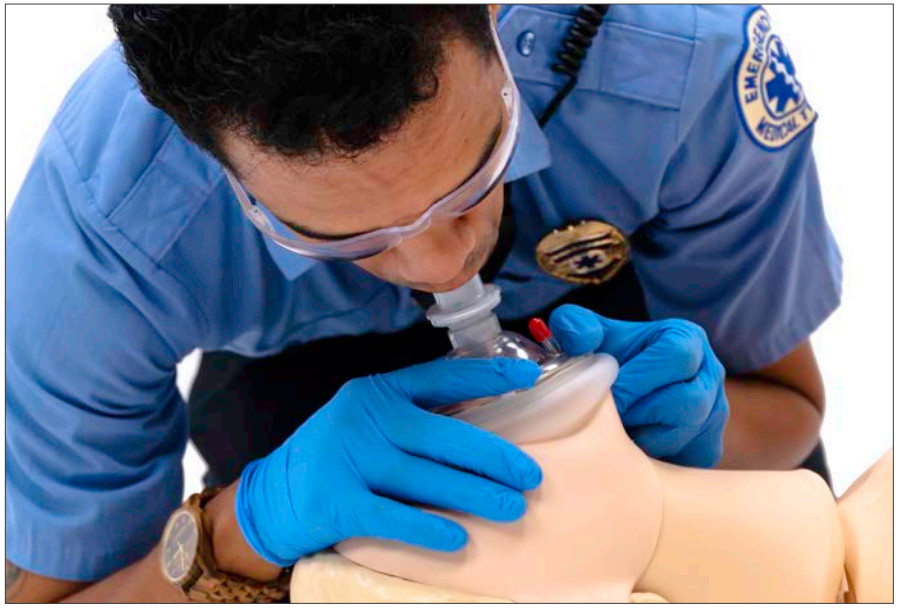
CPR Feedback Devices

CPR feedback devices transmit information on compression rate, depth, and recoil. Providers can significantly improve chest compression quality by adjusting technique based on data from a feedback device. Using a CPR feedback device is shown to improve patient outcomes and is recommended during CPR training and in real-life resuscitation attempts, both in and out of hospital.

Chest Compression Fraction (CCF)

Fewer and shorter interruptions in chest compressions are associated with better outcomes. Time spent during a resuscitation attempt without chest compression, called hands-off time, should be kept as short as possible. Chest compression fraction (CCF) is the proportion of time that chest compressions are performed during a cardiac arrest resuscitation effort. Higher CCF percentages are associated with high-quality CPR and greater rates of survival. A CCF of at least 60% is recommended, but higher percentages are desirable and achievable.

ADULT AIRWAY



Rescue breathing is artificial ventilation of the lungs. It provides oxygenation of the blood and removal of carbon dioxide. It is an important component for successful resuscitation. Conventional CPR with rescue breathing should be performed by all BLS providers, both in and outside the hospital. To give rescue breaths, there must be an open airway. The airway is the only path for getting air into the lungs. When an unresponsive patient is lying flat on their back, decreased muscle tone and the pull of gravity causes the base of the tongue to obstruct the upper airway. The tongue is connected to the lower jaw. Lifting the jaw forward pulls the tongue away from the back of the throat, relieving the obstruction and opening the airway.

Two methods to open the airway are the head tilt–chin lift, and jaw thrust. Use the head tilt–chin lift maneuver to open the airway of a patient when head or neck injury is not suspected.

Head Tilt-Chin Lift

To open the airway with the head tilt–chin lift maneuver:

- Position yourself at the patient's side.
- Place one hand on their forehead.
- Place the fingertips of your other hand under the bony part of the lower jaw, near the chin.
- Apply firm, backward pressure on the forehead while lifting the chin upward.
- Avoid pressing into the soft tissue of the chin with your fingers, as this can also obstruct the airway.
- Leave the mouth slightly open.

Jaw Thrust

If the BLS provider suspects a spinal injury, open the airway using a jaw thrust without head tilt.

To open the airway with a jaw thrust:

- Position yourself at the patient's head.
- Place one hand on each side of the patient's head.
- Place your fingertips under the angle of the lower jaw and lift it upwards until the lower teeth are higher than the upper teeth.
- If the patient's lips close, use your thumbs to push the lower lip open.

An open airway is a higher priority than protecting a possible spinal injury. If the jaw thrust does not open the airway, use the head tilt–chin lift maneuver. Both the head tilt–chin lift and jaw thrust maneuvers should be performed correctly and quickly to minimize interruptions in chest compressions.

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ADULT BREATHING

Rescue breaths are critically important in BLS care, as they provide life-sustaining oxygen and ventilation directly to the patient's lungs. In addition to SCA patients, BLS providers are likely to provide care for victims of respiratory arrest and secondary cardiac arrest, for whom effective rescue breaths are essential. Rescue breaths are given by blowing the BLS provider's exhaled air into the valve of a CPR mask, or by pushing air into the lungs through the airway using a bag-mask device. Gasping in SCA is common but is not normal breathing.

Unresponsive, No Pulse Felt, Not Breathing

If the pulse is not felt and the unresponsive patient is not breathing or is gasping:

- Immediately start CPR, beginning with high-quality chest compressions.
- After 30 compressions, open the airway and give 2 rescue breaths.
- Perform cycles of 30 chest compressions and 2 rescue breaths.

Unresponsive, Pulse Definitely Felt, Not Breathing

If the pulse is definitely felt but the unresponsive patient is not breathing normally:

- Provide rescue breathing. Open the airway and give 1 breath every 6 seconds, or 10 breaths per minute.
- If you suspect an opioid overdose, give naloxone according to local medical protocol.
- Check the pulse about every 2 minutes. If the pulse is not felt and the unresponsive patient is still not breathing, immediately start CPR.

Avoid Excessive Ventilation

Excessive ventilation (too many breaths or breaths that are too large) can be harmful. It can cause the stomach to fill with air and increase pressure in the chest, making it difficult for blood to enter and exit the heart. Air in the stomach can also cause regurgitation of food, liquids, or vomit into the airway. BLS providers should avoid excessive ventilation during rescue breathing. Give enough air to make the patient's chest rise, but no more than that.

Respiratory Arrest and Secondary Cardiac Arrest

In respiratory arrest, breathing has stopped but the heart continues to beat. This is a life-threatening medical emergency caused by diseases such as pneumonia or other conditions such as stroke, choking, drowning, and drug or alcohol overdose. If rescue breathing is not provided during respiratory arrest, the patient's heart will stop within minutes. This is secondary cardiac arrest.

Standard Precautions

Take standard precautions when providing adult rescue breaths. Use a CPR mask or bag-mask device in addition to other appropriate PPE. Some CPR masks and bag-mask devices allow you to attach a high-efficiency particulate air (HEPA) filter to provide further protection during CPR. The HEPA filter fits between the valve and mask, in the path of the patient's exhaled gas. HEPA filters can trap airborne virus particles.

BLS providers can give rescue breathing using their own exhaled breath and a CPR mask. Room air contains about 21% oxygen. Exhaled air contains between 16% and 17% oxygen. This exhaled oxygen is enough to support life.

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Using a CPR Mask

To use a CPR mask:

- Position yourself at the patient's side.
- Place the mask flat on the person's face with the top of the mask over the bridge of the nose.
- Use your thumb and forefinger to provide uniform pressure around the top of the mask.
- Use the thumb of your other hand lifting the chin to control the bottom of the mask.
- Hook your fingertips of the hand controlling the bottom of the mask under the bony ridge of the jaw.
- Open the airway with the head tilt–chin lift maneuver.
- Tilt the head and lift the chin to open the airway. Lift the patient's face up into the mask to create an airtight seal.
- Give a rescue breath by blowing through the valve opening. Each breath is 1 second in length. Give enough air to create a visible rise of the chest, but no more.
- Stop ventilating as soon as you see chest rise.
- Remove your mouth and let the patient exhale.

Using a Bag-Mask Device

A bag-mask is a hand-held device used to inflate the lungs. The device consists of a bag attached to a face mask. BLS providers can give rescue breathing using a bag-mask device and room air. It can also deliver high concentrations of oxygen when connected to an oxygen delivery system.

To use a bag-mask device as a single provider:

- Position yourself above the patient's head.
- Place the mask flat on the patient's face, covering the nose and mouth, with the top of the mask over the bridge of the nose.
- Use your thumb and index finger of one hand in a C position to press the edges of the mask to the face.
- Use your remaining fingers in an E position under the bony ridge of the jaw.
- Tilt the head and lift the jaw up into the mask to open the airway.
- Give a rescue breath by squeezing the bag. Deliver each breath over 1 second in length while watching for chest rise.
- Stop ventilating as soon as you see chest rise.

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ADULT AUTOMATED EXTERNAL DEFIBRILLATION

An automated external defibrillator (AED) is a portable computerized device that is simple to operate. It can identify pulseless ventricular tachycardia and ventricular fibrillation and deliver an electrical shock to restore the heart's normal contractions. If the electrical shock is effective, there will be a return of spontaneous circulation (ROSC). The heart will be able to pump blood and the patient will have a pulse that can be felt by the BLS provider. The patient may also start breathing, moving, or reacting in other ways.

If you have an AED in your workplace, be familiar with its operation. AED design varies by model and manufacturer, but they all operate in a similar manner.

AED Operation

Proper AED operation requires direct contact between the pads and the patient's skin. Any clothing in the way must be removed. This includes swimsuits, bras, and any other clothing covering a patient's chest. If necessary, cut through clothing with the shears that are typically included with a CPR and AED response kit. Opening the lid will turn on the power for some AEDs. With others, simply press the power button. This starts voice prompts and readies the device for use.

AED Pads

Use adult AED pads for patients 8 years of age or older. Locate and pull out the defibrillation pads. The pads have pictures on them to show proper placement. Peel the pads from the backing sheet one at a time and place each according to the pictures. Press the pads firmly in place.

Avoid placing the pads over medication patches or implanted devices. Try to apply the pads within 30 seconds after the AED arrives.

Voice Prompts

When the AED voice prompts you, clear the patient. Loudly say, "Everybody clear," or something similar. Be certain that no one is touching the patient. The AED may take a few seconds to analyze the heart rhythm. It will then tell you if a shock is advised. If the AED advises a shock, it will prompt you to clear the patient again. Make sure no one is touching the patient.

If directed by the AED, deliver a shock. Continue CPR while the device is charging, then clear everyone from the patient before pressing the shock button. For most AEDs, delivering a shock is done by pressing the shock button. Once a shock has been delivered, immediately resume CPR starting with chest compressions. After about 2 minutes of CPR, the AED will prompt you again to analyze the heart rhythm. Follow the voice prompts. Continue the resuscitation attempt until another BLS provider or advanced life support providers arrive, or until the patient starts breathing, moving, or reacting in other ways.

If the patient begins responding, regularly reassess the patient's responsiveness, airway, breathing, and pulse. If a pulse is felt but the patient is not breathing normally, provide rescue breathing or bag-mask ventilation.

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ADULT CPR: ONE BLS PROVIDER

Every adult resuscitation attempt is different in terms of setting, circumstance, and available resources. While working as a coordinated team is common, BLS providers also need to be able to provide high-quality CPR as a single provider. If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping, one BLS provider can provide high-quality adult CPR by putting together all the skills of assessment, compressions, airway, breathing, and AED use.

Assess the Scene and Responsiveness

- Assess scene safety, taking standard precautions.
- If the scene is safe, assess the patient's responsiveness.
- If the patient is unresponsive, activate EMS or your EAP.
- Get an AED and emergency response equipment or send someone else to.

Assess Breathing and Pulse

- Assess the patient's breathing and carotid pulse at the same time for no more than 10 seconds.
- If the patient is not breathing normally or only gasping and you do not feel a pulse, start high-quality CPR.

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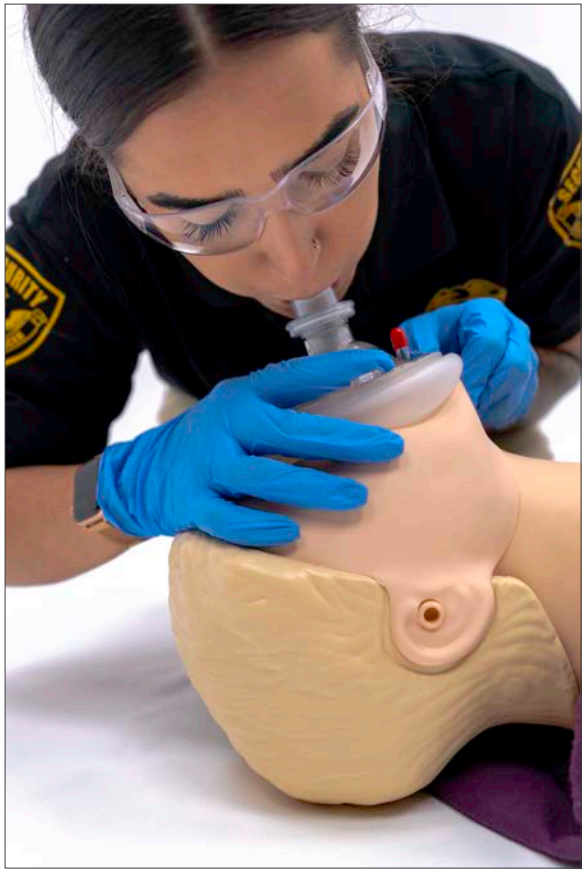
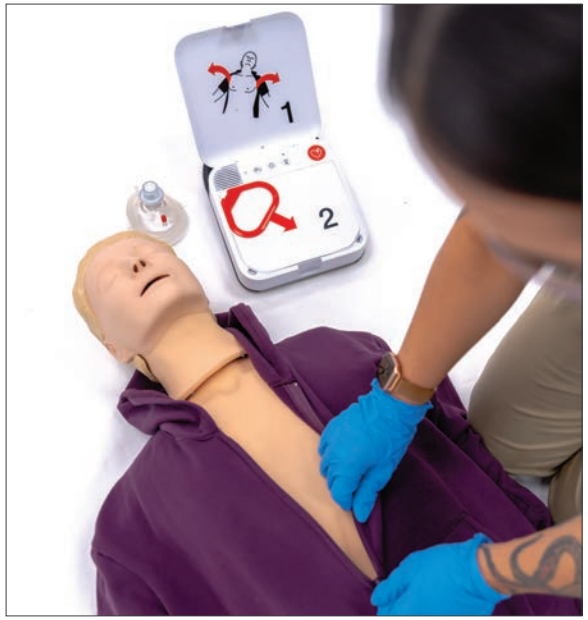
Begin Chest Compressions

- Position the patient on a firm, flat surface. Perform 30 high-quality chest compressions.
- Position two hands on the lower half of the breastbone.
- Use upper body weight to compress.
- Compress at least 2 inches (5 cm).
- Compress at a rate of 100–120 times per minute.
- Allow the chest to fully recoil at the top of each compression.



Deliver Rescue Breaths

- Use a CPR mask or bag-mask device.
- Open the airway and give 2 rescue breaths.
- Ensure each breath is 1 second in length and creates visible rise of the chest.
- Immediately resume high-quality chest compressions.
- Repeat CPR cycles of 30 compressions and 2 breaths for 2 minutes.



Use the AED

- As soon as an AED is available, power on the AED.
- Bare the chest.
- Correctly apply the AED pads.
- Make sure no one is touching the patient.
- If directed by the AED, deliver a shock.
- Continue compressions until the AED has fully charged, then make sure no one is touching the patient.
- Press the shock button.
- Immediately resume CPR starting with chest compressions.
- Continue the resuscitation attempt until another BLS provider or advanced life support providers arrive and take over, or until the patient starts breathing, moving, or reacting in other ways.

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ADULT CPR: MULTIPLE BLS PROVIDERS

It is common for multiple providers to respond to a potential cardiac arrest. When two or more BLS providers are available to attempt resuscitation, each provider performs CPR skills simultaneously with other providers in a coordinated effort.

Assess Scene Safety and Take Standard Precautions

- Assess the scene for safety, regardless of whether you are first on the scene, and take standard precautions.

Assess Responsiveness

- If the scene is safe and you are the first BLS provider to reach the patient's side, assess responsiveness.

Active EMS and/or EAP

- As second BLS provider, activate EMS or the EAP, and get the AED and emergency response equipment, if available.

Assess Breathing and Pulse Simultaneously

- At the patient's side, assess the patient's breathing and carotid pulse at the same time for no more than 10 seconds.

Take action based on your assessment findings.

Unresponsive, Pulse Definitely Felt, Breathing

If the pulse is definitely felt and the unresponsive patient is breathing normally:

- Open and maintain the airway.
  - To help protect the airway, place an uninjured patient on their side with the arm closest to the ground extended, and the other arm positioned to support their head. This "recovery position" uses gravity to drain fluids from the mouth and keep the tongue from blocking the airway.
- Monitor and care for the unresponsive patient according to local medical protocol.

Unresponsive, Pulse Definitely Felt, Not Breathing

If the pulse is definitely felt but the unresponsive patient is not breathing normally:

- Provide rescue breathing.
  - With multiple BLS providers and appropriate equipment on hand, each provider takes a role to deliver effective bag-mask ventilations.
- Position one BLS provider above the patient's head, in charge of opening the airway and securing the mask. Position a second BLS provider on the patient's side to squeeze the bag.
- Place the mask on the patient's face, covering the nose and mouth, with the top of the mask over the bridge of the nose.
- As BLS Provider 1, use the muscles at the base of the thumb to place downward pressure on the mask while using the other four fingers of each hand pull the jaw into the mask.
- As BLS Provider 2, deliver a rescue breath by squeezing the bag. Give 1 breath every 6 seconds, or 10 breaths per minute. Deliver each breath over 1 second in length while watching for chest rise.
- If providers suspect an opioid overdose, give naloxone according to local medical protocol.
- Regularly assess the patient's responsiveness, airway, breathing, and carotid pulse about every 2 minutes.

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Unresponsive, No Pulse Felt, Not Breathing

If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping:

- The first BLS provider should remove any bulky clothing from the patient's chest and immediately start high-quality CPR, beginning with chest compressions.
  - Compress fast, at a rate of 100-120 times per minute.
  - Compress hard, at least 2 inches (5 cm).
  - Allow complete chest recoil at the top of each compression. Do not lean on the chest between compressions.
  - Perform 30 compressions. Count out loud.
- After 30 compressions have been given, the second BLS provider should open the airway and give 2 effective rescue breaths using a CPR mask or bag-mask device using both hands to secure the mask to the patient's face.
- Repeat cycles of 30 compressions and 2 effective rescue breaths.

If in the position giving rescue breaths, encourage the compressor to perform high-quality compressions that are fast, hard, and with complete recoil. Providing high-quality compressions takes a great deal of exertion and endurance. Fatigue can occur quickly and cause a loss of quality, compromising the resuscitation attempt.

Switch the person in the compressor's position frequently, about every 2 minutes. Try to minimize interruptions to compressions to less than 10 seconds.

As soon as the AED is available:

- Power on the AED. Bare the chest.
- Correctly apply the AED pads according to the pictures. **Do not interrupt chest compressions to apply the AED pads.**
- When the AED voice prompts you, clear the patient to allow the AED to analyze. Make sure no one is touching the patient.
- If the AED advises a shock, clear the patient and deliver the shock. Once a shock has been delivered, immediately resume CPR starting with chest compressions. If the AED does not advise a shock, immediately resume chest compressions. Follow the AED's voice prompts.
- Continue the resuscitation attempt until advanced life support providers take over, or until the patient starts breathing, moving, or reacting in other ways.

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ADDITIONAL ADULT BLS CONSIDERATIONS

A BLS provider may face some circumstances or patients that require additional considerations or tasks for effective care.

AED Use

Act quickly if anything affects AED use to keep this link in the chain strong.

Chest Hair

Thick chest hair may prevent the AED pads from adhering to the skin. If chest hair is preventing pad-to-skin contact, use the razor that is typically included with a CPR and AED response kit to quickly shave the spots where the pads will be placed.

- If you do not have a razor, but a second pair of pads is available, use the first set of pads to remove the hair from the skin. Apply the first set of pads firmly over the chest hair, then pull the pads off quickly. Then apply the second set of pads.

In Water

Do not use an AED if the patient is immersed in water. The patient must be removed from water before using an AED.

Wet Setting

If the patient is in a wet setting, such as lying on snow or ice, in rain, on a wet floor or deck, or in a small puddle, it is safe to use the AED. If the patient's chest is wet, quickly dry the chest before applying pads.

Metal Surfaces

AEDs can be used safely on metal surfaces, such as gratings or stairwells. Make sure the pads do not directly touch any metal surface when the AED is powered on.

Implanted Devices

Patients at high risk for cardiac arrest may have a surgically implanted defibrillator or pacemaker. Most often, a noticeable lump is visible in the left upper chest, though sometimes the implant is in the upper right chest or abdomen. Avoid placing the AED pad directly over the implant, as the device may interfere with shock delivery.

Medication Patches

Do not place AED electrode pads directly on top of a medication patch. A patch could block delivery of the shock from the electrode pad to the heart and cause small burns to the skin. If it doesn't delay shock delivery, peel off the patch with a gloved hand and quickly wipe the area before attaching the electrode pad.

Metal Jewelry

If the AED pads are not in contact with metal jewelry, the jewelry does not have to be removed.

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PROCEDURE FOR PREGNANT WOMEN IN CARDIAC ARREST

PERFORM AN ASSESSMENT

- Assess scene safety.
- Take standard precautions.[11]
- Assess responsiveness.
- Activate EMS and/or EAP.[12] Advise dispatcher or code team of potential pregnant patient in cardiac arrest.
- Get an AED and emergency response equipment (or send someone else to).

ASSESS BREATHING & PULSE AT THE SAME TIME. IS THE PULSE DEFINITELY FELT WITHIN 10 SECONDS?

Unresponsive, pulse felt. BREATHING normally.

ROLL/WEDGE PATIENT ONTO LEFT SIDE, MAINTAIN AN OPEN AIRWAY

- Regularly reassess responsiveness, airway, breathing, and pulse until another BLS or ALS provider takes over.

Unresponsive, pulse felt. NOT BREATHING normally.

PROVIDE RESCUE BREATHING OR BAG-MASK VENTILATION

- Give 1 breath every 6 seconds.
- Give naloxone if opioid overdose possible.[13]
- Regularly reassess responsiveness, airway, and breathing until another BLS or ALS provider takes over.
- Check carotid pulse every 2 minutes.
- If no pulse, start CPR.

Unresponsive, no pulse felt. NOT BREATHING normally or only gasping.

START CPR

- Position patient on a firm, flat surface.
- Perform cycles of 30 high-quality chest compressions and 2 rescue breaths.

USE THE AED AS SOON AS IT IS AVAILABLE. APPLY PADS TO PATIENT'S BARE CHEST.
CONTINUE HIGH-QUALITY CPR WHILE AED CHARGES. FOLLOW AED PROMPTS.

SHOCK ADVISED?

Yes

- Give 1 shock.
- Immediately resume CPR.
- Follow AED prompts.

No

- Immediately resume CPR.
- Follow AED prompts.

CONTINUE CPR AND AED UNTIL OTHER BLS OR ALS PROVIDERS TAKE OVER OR PATIENT STARTS RESPONDING (BREATHING, MOVING, REACTING).

PRIORITIES FOR BLS IN PREGNANCY

- High-quality CPR and ventilation.
- When additional providers are available: Manually moving the uterus to the patient's left (continuous lateral uterine displacement) to relieve pressure on major abdominal vessels helps increase blood flow to both the patient's heart and the baby.
- Competently performed BLS, early transport to an appropriate facility, and rapid organization of an expert resuscitation team provides the best chance for survival of mother and baby.

CPR TASKS FOR TWO BLS PROVIDERS: ADULT PATIENT

BLS PROVIDER 1: GIVE COMPRESSIONS

- Position yourself at patient's side.
- Perform cycles of 30 high-quality chest compressions. Count out loud.
- Push hard and fast at a rate of 100-120 compressions per minute.
- Compress the chest at least 2 inches (5cm).
- Allow the chest to recoil completely after each compression. Do not lean on the chest between compressions.
- Switch task of giving compressions every 2 minutes (when the AED is analyzing, or sooner if tired).
- Minimize interruptions in chest compressions. Try to limit switches to <5 seconds.

BLS PROVIDER 2: GIVE BREATHS

- Position yourself at the patient's head.
- Maintain an open airway with head tilt–chin lift or jaw thrust.
- Give 2 rescue breaths. Each breath should cause visible chest rise.
- Avoid excessive ventilation (too many breaths or too much volume).
- Encourage the compressor to compress hard and fast, and allow for complete recoil.

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11 Use appropriate personal protective equipment (PPE) to protect against possible exposure to infectious agents (gloves, gowns, masks, respirators, bag-mask device with HEPA filter and goggles/face shield). Perform hand hygiene immediately after removing gloves.

12 Call 911 to activate Emergency Medical Services (EMS) using a mobile device (if appropriate) and/or activate your EAP (EAP).

13 Per local protocol/standing orders.

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Pregnant Women in Cardiac Arrest

Do not delay chest compressions or defibrillation for a pregnant patient. If the patient is visibly pregnant and additional BLS or ALS providers are available to give CPR, one provider can manually move the uterus towards the patient's left side. This will relieve pressure on major abdominal vessels, helping to increase blood flow. Follow the normal steps for operating the AED. The shock from the AED will not harm the fetus. If the patient starts breathing, moving, or reacting in other ways, place the person on their left side to improve blood flow.

PRIORITIES FOR BLS IN PREGNANCY

- High-quality CPR and ventilation are priorities for a pregnant patient.
- When additional providers are available: Manually moving the uterus to the patient's left (continuous lateral uterine displacement) to relieve pressure on major abdominal vessels helps increase blood flow to both the woman's heart and the baby.
- Competently performed BLS, early transport to an appropriate facility, and rapid organization of an expert resuscitation team provides the best chance for survival of mother and baby.

Advanced Airways

An advanced airway such as the laryngeal mask airway (LMA), esophageal-tracheal double lumen tube, and endotracheal tube are devices that isolate the airway, prevent obstruction by the tongue, and reduce the risk of food, liquids, or vomit entering the airway. In the hands of trained providers, advanced airways provide reliable and effective ventilation. BLS providers who work on teams with advanced life support providers may assist with ventilations after an advanced airway has been placed. The mask from the bag-mask is removed and the bag is attached directly to the tube protruding from the patient's mouth.

> *Once an advanced airway device is in place, it is no longer necessary to pause compressions to give breaths. Continuous compressions at a rate of 100-120 per minute are provided. The BLS provider squeezes the bag to deliver 1 breath every six seconds.*

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Drowning

The immediate cause of death in drowning is a lack of oxygen. As a result, the first and most important treatment is giving rescue breaths to a drowning victim.

In the case of drowning:

- Begin with rescue breaths. Use a CPR mask.
- Open the airway and give 2 rescue breaths. Ensure each breath is 1 second in length and creates visible rise of the chest.
- If the pulse is felt but the patient is not breathing, provide rescue breathing or bag-mask ventilation.
- If no pulse is felt, start CPR beginning with 30 high-quality chest compressions.

Mouth-to-Mouth Rescue Breathing

Resuscitation puts healthcare personnel, including BLS providers, at an increased risk of occupational exposure and infection from bloodborne and airborne pathogens. BLS providers should routinely take standard precautions during resuscitation, including using a CPR mask or bag-mask with a HEPA filter.

However, there may be a rare or extraordinary circumstance when a barrier device is not available, and a BLS provider is willing to provide mouth-to-mouth rescue breathing. Mouth-to-mouth rescue breathing is a form of artificial ventilation that can provide oxygen to a respiratory or cardiac arrest victim.

To give mouth-to-mouth rescue breathing to an adult:

- Open the airway with a head tilt–chin lift.
- Pinch the nose closed with your thumb and forefinger.
- Take a regular-sized breath and seal your lips around the victim's mouth, creating an airtight seal.
- Give 1 breath over 1 second. Give enough air to make the chest visibly rise, but no more than that.

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section three

CHILD BLS

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PEDIATRIC CHAINS OF SURVIVAL

Sudden cardiac arrest in children is not typical, but it can and does occur in children of all ages. More often though, cardiac arrest in a child results from asphyxia, a lack of oxygen caused by respiratory failure or respiratory arrest.

When breathing slows or stops, it leads to bradycardia, a slow heart rhythm of fewer than 60 beats per minute. At that rate, the heart is not able to pump enough oxygen-rich blood to the body. The lack of oxygen causes the heart to stop within minutes.

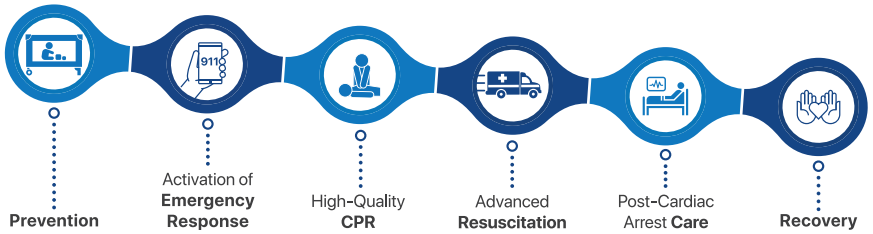
Causes of respiratory failure or respiratory arrest, and subsequent cardiac arrest, include airway obstruction, lung infections or diseases, drowning, choking, and shock resulting from injuries such as motor vehicle accidents, burns, falls, and child abuse.

Prevention is critical in reducing pediatric cardiac arrest deaths. In the out-of-hospital setting, prevention includes the use of essential safety equipment, such as child passenger safety seats and bicycle helmets, and proper supervision. In the hospital, cardiac arrest prevention focuses on early recognition and treatment of at-risk children.

Like the adult "chain of survival," the pediatric chain of survival consists of a series of six interdependent links that describe the best approach to cardiac arrest care.

Each link in the chain is essential for the most positive outcome. If a single link is missing, the chances for survival are greatly reduced. There are two pediatric chains of survival. The links in the chain differ slightly depending on the cardiac arrest setting. The greatest chance for survival exists when all the links of the chain of survival are strong.

Figure 6: Pediatric Out-of-Hospital Chain of Survival



Out-of-Hospital Chain of Survival

The chain of survival for pre-hospital or out-of-hospital (Figure 6) cardiac arrest consists of:

- Prevention of causes of cardiac arrest, respiratory failure, or respiratory arrest,
- Prompt activation of EMS,
- Immediate high-quality CPR and defibrillation,
- Advanced resuscitation,
- Effective post-cardiac arrest care at a hospital, and
- Recovery.

The pediatric out-of-hospital chain of survival includes continued resuscitation by EMS and transportation to the hospital for all patients with a chance of survival.

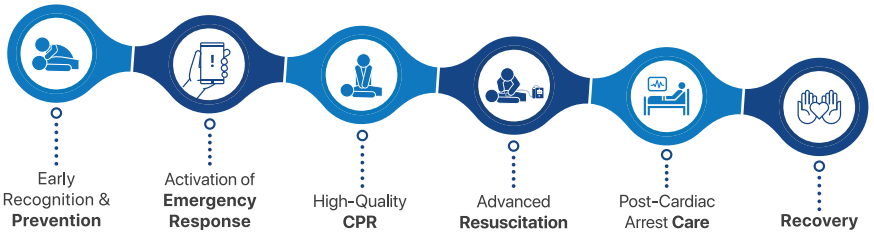
In-Hospital Chain of Survival

Cardiac arrest inside a hospital or facility usually occurs when a known medical condition worsens, so the in-hospital chain of survival focuses on how resuscitation fits into ongoing medical care (Figure 7).

The chain of survival for in-facility cardiac arrest includes:

- Monitoring, prevention, and treatment of prearrest conditions, and early recognition of cardiac arrest,
- Prompt activation of the EAP and response by teams of medical professionals,
- Immediate high-quality CPR and defibrillation,
- Advanced resuscitation,
- Effective post-cardiac arrest care, and
- Recovery.

Figure7: Pediatric In-Hospital Chain of Survival



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CHILD BLS PROCEDURE

In this BLS class, a child is defined as 1 year of age until the onset of puberty. Puberty can be identified by breast development in females and the presence of armpit hair in males. For those with signs of puberty, provide adult BLS. BLS providers should follow the procedure for pediatric BLS, a step-by-step guide for responding to a potential cardiac arrest. Using this procedure, you can perform child BLS as a single provider and as a member of a team.

Like the adult procedure, there are three main elements of the pediatric BLS procedure:

- Assessment of the scene and patient,
- Actions based the presence or absence of normal breathing and a pulse, and
- Use of an AED.

Assess Scene Safety and Take Standard Precautions

First, assess scene safety. Upon arrival and before anything else, pause to make sure the scene is safe for you and the victim. If the scene is not safe, do not enter it until hazards have been minimized or eliminated. This includes taking standard precautions.

Assess Responsiveness

If the scene is safe, assess responsiveness. Tap the victim and ask loudly, “Are you okay?”

Activate EMS and/or EAP

If the patient is unresponsive, call 911 to activate EMS using a mobile device or activate your facility’s EAP.

Assess Breathing and Pulse

Simultaneously assess breathing and pulse. Look at the patient’s chest and face for signs of normal breathing. Weak, irregular gasping, snorting, snoring, or gurgling is not normal breathing. It is a sign of cardiac arrest.

At the same time as assessing breathing, check the child’s carotid or femoral pulse.

- To locate the carotid pulse, use the same technique as you would on an adult.
- To locate the femoral pulse, place two or three fingers midway between the hip bone and the pubic bone, just below the crease where the leg joins the torso.

Take no longer than 10 seconds to simultaneously assess breathing and pulse. Then, take action based the presence or absence of normal breathing and pulse.

Perfusion is the circulation of oxygenated blood through tissues. The signs of poor perfusion include:

- Pale, mottled or blue lips or skin
- Decreasing responsiveness
- Weak pulse
- Cool extremities, particularly the hands and feet

Poor perfusion is an indication that cardiac arrest is imminent. If the pulse is felt, but there is not normal breathing and the heart rate is less than 60 beats per minute with signs of poor perfusion, start high-quality CPR. Beginning CPR prior to full cardiac arrest can improve likelihood of survival.

Unresponsive, Pulse Felt, Breathing Normally

If the pulse is definitely felt and the unresponsive patient is breathing normally, maintain an open airway. Regularly reassess responsiveness, airway, breathing, and pulse. Monitor and care for the unresponsive patient according to local medical protocol.

Unresponsive, Pulse Felt, Not Breathing Normally

If the pulse is definitely felt and the unresponsive patient is not breathing normally, provide rescue breathing or bag-mask ventilation. Give one breath every 2-3 seconds, about 20-30 breaths per minute. Give enough air to create a visible rise of chest, but no more. Stop ventilating as soon as you see chest rise.

> *Excessive ventilation can be harmful. This ventilation rate recommendation is based on limited research in patients with endotracheal tubes in place. Local medical protocols may be different.*

Unresponsive, No Pulse Felt, Not Breathing Normally

If the pulse is not felt and the unresponsive pediatric patient is not breathing normally or only gasping, take action based on whether or not the arrest was witnessed.

Witnessed Cardiac Arrest

A witnessed cardiac arrest is one that is seen or heard or an arrest that occurs when the patient is connected to a heart monitor. If the sudden collapse of a child was witnessed, you may assume that the child has suffered a sudden cardiac arrest.

- If you are alone and an AED is nearby, get the AED right away.
- Activate EMS and/or EAP if you haven't done so already.
- Quickly return to the patient, use the AED and perform CPR.

Unwitnessed Cardiac Arrest

If the arrest was not witnessed, and you are alone, immediately start CPR, beginning with chest compressions. As cardiac arrest in children is most frequently caused by asphyxia, 2 minutes of CPR is recommended before leaving the child to get an AED and activate EMS. Immediate CPR with an emphasis on effective rescue breaths may provide the only chance for survival.

Drowning

In the case of drowning, begin CPR with rescue breaths.

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PROCEDURE FOR PEDIATRIC BASIC LIFE SUPPORT

PERFORM AN ASSESSMENT

- Assess scene safety.
- Take standard precautions.[14]
- Assess responsiveness.
- Activate EMS and/or EAP.[15]

ASSESS BREATHING & PULSE AT THE SAME TIME. IS THE PULSE DEFINITELY FELT WITHIN 10 SECONDS?

Unresponsive, pulse felt. BREATHING normally.

MAINTAIN AN OPEN AIRWAY

- Regularly reassess responsiveness, airway, breathing, and pulse until another BLS or ALS provider takes over.
- To help protect the airway, place an uninjured patient on their side in the recovery position.

Unresponsive, pulse felt. NOT BREATHING normally.

PROVIDE RESCUE BREATHING OR BAG-MASK VENTILATION

- Adult or child with signs of puberty: Give 1 breath every 6 seconds.
- Give naloxone if opioid overdose possible.[16]
- Check carotid pulse every 2 minutes.
- If no pulse, start CPR.

HEART RATE LESS THAN 60 BEATS PER MINUTE WITH SIGNS OF POOR PERFUSION?

Yes	No
START CPR	**PROVIDE RESCUE BREATHING**
Perform cycles of 30 high-quality chest compressions and 2 rescue breaths.	Check pulse every 2 minutes. If no pulse, start CPR.

Unresponsive, no pulse felt. NOT BREATHING normally or only gasping.

WITNESSED SUDDEN COLLAPSE?

Yes	No
ACTIVATE EMS &/OR EAP	**START CPR**
Get the AED and the emergency response equipment (if not already done). Quickly return to the patient, use the AED, and perform CPR.	Perform cycles of 30 high-quality chest compressions and 2 rescue breaths. If alone after about 2 minutes, activate EMS and/or EAP. Get the AED and the emergency response equipment (if not already done).

USE THE AED AS SOON AS IT IS AVAILABLE. APPLY PADS TO PATIENT'S BARE CHEST.
CONTINUE HIGH-QUALITY CPR WHILE AED CHARGES. FOLLOW AED PROMPTS.

SHOCK ADVISED?

Yes	No
Give 1 shock. Immediately resume CPR. Follow AED prompts.	Immediately resume CPR. Follow AED prompts.

CONTINUE CPR AND AED UNTIL OTHER BLS OR ALS PROVIDERS TAKE OVER OR PATIENT STARTS RESPONDING (BREATHING, MOVING, REACTING).

CPR TASKS FOR TWO BLS PROVIDERS: PEDIATRIC PATIENT

BLS PROVIDER 1: GIVE COMPRESSIONS

- Remain with patient.
- Perform cycles of 30 high-quality chest compressions and 2 rescue breaths. Count out loud.
- Push hard and fast at a rate of 100-120 compressions per minute.
  - Infant: Compress the chest at least 1.5 inches (4 cm).
  - Child: Compress the chest at least 2 inches (5 cm).
- Allow the chest to recoil completely after each compression. Do not lean on the chest between compressions.
- Avoid excessive ventilation (too many breaths or too much volume).

BLS PROVIDER 2: GIVE BREATHS

- Activate EMS and/or EAP. Get an AED and emergency response equipment (if not already done).
- When returning to BLS Provider 1 and patient, use the AED.
- Switch to cycles of 15 high-quality chest compressions and 2 rescue breaths.
- Switch task of giving compressions every 2 minutes (when the AED is analyzing, or sooner if tired).
- Minimize interruptions in chest compressions. Try to limit switches to <5 seconds.

14 Use appropriate personal protective equipment (PPE) to protect against possible exposure to infectious agents (gloves, gowns, masks, respirators, bag-mask device with HEPA filter and goggles/face shield). Perform hand hygiene immediately after removing gloves.

15 Call 911 to activate Emergency Medical Services (EMS) using a mobile device (if appropriate) and/or activate your EAP (EAP).

16 Per local protocol/standing orders.

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CHILD COMPRESSIONS

As in the adult procedure, high-quality chest compressions are the foundation of high-quality CPR.

To deliver child chest compressions:

- Position the patient face up on a firm, flat surface. If the patient is face down, carefully roll them over.
- Position yourself at the patient's side, kneeling close to one side of the chest.
- Place 1 or 2 hands on the center of the chest.
  - For a small child, 1 hand may be enough. For most children, the compression technique is the same as for the adult.
- Position your shoulders directly above your hands and straighten your arms to lock your elbows.
- Whether you use 1 or 2 hands, push hard, straight down, using your upper body weight to compress the chest at least 2 inches (5 cm).
- At the end of each compression, lift all your weight off the patient's chest, allowing it to completely recoil, or rebound, to its normal position without losing contact with the chest.
  - Avoid leaning on the chest between compressions. Complete chest recoil allows the heart to refill.
- Compress the chest at a rate of 100-120 compressions per minute. Minimize interruption in chest compressions.

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CHILD AIRWAY AND BREATHING

As with an adult, there must be an open airway to give rescue breaths to a child. The two methods to open the airway are the same: head tilt–chin lift, and jaw thrust. Use the head tilt–chin lift maneuver to open the airway of a child when head or neck injury is not suspected. Rescue breaths are extremely important for children because cardiac arrest typically results from asphyxia. If the pulse is definitely felt but an unresponsive patient is not breathing normally, provide rescue breathing.

- Open the airway and give 1 breath every 2 to 3 seconds, or 20 to 30 breaths per minute.
- If you suspect an opioid overdose, give naloxone according to local medical protocol.

> *Take standard precautions when providing child rescue breaths. Use a pediatric CPR mask or bag-mask device in addition to other appropriate PPE.*

Using a CPR Mask

Use a CPR mask as you would for an adult.

- Position yourself at the patient's side.
- Place the mask flat on the child's face with the top of the mask over the bridge of the nose.
- Use your thumb and forefinger to provide uniform pressure around the top of the mask.
- Use the thumb of your hand lifting the chin to control the bottom of the mask.
- Hook your fingertips of the hand controlling the bottom of the mask under the bony ridge of the jaw.
- Tilt the head and lift the chin to open the airway. Lift the child's face up into the mask to create an airtight seal.
- Give a rescue breath by blowing through the valve opening. Each breath is 1 second in length. Give enough air to create a visible rise of chest, but no more.
- Stop ventilating as soon as you see chest rise.
- Remove your mouth and let the patient exhale.

Using a Bag-Mask Device

Pediatric bag-mask devices are available in child and infant sizes. Select a child-sized bag-mask.

To use a pediatric bag-mask device as a single provider:

- Position yourself above the patient's head.
- Place the mask flat on the patient's face, covering the nose and mouth, with the top of the mask over the bridge of the nose.
- Use your thumb and index finger of one hand in a C position to press the edges of the mask to the face.
- Use your remaining fingers in an E position under the bony ridge of the jaw.
- Tilt the head and lift the jaw up into the mask to open the airway.
- Give a rescue breath by squeezing the bag. Deliver each breath over 1 second in length while watching for chest rise.
- Stop ventilating as soon as you see chest rise.

Check the pulse about every 2 minutes. If the pulse is felt, but the heart rate is less than 60 beats per minute with signs of poor perfusion, start high-quality CPR.

> *Excessive ventilation —too many breaths or breaths that are too large —can be harmful. It can cause the stomach to fill with air and increase pressure in the chest, making it difficult for blood to enter and exit the heart.*

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CHILD AUTOMATED EXTERNAL DEFIBRILLATION (AED)

Most AEDs are designed for both adult and pediatric use. The energy level of the shock for pediatric use is reduced from the standard adult energy setting. The shock is reduced by an electronic device called an attenuator, which frequently comes with preconnected pediatric pads. The attenuator may also be built into the AED and activated using a button, “key,” or another type of switching mechanism.

Pediatric AED Pads

Pediatric pads are recommended for children below 8 years of age. If the child pads are not available, use the adult pads. The standard adult shock will be higher, but a higher energy shock is better than no shock at all. Do not apply child pads to patients 8 years of age and older because the energy level of the shock will be too low.

AED Operation

Turn on the AED and bare the patient’s chest. If there is a button, “key,” or another type of mechanism for switching to child use, activate it. Peel the pads from the backing sheet one at a time and place each according to the pictures. Some pads require a front-and-back position. Others require a left-right position. Press the pads firmly in place. Do not allow them to touch each other.

Voice Prompts

When the AED voice prompts you, clear the patient. Loudly say, “Everybody clear,” or something similar. Be certain that no one is touching the patient. The AED may take a few seconds to analyze the heart rhythm. It will then tell you if a shock is advised. If the AED advises a shock, continue high-quality compressions while the AED is charging. It will prompt you to clear the patient again. Make sure no one is touching the patient. If directed by the AED, deliver a shock. Once a shock has been delivered, immediately resume CPR starting with chest compressions.

After about 2 minutes of CPR, the AED will prompt you again to analyze the heart rhythm. Follow the voice prompts. Continue the resuscitation attempt until another BLS provider or advanced life support providers arrive and take over, or until the patient starts breathing, moving, or reacting in other ways.

If the patient begins responding, regularly reassess the patient’s responsiveness, airway, breathing, and pulse. If a pulse is felt but the patient is not breathing normally, provide rescue breathing or bag-mask ventilation.

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CHILD CPR: ONE BLS PROVIDER

While working as a coordinated team is common, BLS providers also need to be able to provide high-quality child CPR as a single provider. If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping, one BLS provider can provide high-quality child CPR by putting together all the skills of assessment, compressions, airway, breathing, and AED use.

Assess Scene Safety and Responsiveness

- First, assess scene safety and take standard precautions.
- If the scene is safe, assess the patient's responsiveness.
  - If the patient is unresponsive, call 911 to activate EMS using a mobile device or activate your facility's EAP.

Assess Breathing and Pulse

- Assess the patient's breathing and carotid or femoral pulse at the same time for no more than 10 seconds. If the pulse is not felt and the unresponsive pediatric patient is not breathing normally or only gasping, take action based on whether or not the arrest was witnessed.

Take action based on your assessment findings and whether the arrest was witnessed.

Witnessed

For witnessed sudden collapse:

- If you are alone and an AED is nearby, get the AED.
- Activate EMS and/or EAP if you haven't done so already.
- Quickly return to the patient, use the AED, and perform CPR.

Unwitnessed

For unwitnessed arrest:

- If you are alone, immediately start CPR, beginning with chest compressions.
- Perform about 2 minutes of CPR before leaving the child to activate EMS and/or EAP and get an AED.
- Position the patient on a firm, flat surface. Perform 30 high-quality chest compressions.
- Position 1 or 2 hands on the lower half of the breastbone.
- Use upper body weight to compress.
- Compress at least 2 inches (5 cm).
- Compress at a rate of 100–120 times per minute.
- Allow the chest to fully recoil at the top of each compression.

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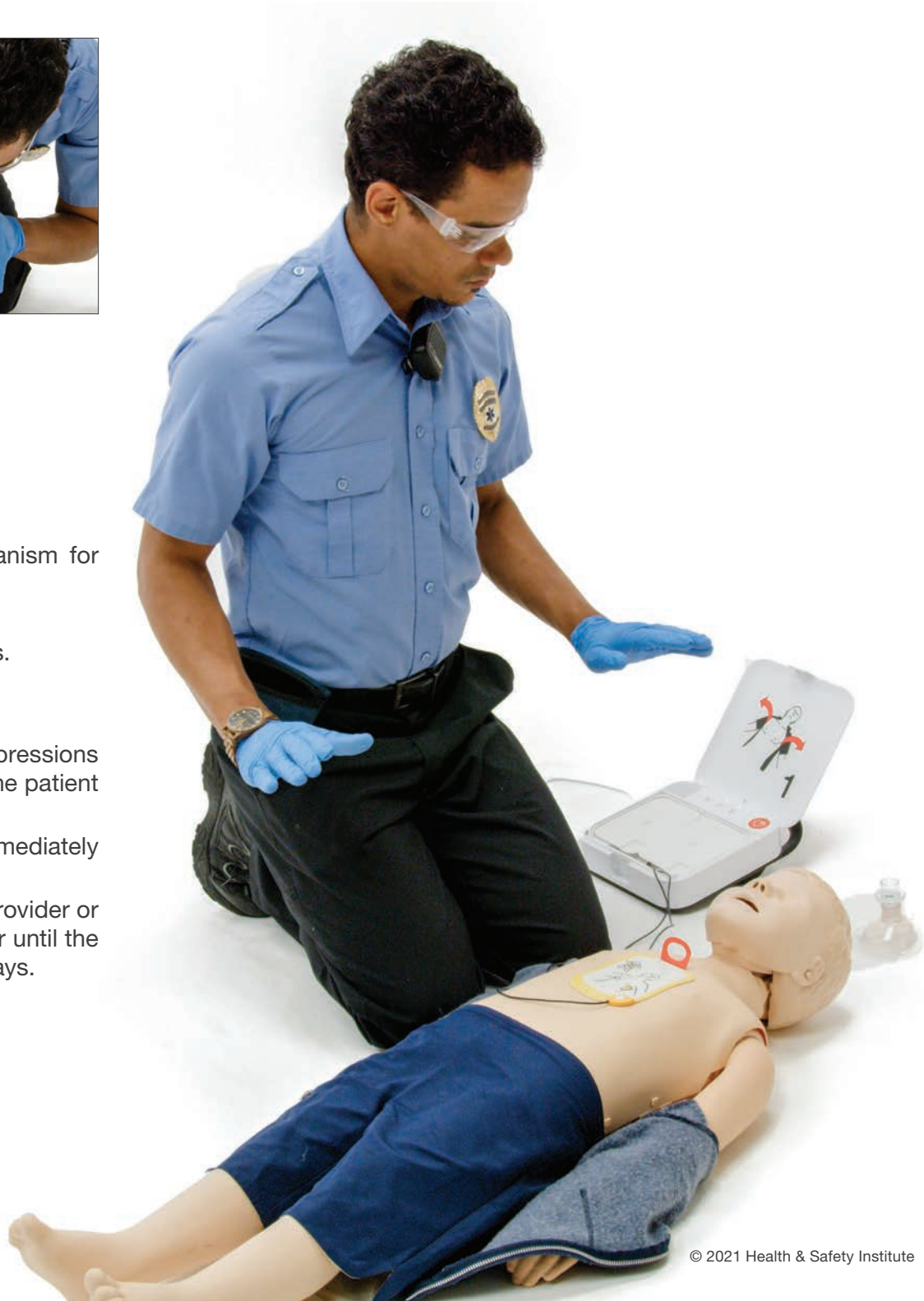
Use a CPR mask or pediatric bag-mask device.

- Open the airway and give 2 rescue breaths.
- Ensure each breath is 1 second in length and creates visible rise of the chest.
- Immediately resume high-quality chest compressions.

Repeat CPR cycles of 30 compressions and 2 breaths for 2 minutes.

As soon as an AED is available:

- Power on the AED.
- Bare the chest.
- If there is a button, “key,” or another type of mechanism for switching to child use, activate it.
- Use pediatric pads for children below 8 years of age.
- Correctly apply the AED pads according to the pictures.
- If the child pads are not available, use the adult pads.
- When the AED voice prompts you, clear the patient.
- If the AED advises a shock, continue high-quality compressions while it is charging. The AED will prompt you to clear the patient again. Make sure no one is touching the patient.
- Deliver a shock. Once a shock has been delivered, immediately resume CPR starting with chest compressions.
- Continue the resuscitation attempt until another BLS provider or advanced life support providers arrive and take over, or until the patient starts breathing, moving, or reacting in other ways.



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CHILD CPR: MULTIPLE BLS PROVIDERS

It is common for multiple providers to respond to a potential cardiac arrest. When two or more BLS providers are available to attempt resuscitation, each provider performs CPR skills simultaneously with other providers in a coordinated effort.

Assess Scene Safety and Take Standard Precautions

- Assess the scene for safety, regardless of whether you are first on the scene, and take standard precautions.

Assess Responsiveness

- If the scene is safe and you are the first BLS provider to reach the patient's side, assess responsiveness.

Active EMS and/or EAP

- As second BLS provider, activate EMS or the EAP, and get the AED and emergency response equipment, if available.

Assess Breathing and Pulse Simultaneously

- At the patient's side, assess the patient's breathing and carotid or femoral pulse at the same time for no more than 10 seconds.

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Take action based on your assessment findings.

Unresponsive, Pulse Felt, Breathing

If the pulse is definitely felt and the unresponsive patient is breathing normally:

- Open and maintain the airway. To help protect the airway, place an uninjured patient on their side in the "recovery position."
- Monitor and care for the unresponsive patient according to local medical protocol.

Unresponsive, Pulse Felt, Not Breathing

If the pulse is definitely felt but the unresponsive patient is not breathing normally:

- Provide rescue breathing. With two or more BLS providers and appropriate equipment on hand, each provider takes a role to deliver effective ventilations using a pediatric bag-mask device.

> **Excessive ventilation can be harmful. This ventilation rate recommendation is based on limited research in patients with endotracheal tubes in place. Local medical protocols may be different.*

- Position one BLS provider above the patient's head, in charge of opening the airway and securing the mask.
- Position a second BLS provider on the patient's side to squeeze the bag.
- As BLS Provider 2, deliver a rescue breath by squeezing the bag.
- Give 1 breath every 2-3 seconds, or 20-30 breaths per minute.* Deliver each breath over 1 second in length while watching for chest rise. Give enough air to create a visible rise of chest, but no more. Stop ventilating as soon as you see chest rise.
- If providers suspect an opioid overdose, give naloxone according to local medical protocol.
- Regularly assess the patient's responsiveness, airway, breathing, and pulse about every 2 minutes for no more than 10 seconds.

Unresponsive, No Pulse Felt, Not Breathing

If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping:

- The first BLS provider should remove any bulky clothing from the patient's chest and immediately start high-quality CPR, beginning with chest compressions.
- When two or more BLS providers attempt to resuscitate a child, use a compression-to-ventilation ratio of 15 compressions to 2 rescue breaths.
  - Compress fast, at a rate of 100-120 times per minute.
  - Compress hard, at least 2 inches (5 cm).
  - Allow complete chest recoil at the top of each compression.
  - Do not lean on the chest between compressions.
  - Perform 15 compressions. Count out loud.
- After 15 compressions have been given, the second BLS provider should open the airway and give 2 effective rescue breaths using a pediatric bag-mask.
- Repeat cycles of 15 compressions and 2 effective rescue breaths.

Switch the person in the compressor's position frequently, about every 2 minutes. Try to minimize interruptions to compressions to less than 10 seconds.

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Use the AED soon as it is available:

- Power on the AED.
- Bare the chest.
- If there is a button, “key,” or another type of mechanism for switching to child use, activate it.
- Correctly apply the AED pads according to the pictures.
- When the AED voice prompts you, clear the patient. Make sure no one is touching the patient.
- If the AED advises a shock, continue high-quality chest compressions until the AED charges. Then clear the patient, and deliver the shock. Once a shock has been delivered, immediately resume CPR starting with chest compressions.
- If the AED does not advise a shock, immediately resume chest compressions. Follow the AED’s voice prompts.
- Continue the resuscitation attempt until advanced life support providers take over, or until the patient starts breathing, moving, or reacting in other ways.

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section three

INFANT BLS

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AMBULANCE

INFANT BLS PROCEDURE

In BLS, an infant is defined as younger than 1 year of age, excluding newly born infants. Like the child BLS procedure, there are three main elements of the infant BLS procedure:

- Assessment of the scene and patient,
- Actions based the presence or absence of normal breathing and a pulse, and
- Use of an AED.

Assess Scene Safety and Take Standard Precautions

- First, assess scene safety. This includes taking standard precautions.

Assess Responsiveness

- If the scene is safe, assess responsiveness. Gently tap the victim and ask loudly, "Are you okay?"

Activate EMS and/or EAP

- If the infant is unresponsive, call 911 to activate EMS using a mobile device or activate your facility's EAP. If you don't have a mobile phone nearby, bring the infant with you to activate.

Assess Breathing and Pulse

- Simultaneously assess breathing and pulse. Check the infant's brachial pulse. Place 2 or 3 fingers on the inside of the upper arm, midway between the elbow and shoulder.
- Take no longer than 10 seconds to simultaneously assess breathing and pulse.

Take action based on your assessment findings.

- **If the pulse is definitely felt and the unresponsive patient is breathing normally, maintain an open airway.** Regularly reassess responsiveness, airway, breathing, and pulse.
- **If the pulse is definitely felt and the unresponsive patient is not breathing normally, provide rescue breathing or bag-mask ventilation.** Give one breath every 2-3 seconds, about 20-30 breaths per minute.[17] Give enough air to create a visible rise of chest, but no more. Stop ventilating as soon as you see chest rise.
- **If the pulse is felt, but there is not normal breathing and the heart rate is less than 60 beats per minute with signs of poor perfusion, start high-quality CPR.**
- If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping, take action based on whether or not the arrest was witnessed.

If the sudden collapse of an infant was witnessed, you may assume that the infant has suffered a sudden cardiac arrest.

- If you are alone and an AED is nearby, get the AED right away.
- Activate EMS and/or EAP if you haven't done so already.
- Quickly return to the patient, use the AED, and perform CPR.

If the arrest was not witnessed, and you are alone, immediately start CPR, beginning with chest compressions.

- As cardiac arrest in infants is most frequently caused by asphyxia, 2 minutes of CPR is recommended before leaving the patient to get an AED and activate EMS or your EAP if you haven't done so already.

In the case of drowning, begin with rescue breaths.

17 Excessive ventilation can be harmful. This ventilation rate recommendation is based on limited research in patients with endotracheal tubes in place. Local medical protocols may be different.

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PROCEDURE FOR PEDIATRIC BASIC LIFE SUPPORT

PERFORM AN ASSESSMENT

- Assess scene safety.
- Take standard precautions.[18]
- Assess responsiveness.
- Activate EMS and/or EAP.[19]

ASSESS BREATHING & PULSE AT THE SAME TIME. IS THE PULSE DEFINITELY FELT WITHIN 10 SECONDS?

Unresponsive, pulse felt. BREATHING normally.

MAINTAIN AN OPEN AIRWAY

- Regularly reassess responsiveness, airway, breathing, and pulse until another BLS or ALS provider takes over.
- To help protect the airway, place an uninjured patient on their side in the recovery position.

Unresponsive, pulse felt. NOT BREATHING normally.

PROVIDE RESCUE BREATHING OR BAG-MASK VENTILATION

- Adult or child with signs of puberty: Give 1 breath every 6 seconds.
- Give naloxone if opioid overdose possible.[20]
- Check carotid pulse every 2 minutes.
- If no pulse, start CPR.

HEART RATE LESS THAN 60 BEATS PER MINUTE WITH SIGNS OF POOR PERFUSION?

Yes	No
START CPR	**PROVIDE RESCUE BREATHING**
Perform cycles of 30 high-quality chest compressions and 2 rescue breaths.	Check pulse every 2 minutes. If no pulse, start CPR.

Unresponsive, no pulse felt. NOT BREATHING normally or only gasping.

WITNESSED SUDDEN COLLAPSE?

Yes	No
ACTIVATE EMS &/OR EAP	**START CPR**
Get the AED and the emergency response equipment (if not already done). Quickly return to the patient, use the AED, and perform CPR.	Perform cycles of 30 high-quality chest compressions and 2 rescue breaths. If alone after about 2 minutes, activate EMS and/or EAP. Get the AED and the emergency response equipment (if not already done).

USE THE AED AS SOON AS IT IS AVAILABLE. APPLY PADS TO PATIENT'S BARE CHEST.
CONTINUE HIGH-QUALITY CPR WHILE AED CHARGES. FOLLOW AED PROMPTS.

SHOCK ADVISED?

Yes	No
Give 1 shock. Immediately resume CPR. Follow AED prompts.	Immediately resume CPR. Follow AED prompts.

CONTINUE CPR AND AED UNTIL OTHER BLS OR ALS PROVIDERS TAKE OVER OR PATIENT STARTS RESPONDING (BREATHING, MOVING, REACTING).

CPR TASKS FOR TWO BLS PROVIDERS: PEDIATRIC PATIENT

BLS PROVIDER 1: GIVE COMPRESSIONS

- Remain with patient.
- Perform cycles of 30 high-quality chest compressions and 2 rescue breaths. Count out loud.
- Push hard and fast at a rate of 100-120 compressions per minute.
  - Infant: Compress the chest at least 1.5 inches (4 cm).
  - Child: Compress the chest at least 2 inches (5 cm).
- Allow the chest to recoil completely after each compression. Do not lean on the chest between compressions.
- Avoid excessive ventilation (too many breaths or too much volume).

BLS PROVIDER 2: GIVE BREATHS

- Activate EMS and/or EAP. Get an AED and emergency response equipment (if not already done).
- When returning to BLS Provider 1 and patient, use the AED.
- Switch to cycles of 15 high-quality chest compressions and 2 rescue breaths.
- Switch task of giving compressions every 2 minutes (when the AED is analyzing, or sooner if tired).
- Minimize interruptions in chest compressions. Try to limit switches to <5 seconds.

18 Use appropriate personal protective equipment (PPE) to protect against possible exposure to infectious agents (gloves, gowns, masks, respirators, bag-mask device with HEPA filter and goggles/face shield). Perform hand hygiene immediately after removing gloves.

19 Call 911 to activate Emergency Medical Services (EMS) using a mobile device (if appropriate) and/or activate your EAP (EAP).

20 Per local protocol/standing orders.

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INFANT COMPRESSIONS

As in the adult and child procedure, high-quality chest compressions are the foundation of high-quality infant CPR.

To deliver infant chest compressions:

- Position the patient face up on a firm, flat surface. If the patient is face down, carefully roll them over.
- For infant compressions, use one of three hand-position techniques: the 2-Finger, 2-Thumb Encircling-Hands, or the Heel of One Hand.
  - For the 2-Finger Technique, place two fingertips in the center of the infant's chest, just below the nipple line, on the lower half of the breastbone. Do not press the tip of the breastbone. Use both fingers to compress the chest.
  - For the 2-Thumb Encircling-Hands Technique, place the pads of both thumbs side-by-side in the center of the infant's chest, on the lower half of the breastbone. Your thumbs may overlap on very small infants. With the fingers of both hands, encircle the infant's chest and support the back. Use both thumbs to compress the chest.
  - For the Heel of One Hand Technique, place the heel of one hand on the center of the chest, on the lower half of the breastbone. Position your shoulder directly above your hand and straighten your arm to lock your elbow. Use the heel of one hand to compress the chest. This technique may be useful for larger infants or when the BLS provider has difficulty compressing the appropriate depth using fingers or thumbs.
- Whichever technique you use, push hard, straight down, to compress the chest approximately 1½ inches (4 cm). This depth should be at least one third of the diameter of the infant's chest.
- At the end of each compression, allow complete chest recoil.
- Compress the chest at a rate of 100-120 compressions per minute. Minimize interruptions.

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INFANT AIRWAY AND BREATHING

As with the adult and child, there must be an open airway to give rescue breaths to an infant. The two methods to open the airway are the same; head tilt–chin lift, and jaw thrust.

- Use the head tilt–chin lift maneuver to open the airway of an infant when head or neck injury is not suspected. Keep an infant's head in a neutral "sniffing" position. Tilting the head beyond a neutral position that results in hyperflexion or hyperextension may block the airway.
- Rescue breaths are extremely important for infants because infant cardiac arrest typically results from asphyxia.

Take standard precautions when providing infant rescue breaths. Use a pediatric CPR mask or bag-mask device in addition to other appropriate PPE.

Using a CPR Mask

Use an infant-sized CPR mask in the same manner as you would for an adult or child.

- Position yourself at the patient's side.
- Place the mask flat on the infant's face with the top of the mask over the bridge of the nose.
- Use your thumb and forefinger to provide uniform pressure around the top of the mask.
- Use the thumb of your hand lifting the chin to control the bottom of the mask.
- Hook your fingertips of the hand controlling the bottom of mask under the bony ridge of the jaw.
- Open the airway with the head tilt–chin lift maneuver.
- Tilt the head and lift the chin to open the airway. Maintain a neutral "sniffing" position. Lift the infant's face up into mask to create an airtight seal.
- Give a rescue breath by blowing through the valve opening. Each breath is 1 second in length. Give enough air to create a visible rise of chest, but no more.
- Stop ventilating as soon as you see chest rise.
- Remove your mouth and let the patient exhale.

Air in the stomach can cause regurgitation of food, liquids, or vomit into the airway. BLS providers should avoid excessive ventilation during rescue breathing. Give enough air to make the infant's chest rise, but no more than that. Stop ventilating as soon as you see chest rise

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Using a Bag-Mask Device

Select an infant sized-bag-mask device.

To use a pediatric bag-mask device as a single provider:

- Position yourself above the patient's head.
- Place the mask flat on the patient's face, covering the nose and mouth, with the top of the mask over the bridge of the nose.
- Use your thumb and index finger of one hand in a C position to press the edges of the mask to the face.
- Use your remaining fingers in an E position under the bony ridge of the jaw.
- Tilt the head and lift the jaw up into the mask to open the airway. Maintain a neutral "sniffing" position.
- Give a rescue breath by squeezing the bag. Deliver each breath over 1 second in length while watching for chest rise.

Avoid excessive ventilation during rescue breathing. Give enough air to make the patient's chest rise, but no more than that.

Mouth-to-Mouth-and-Nose Rescue Breathing

There may be a rare or extraordinary circumstance when a barrier device is not available, and a BLS provider is willing to provide artificial ventilation without a barrier. For infants, the preferred technique is mouth-to-mouth-and-nose rescue breathing.

To give Mouth-to-Mouth-and-Nose rescue breathing to an infant:

- Open the airway with a head tilt–chin lift.
- Take a regular-sized breath and place your mouth over the infant's mouth and nose, creating an airtight seal.
- Give 1 breath over 1 second. Give enough air to make the chest visibly rise, but no more than that.
- If the chest does not rise, repeat the head tilt–chin lift make a better seal, and try again. It may be necessary to move the infant's head through a range of positions to provide effective rescue breathing.
- If you have difficulty making an effective seal over the mouth and nose, try using the mouth-to-mouth technique.

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INFANT AUTOMATED EXTERNAL DEFIBRILLATION

AED Pads

Pediatric pads are recommended when choosing AED pads for an infant. If pediatric pads are not available, choose the adult pads. The standard adult shock will be higher, but a higher energy shock is better than no shock at all.

AED Operation

Turn on the AED and bare the patient's chest. If there is a button, "key," or another type of mechanism for switching to pediatric use, activate it. Peel the pads from the backing sheet one at a time and place each according to the pictures. The front-and-back pad position is common for infants. Press the pads firmly in place. Make sure the pads do not overlap or touch each other.

Voice Prompts

When the AED voice prompts you, make sure no one is touching the patient. If a shock is advised, continue high-quality compressions until the AED has charged. If directed by the AED, deliver a shock. Once a shock has been delivered, immediately resume CPR starting with chest compressions. After about 2 minutes of CPR, the AED will prompt you again to analyze the heart rhythm. Follow the voice prompts.

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INFANT CPR: ONE BLS PROVIDER

While working as a coordinated team is common, BLS providers also need to be able to provide high-quality infant CPR as a single provider.

- First, assess scene safety and take standard precautions.
- If the scene is safe, assess the patient's responsiveness.
- If the patient is unresponsive, call 911 to activate EMS using a mobile device or activate your facility's EAP.

Assess the patient's breathing and brachial pulse at the same time for no more than 10 seconds. If the pulse is not felt and the unresponsive infant is not breathing normally or only gasping, take action based on whether or not the arrest was witnessed.

For witnessed sudden collapse:

- If you are alone and an AED is nearby, get the AED.
- Activate EMS and/or EAP if you haven't done so already.
- Quickly return to the patient, use the AED, and perform CPR.

For unwitnessed arrest:

- If you are alone, immediately start CPR, beginning with chest compressions.
- Perform about 2 minutes of CPR before leaving to activate EMS and/or EAP and get an AED.
- Position the patient on a firm, flat surface. Perform 30 high-quality chest compressions.
- Use one of three techniques to compress the chest: the 2-Finger, 2-Thumb Encircling-Hands, or the Heel of One Hand.
- Compress the chest approximately 1½ inches (4 cm).
- Compress at a rate of 100–120 times per minute.
- Allow the chest to fully recoil at the top of each compression.
- Use an infant-sized CPR mask or bag-mask device.
- Open the airway and give 2 rescue breaths.
- Ensure each breath is 1 second in length and creates visible rise of the chest.
- Immediately resume high-quality chest compressions.

Repeat CPR cycles of 30 compressions and 2 breaths for 2 minutes.

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As soon as an AED is available:

- Power on the AED.
- Bare the chest.
- If there is a button, “key,” or another type of mechanism for switching to pediatric use, activate it.
- Correctly apply the pediatric pads according to the pictures.
- If the pediatric pads are not available, use the adult pads.
- Follow the AED’s voice prompts.
- Continue the resuscitation attempt until another BLS provider or advanced life support providers arrive, or until the patient starts breathing, moving, or reacting in other ways.

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INFANT CPR: MULTIPLE BLS PROVIDERS

It is common for multiple providers to respond to a potential cardiac arrest. When two or more BLS providers are available to attempt resuscitation, each provider performs CPR skills simultaneously with other providers in a coordinated effort.

Assess Scene Safety and Take Standard Precautions

- Assess the scene for safety, regardless of whether you are first on the scene, and take standard precautions.

Assess Responsiveness

- If the scene is safe and you are the first BLS provider to reach the patient's side, assess responsiveness.

Activate EMS and/or EAP

- As the second BLS provider, activate EMS or the EAP, and get the AED and emergency response equipment, if available.

Assess Breathing and Pulse

- At the patient's side, assess the patient's breathing and brachial pulse at the same time for no more than 10 seconds.

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Take action based on your assessment findings.

If the pulse is definitely felt and the unresponsive patient is breathing normally:

- Activate EMS and/or EAP if you haven't done so already.
- Maintain the airway.
  - To help protect the airway, place an uninjured infant in the "recovery position." Lie the infant face down on your forearm. Support the infant's head with your hand.
- Monitor and care for the unresponsive patient according to local medical protocol.

If the pulse is definitely felt but the unresponsive patient is not breathing normally:

- Activate EMS and/or EAP if you haven't done so already.
- Provide rescue breathing.
  - With two or more BLS providers and appropriate equipment on hand, each provider takes a role to deliver effective ventilations using an infant-sized pediatric bag-mask device.
- Position one BLS provider above the patient's head, in charge of opening the airway and securing the mask with two hands.
- Position a second BLS provider on the patient's side to squeeze the bag. As BLS Provider 2, deliver a rescue breath by squeezing the bag. Give 1 breath every 2-3 seconds, or 20-30 breaths per minute. Deliver each breath over 1 second in length while watching for chest rise. Give enough air to make the infant's chest rise, but no more than that. Stop ventilating as soon as you see chest rise.
- Regularly assess the patient's responsiveness, airway, breathing, and pulse about every 2 minutes for no more than 10 seconds.
- If the pulse is felt, but there is not normal breathing and the heart rate is less than 60 beats per minute with signs of poor perfusion, start high-quality CPR.

If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping:

- The first BLS provider should remove any bulky clothing from the patient's chest and immediately start high-quality CPR, beginning with chest compressions. The second provider should activate EMS and/or EAP if you haven't done so already.
- When two or more BLS providers attempt to resuscitate an infant, use a compression-to-ventilation ratio of 15 compressions to 2 rescue breaths.
  - Compress fast, at a rate of 100-120 times per minute.
  - Compress the chest approximately 1½ inches (4 cm).
  - Allow the chest to fully recoil at the top of each compression. Perform 15 compressions. Count out loud.
  - After 15 compressions have been given, the second BLS provider should open the airway and give 2 effective rescue breaths using a pediatric bag-mask. Keep the infant's head in a neutral "sniffing" position.

Repeat cycles of 15 compressions and 2 effective rescue breaths. Switch the person in the compressor's position frequently, about every 2 minutes. Try to minimize interruptions to compressions to less than 10 seconds.

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Use the AED as soon as it is available.

- Power on the AED.
- Bare the chest.
- If there is a button, “key,” or another type of mechanism for switching to pediatric use, activate it.
- Correctly apply the AED pads according to the pictures.
- When the AED voice prompts you, clear the patient. Make sure no one is touching the patient.
- If the AED advises a shock, continue high-quality compressions while the AED charges. Then clear the patient, and deliver the shock.
- Once a shock has been delivered, immediately resume CPR starting with chest compressions.
- If the AED does not advise a shock, immediately resume with chest compressions. Follow the AEDs voice prompts.
- Continue the resuscitation attempt until advanced life support providers take over, or until the patient starts breathing, moving, or reacting in other ways.

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2 Milk

section four

CHOKING

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RELIEF OF CHOKING

Choking, also known as foreign-body airway obstruction, can occur when a solid object, such as a piece of food or a small object, becomes stuck in the upper airway. The person cannot breathe. A forceful thrust beneath the ribs and up into the diaphragm can pressurize the air in the chest and pop out the obstruction. Chest compressions can also create enough pressure to expel a foreign-body airway obstruction.

To provide the appropriate care, you must be able to recognize the difference between a mild and a severe airway obstruction.

Mild Obstruction

With a mild obstruction, the patient can speak and cough. They may wheeze between coughs. A mild obstruction is typically cleared naturally by the patient through forceful coughing. If the person can inhale and exhale, encourage the patient to continue coughing. Watch for signs of the airway obstruction becoming severe.

Severe Obstruction

When a severe airway obstruction occurs, the patient cannot get air in or out of the lungs. This is a life-threatening medical emergency. If the foreign body is not removed, the patient will quickly become unresponsive and suffer a secondary cardiac arrest within minutes. Signs of a severe airway obstruction include the inability to speak, a weak cough, or no cough at all. The patient may make a high-pitched noise when trying to inhale or make no sound at all. They may hold their hands to the throat.

If the patient is an adult or child:

- Ask, “Are you choking?”
- If the person nods yes, or is unable to speak or cough, act quickly.
- If you are not alone, have someone call 911 to activate EMS using a mobile device or activate your facility’s EAP.
- Stand behind the patient. If needed, kneel behind a child.
- Reach around and locate the navel.
- Make a fist with the other hand and place it thumb-side against the abdomen, just above the navel and below the ribs.
- Grasp your fist with the other hand.
- Quickly thrust inward and upward into the abdomen.
- Repeat abdominal thrusts. Each thrust needs to be given with the intent of dislodging and expelling the object.
- Continue until the patient can breathe normally or becomes unresponsive.

If the object is expelled and there is a good air exchange, encourage the patient to be seen by a healthcare professional. Infrequent, but serious complications from abdominal thrusts can occur.

If the patient becomes unresponsive:

- Carefully lower the patient to the ground.
- Begin CPR starting with compressions. Do not check for a pulse.
- Before opening the airway to provide rescue breaths, open the patient’s mouth wide. If you see an object, remove it with your fingers.
- Perform about 2 minutes of CPR.
- Activate EMS and/or EAP if you haven’t done so already.
- Continue the resuscitation attempt until advanced life support providers take over, or until the patient starts breathing, moving, or reacting in other ways.

If the patient is pregnant or obese, use chest thrusts instead of abdominal thrusts.

- Position yourself directly behind the patient.
- Reach under the armpits and place the thumb-side of your fist on the center of the chest.
- Grasp your fist with your other hand and thrust straight backward. Try to not put pressure on the ribs.
- Give each chest thrust forcefully with the intent of dislodging and expelling the object.
- Repeat the chest thrusts until the object is expelled and the patient can breathe or becomes unresponsive.

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INFANT CHOKING

If an infant appears to be choking but is responsive, watch for signs of the obstruction becoming severe. If there is a good air exchange with a mild airway obstruction – the infant is coughing forcefully, has a strong cry, and can inhale and exhale - stand ready to help if things get worse. With a severe airway obstruction, the infant may cough weakly, be unable to cry, or be unable to make any sound at all. There may be a high-pitched noise when the patient tries to inhale.

If the infant is responsive and you are not alone, have someone call 911 to activate EMS using a mobile device or activate your facility's EAP.

- Kneel or sit with the infant in your lap.
- Hold the infant facedown over your forearm with legs straddled and with the head lower than the chest. Support the head by holding the jaw.
- Rest your forearm on your lap or thigh to support the infant.
- Using the heel of the other hand, give up to 5 back slaps between the shoulder blades.
- Give each back slap forcefully with the intent of dislodging and expelling the object.
- Sandwich the patient between your forearms and turn the infant over, using the palm of one hand to support the face and the palm of the other hand to support the back of the head.
- Place 2 fingertips on the breastbone just below the nipple line and give up to 5 chest thrusts.
- Give each chest thrust forcefully with the intent of dislodging and expelling the object.
- Repeat the sequence of back slaps and chest thrusts until the object is expelled and the infant can breathe or becomes unresponsive.

If the patient becomes unresponsive:

- Place the infant on a firm, flat surface.
- Begin CPR starting with compressions. Do not check for a pulse.
- Before opening the airway to provide rescue breaths, open the mouth wide. If you see an object, carefully remove it with your fingers. Don't stick your finger blindly in an infant's throat and attempt sweep out an object. This can cause injury or push the object further down the throat, worsening the obstruction.
- Perform about 2 minutes of CPR.
- Activate EMS and/or EAP if you haven't done so already.
- Continue the resuscitation attempt until advanced life support providers take over, or until the patient starts breathing, moving, or reacting in other ways.

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section five

SUSPECTED OPIOID-ASSOCIATED EMERGENCY AND OTHER LIFE-THREATENING CONDITIONS

BLS providers often care for patients experiencing serious medical conditions and life-threatening emergencies, including suspected opioid-associated emergencies, acute coronary syndromes, stroke, drowning and severe allergic reactions. This supplementary training content addresses these emergencies.

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SUSPECTED OPIOID OVERDOSE

Drug overdose deaths continue to increase in the United States. Seventy percent of drug overdose deaths involve a prescription or illicit opioid such as oxycodone, hydrocodone, morphine, fentanyl or heroin. Opioids can cause death by slowing, and eventually stopping, a person's breathing. A quick response to an opioid overdose, including administering naloxone, can prevent brain injury and death. Naloxone is an opioid antagonist; it can reverse and block the effects of opioids. Narcan Nasal Spray® is the most commonly prescribed opioid reversal medication. Anyone who uses opioids can experience an overdose, but certain factors may increase risk including but not limited to:[21]

- Combining opioids with alcohol or certain other drugs
- Taking high daily dosages of prescription opioids
- Taking more opioids than prescribed
- Certain medical conditions, such as sleep apnea, or reduced kidney or liver function
- Age greater than 65 years old

Signs of Opioid Overdose

Recognizing an opioid overdose can be difficult. If you aren't sure, it is best to treat the situation like an overdose. Signs of an overdose may include:

- Small, constricted "pinpoint pupils"
- Falling asleep or loss of consciousness
- Slow, shallow or no breathing
- Choking or gurgling sounds
- Limp body
- Pale, blue, or cold skin

21 Opioid Overdose Available: https://www.cdc.gov/drugoverdose/ [Retrieved 3/5/21]

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Opioid Overdose Treatment Recommendation

- Assess scene safety. Take standard precautions.
  - Personal protective equipment is essential as inadvertent inhalation or absorption of illicit or prescription opioid drugs can be harmful.[22] If the scene is not safe, do not enter it until hazards have been minimized or eliminated. Take special care to avoid contact with prescription drug bottles, prescription drug patches (transdermal, applied to skin), loose powders or pills stored in plastic resealable baggies, exposed needles and syringes, and other drug paraphernalia.
- Assess responsiveness.
- Activate EMS and/or EAP.
- If you are alone, get naloxone and an AED, if available.
- Assess breathing and pulse at the same time. Is the pulse definitely felt within 10 seconds?
  - If the pulse is not felt and the unresponsive patient is not breathing normally or only gasping, immediately start CPR, beginning with chest compressions. Use the AED as soon as one becomes available. Give naloxone according to local medical protocol.
  - If the pulse is definitely felt and the unresponsive patient is not breathing normally, provide rescue breathing or bag-mask ventilation. Give naloxone and transport according to local medical protocol.
  - If the pulse is definitely felt and the unresponsive patient is breathing normally, maintain an open airway. Give naloxone and transport according to local medical protocol.

Steps to Use Narcan Nasal Spray®:

- Remove Narcan Nasal Spray from the box.
- Hold the device with your thumb on bottom of the plunger and your first and middle fingers on either side of nozzle.
- Tilt the patient's head back, providing support under the neck with your hand.
- Gently insert the tip of the nozzle into either nostril until your fingers on either side of nozzle are against the bottom of the patient's nose.
- Press the plunger firmly to give the dose of Narcan Nasal Spray®.
- Remove the Narcan Nasal Spray from the nostril after giving the dose.

If the patient does not respond, another dose may be given in the same way. Narcan Nasal Spray® may be dosed every 2 to 3 minutes, if available, according to local medical protocol.

22 Centers for Disease Control and Prevention. Preventing Emergency Responders' Exposures to Illicit Drugs. Available: https://www.cdc.gov/niosh/topics/fentanyl/risk.html [Retrieved 3/5/21]

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PROCEDURE FOR OPIOD-ASSOCIATED EMERGENCIES (OAE)

PERFORM AN ASSESSMENT

- Assess scene safety.
- Take standard precautions.[23]
- Assess responsiveness.
- Activate EMS and/or EAP.[24]
- Get naloxone and AED if available.

ASSESS BREATHING & PULSE AT THE SAME TIME. IS THE PULSE DEFINITELY FELT WITHIN 10 SECONDS?

Unresponsive, pulse felt. BREATHING normally.	Unresponsive, pulse felt. NOT BREATHING normally.	Unresponsive, no pulse felt. NOT BREATHING normally or only gasping.
MAINTAIN AN OPEN AIRWAY	**PROVIDE RESCUE BREATHING OR BAG-MASK VENTILATION**	**START CPR[25]**
To help protect the airway, place an uninjured patient on their side in the recovery position. Consider naloxone and transport.[26] Regularly reassess responsiveness, airway, breathing, and pulse until other BLS or ALS providers takes over.	Adult or child with signs of puberty: Give 1 breath every 6 seconds. Infant or child without signs of puberty: Give 1 breath every 2-3 seconds. Give naloxone. Regularly reassess responsiveness, airway, breathing, and pulse until other BLS or ALS providers take over.	Use an AED as soon as one becomes available. Consider naloxone.

23 Use appropriate personal protective equipment (PPE) to protect against possible exposure to infectious agents (gloves, gowns, masks, respirators, bag-mask device with HEPA filter and goggles/face shield). Perform hand hygiene immediately after removing gloves.

24 Call 911 to activate Emergency Medical Services (EMS) using a mobile device (if appropriate) and/or activate your EAP (EAP).

25 See Procedure for Adult or Pediatric Basic Life Support.

26 Per local protocol/standing orders.

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ACUTE CORONARY SYNDROMES

Acute coronary syndromes (ACS) is a medical term used to cover a broad range of conditions where the blood and oxygen supply to the heart muscle is suddenly blocked. One such condition is a myocardial infarction, commonly known as a heart attack. The myocardium refers to the muscular tissue of the heart. The word "infarction" comes from Latin and means "to plug up or cram." This cramming is typically caused by arteriosclerosis, a chronic disease that causes plaque - cholesterol and other substances found in the blood – to thicken, harden, and narrow the coronary arteries.

When the preexisting coronary artery plaque breaks, a blood clot forms and lodges in the blood vessel, blocking the flow of blood and oxygen to the heart muscle, causing a heart attack. Less commonly, a severe spasm or sudden contraction of a coronary artery can stop blood flow to the heart muscle. The more time that passes without treatment to restore blood flow, the greater the damage to the heart muscle. In the United States, someone has a heart attack every 40 seconds.[27]

Signs and Symptoms of Heart Attack[28]

The symptoms of a heart attack vary from person to person. Heart attacks can start slowly and cause only mild pain or discomfort. Symptoms can be mild, or more intense and sudden. Symptoms also may come and go over several hours.

- Chest pain or discomfort that lasts for more than a few minutes or goes away and comes back
- Upper body discomfort (pain or discomfort in the left arm, both arms, the upper back, neck, jaw, or stomach)
- Shortness of breath
- Feeling weak, light-headed, or faint
- Unusual fatigue and chest discomfort (often described as pressure, aching, tightness instead of pain)
- Nausea and vomiting
- Cold, clammy, and sweaty skin

27 Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, Carson AP, et al. Heart disease and stroke statistics—2019 update: a report from the American Heart Association. Circulation. 2019;139(10):e56–528.
28 Heart Attack. National Heart, Lung, and Blood Institute. Available: https://www.nhlbi.nih.gov/health-topics/heart-attack [Retrieved 3/4/2021]

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Heart Attack Compared to Sudden Cardiac Arrest

Sudden cardiac arrest (SCA) occurs when the normal electrical impulses in the heart cause it to beat too quickly, inefficiently, or in an unsynchronized manner. SCA results from a problem with the heart's electrical system. With SCA, the heart suddenly and unexpectedly stops beating. Blood flow to the body, along with the oxygen it carries, abruptly stops.

Cardiac arrest happens suddenly, and often without any warning signs, though some people do experience signs and symptoms similar to a heart attack before SCA. A victim of SCA will be unconscious, unresponsive, and not breathing normally or only gasping. A heart attack is caused by a blood clot that blocks the flow of blood and oxygen to the heart. With a heart attack the heart generally continues to beat, despite the blockage, and the victim remains conscious and responsive.

System of Care Approach

Patients experiencing a heart attack need immediate emergency care to reopen the blocked artery. This requires a coordinated "system of care" approach. A system of care is the best strategy to make sure that heart attack patients are quickly diagnosed and transported to the hospital that can offer the most appropriate care. The quicker the patient, family, or BLS/first aid providers recognize the signs and symptoms of a possible heart attack and activate EMS or an EAP, the sooner treatment can begin. Appropriately trained EMS providers can obtain an out-of-hospital 12-lead electrocardiogram (ECG) from the patient. It can be interpreted on the scene or electronically transmitted to the hospital to determine which hospital is best able to deliver the appropriate patient care. This is a crucial step in reducing time to treatment. EMS providers can also monitor vital signs and cardiac rhythm and provide CPR and defibrillation if needed. For these reasons, family members, bystanders, or first aid providers should not drive suspected heart attack patients to the hospital and patients should not drive themselves.

At the hospital, the preferred treatment is called percutaneous coronary intervention (PCI). PCI opens coronary arteries that are narrowed by plaque or blocked by a clot. PCI physically removes the blockage using a catheter and stent to keep the artery open, reducing heart damage. If the patient is unable to be treated with PCI, they will usually receive medications to break up the clot. To decrease the likelihood and amount of heart damage, the goal time from first medical contact to treatment is less than 90 minutes. Every minute that treatment is delayed, more heart muscle dies. "Time is muscle."

Heart Attack Treatment Recommendation

When a responsive patient presents with a suspected heart attack, assess scene safety and take standard precautions. Call 911 to activate EMS using a mobile device (if appropriate) and/or activate your EAP. Get an AED and emergency response equipment or send someone else to. Be prepared for the possibility of sudden cardiac arrest, and the need for CPR and the use of an AED.

Calm, comfort, and reassure the patient. Loosen any tight clothing. Allow them to find a comfortable position. The early administration of aspirin can be lifesaving. Unless the patient has a known allergy to aspirin or has been advised by a healthcare provider not to take aspirin, encourage the patient to take aspirin. Aspirin is an antiplatelet blood thinner. Platelets are small, colorless cell fragments in the blood that help form clots to prevent bleeding. As an antiplatelet blood thinner, aspirin can help prevent blood clots from forming in the coronary arteries and can reduce heart damage.

The suggested dose is 1 adult 325-mg tablet, or 2 to 4 low-dose "baby" aspirins (81 mg each), chewed and swallowed. The aspirin should not be enteric coated. Monitor and care for the patient according to local medical protocol. If the patient becomes unresponsive, follow the adult basic life support procedure for healthcare providers.

STROKE

A stroke, sometimes called a brain attack, occurs when the blood supply to a portion of the brain is suddenly interrupted. This most commonly occurs when a blood clot obstructs a blood vessel in the brain (ischemic stroke). A stroke can also occur when a weak spot in a blood vessel wall, known as an aneurysm, bursts open and bleeds into surrounding brain tissue (hemorrhagic stroke). In either case, parts of the brain become damaged or die. A stroke can cause lasting brain damage, long-term disability, or even death. Someone in the United States has a stroke every 40 seconds. Every 4 minutes, someone dies of stroke.

Warning Signs of Stroke

Out-of-hospital BLS providers can identify someone with stroke more accurately if they use checklists called stroke recognition scales. Various stroke recognition scales are available, so follow your local medical protocols. A common scale follows the mnemonic FAST.

F	**Face**: Ask the person to smile. Does one side of the face droop?
A	**Arms**: Ask the person to raise both arms. Does one arm drift downward?
S	**Speech**: Ask the person to repeat a simple phrase. Is the speech slurred or strange?
T	**Time**: If you see any of these signs, it is time to activate EMS or your EAP.

Other Common Signs of a Stroke

- Sudden weakness on one side of the body
- Sudden confusion, trouble speaking or understanding
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden severe headache

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System of Care Approach

Like heart attack, stroke patients need immediate emergency care. Also, like heart attack, this requires a coordinated system of care. This is the best way to make sure that stroke patients are quickly diagnosed and transported to the hospital that can offer the most appropriate care, such as a specialized stroke center. The quicker the patient, family, or first aid providers recognize the signs and symptoms of a stroke and activate EMS or an EAP, the sooner treatment can begin.

Most strokes are ischemic strokes. If the patient arrives at the hospital within 3 hours of the first symptoms of an ischemic stroke, they may be eligible for a "clot-busting" drug (alteplase, a thrombolytic medication). Thrombolytics improve the chances of recovering from a stroke with less disability.

Emergency care starts on the way to the hospital. EMS providers ask questions about stroke symptoms and when they started. This information helps healthcare providers at the hospital act more quickly to administer the clot-busting drug. Family members, bystanders, or first aid providers should not drive suspected stroke patients to the hospital and patients should not drive themselves. Every minute that treatment is delayed, more brain tissue dies. "Time is brain."

Stroke Treatment Recommendations

When a responsive patient presents with a suspected stroke, assess scene safety and take standard precautions. Call 911 to activate EMS using a mobile device (if appropriate) and/or activate your EAP. Unlike a suspected heart attack, **do not give aspirin for a suspected stroke**. As a blood thinner, aspirin would increase bleeding and potentially worsen a hemorrhagic stroke.

BLS providers transporting the patient should ensure early notification to the receiving hospital, monitor the patient's status, and check blood glucose according to local medical protocol (high levels of glucose are common in patients with acute ischemic stroke). Calm, comfort, and reassure the patient. Once the patient arrives at the hospital, evaluation and appropriate care should continue without delay.

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DROWNING

Every day, in the United States about 10 people die from unintentional drowning. Of these, two are children aged 14 or younger. Drowning ranks fifth among the leading causes of unintentional injury death.

In drowning, cardiac arrest results from asphyxia. Fluid is swallowed or aspirated into the airway. The lack of oxygen to the brain causes respiratory arrest. Respiratory arrest causes the heart to stop within minutes.

Because the cardiac arrest is secondary to suffocation, the basic life support procedure is modified from that of sudden cardiac arrest and uses an airway, breathing, circulation (A-B-C) CPR approach. The first and most important treatment of the drowning victim is the immediate provision of rescue breathing.

CONVENTIONAL BLS APPROACH (CAB)	DROWNING CPR APPROACH (ABC)
Compressions	**A**irway
Airway	**B**reathing
Breathing	**C**irculation

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Modified BLS Procedure (ABC)

Perform an Initial Assessment

- Assess scene safety. If the scene is not safe, do not enter it until hazards have been minimized or eliminated. BLS providers must not become drowning victims themselves. Never enter the water unless you are trained in water rescue.
- Once the patient is out of water, assess responsiveness.
  - If the patient is unresponsive, activate EMS or your EAP if you haven't done so already.
- Open the airway (A) and assess the patient's breathing (B).
  - If there is no breathing, give 2 rescue breaths.
  - Ensure each breath is 1 second in length and creates visible rise of the chest.
- Check the patient's pulse (C).
  - If the pulse is felt but the patient is not breathing, provide rescue breathing or bag-mask ventilation.
    - Adult or child with signs of puberty: Give 1 breath every 6 seconds.
    - Infant or child without signs of puberty: Give 1 breath every 2-3 seconds.
    - Check pulse every 2 minutes.
  - If no pulse is felt, start CPR beginning with 30 high-quality chest compressions.
    - After 30 compressions have been given, open the airway and give 2 effective rescue breaths using a CPR mask or bag-mask device.
  - When two BLS providers are attempting to resuscitate a pediatric patient, perform cycles of 15 high-quality chest compressions and 2 rescue breaths.
- Use the AED as soon as it is available and the victim has been removed from water immersion.
  - Power on the AED.
  - Bare the chest and quickly wipe it dry.
  - Correctly apply the AED pads according to the pictures. Do not interrupt chest compressions to apply the AED pads.
  - Follow AED prompts.

Vomiting occurs often during resuscitation from drowning. If the patient vomits, turn an uninjured patient on their side in the recovery position. If you suspect a head, neck, or spinal injury, logroll the patient while maintaining alignment of the spine. Suction and maintain the airway according to local medical protocol. There is no need to clear the airway of aspirated water. Attempts to remove water from the airways using abdominal thrusts are unnecessary and potentially dangerous.

Submersion greater than 10 minutes is associated with poor outcome. However, there have been instances of survival with good recovery after prolonged submersion, mainly in children submersed in icy water. All drowning victims should be transported to the hospital, even those who appear to have recovered. Pulmonary complications are frequent and may be severe.

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SEVERE ALLERGIC REACTIONS

Anaphylaxis is a serious, rapidly developing, life-threatening severe allergic reaction, not simply a rash or hives. An anaphylactic reaction occurs when the victim is exposed to something they are allergic to. The causes, or triggers, are known as allergens. Allergens can enter the body through ingestion, injection, skin absorption, or inhalation.

Allergens include:

- **Foods**
  These foods and food groups account for 90% of severe allergic reactions:
  - Milk
  - Eggs
  - Fish
  - Crustacean shellfish
  - Wheat
  - Soy
  - Peanuts
  - Tree nuts
- **Insects**
  Thousands of people are stung by insects each year, and as many as 90 to 100 people in North America die each year as a result of anaphylaxis from insect stings.
- **Medications**
  Medications, such as penicillin and aspirin, can cause severe allergic reactions.
- **Manufactured Products**
  Latex, often used in disposable gloves or other manufactured products, is also a common cause of severe allergic reaction, especially among healthcare providers because they use latex gloves so frequently.

Someone who has had a severe allergic reaction in the past is likely to have another reaction when exposed to the same allergen. A severe allergic reaction can develop rapidly. In general, the faster the reaction occurs, the more severe it is. Without treatment, death can occur within minutes. The likelihood of survival is greatly enhanced by the early administration of epinephrine. Epinephrine, also known as adrenaline, is a hormone secreted by the adrenal glands. As an injectable medication, epinephrine can quickly counter the life-threatening symptoms of anaphylaxis and provide more time to treat the underlying cause.

Signs and Symptoms of Severe Allergic Reaction

The first signs of a reaction may be mild, but symptoms can worsen rapidly. The victim may experience swelling of the lips, eyelids, or face. Itchy raised red lumps, or hives, can appear on the face and chest. Blood vessels dilate in anaphylaxis, causing blood pressure to drop. Skin can become pale, cool, and moist to the touch. The patient may complain of nausea and abdominal cramping. The most worrisome development is swelling of the soft tissue in the throat because it constricts the airway. This can result in hoarseness, coughing, wheezing, difficulty swallowing, difficulty in taking a breath, or the loss of breathing altogether.

Epinephrine Autoinjectors

Epinephrine autoinjectors are simple-to-use medical devices that allow individuals with minimal training to administer epinephrine quickly in an emergency. Autoinjectors automatically inject epinephrine through a spring-loaded needle when pressed firmly against the skin. Individuals who have experienced a serious allergic reaction or are at risk for one are typically prescribed epinephrine autoinjectors to carry and use. In addition, epinephrine autoinjectors are available for use by trained laypersons in situations where anaphylactic reactions may occur more frequently, such as by teachers in schools, or by people who work or play in remote areas that have long EMS response times.

The EpiPen® epinephrine autoinjector is a commonly used delivery device available in 2 dosages, one for individuals above 66 pounds (EpiPen®, 0.3 mg/0.3 mL) and one for those between 33 and 66 pounds (EpiPen® Jr.®, 0.15 mg/0.3 mL). Both are supplied by the manufacturer with 2 single-dose pre-filled autoinjectors and 1 autoinjector trainer device. Patients who are prescribed an autoinjector, or their caregivers, are instructed to use and practice with the trainer to familiarize themselves with the use of the device in an allergic emergency.

Barriers to Use

Most epinephrine autoinjectors are prescribed for self-administration during a life-threatening anaphylactic emergency. However, many of those who are prescribed autoinjectors do not carry them consistently. Anyone with a prescribed epinephrine autoinjector should have it nearby at all times, especially when there is a higher risk for exposure to a known allergen. Even when an epinephrine autoinjector is available, there is often hesitation to use it. Common reasons for hesitation include the following:

- Failure to recognize the symptoms of anaphylaxis
- Uncertainty about how and when to use an autoinjector
- Belief that EMS professionals can provide timely care
- Fear of making things worse

Anaphylaxis Treatment Recommendations

When a responsive patient presents with a severe allergic reaction, assess scene safety and take standard precautions.

- Call 911 to activate EMS using a mobile device (if appropriate) and/or activate your EAP.
- Get the epinephrine autoinjector, an AED, and emergency response equipment, or send someone else to. Be prepared for the possibility of sudden cardiac arrest, and the need for CPR and the use of an AED.
- Calm, comfort, and reassure the patient. If the patient has an epinephrine autoinjector available, assist them in using it. If the patient cannot self-administer the epinephrine or does not have it, immediately administer it yourself.

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Steps to Administer the Epipen® Epinephrine Autoinjector

Prepare EpiPen®

- Remove the EpiPen® from its storage container.
- Inspect the epinephrine solution visually through the clear window of the autoinjector. Do not administer it if the epinephrine solution appears discolored (pinkish or brown color), cloudy, or contains particles.
- Form a fist around the autoinjector with the orange tip pointing downward and pull off the blue safety release cap.
- Never put a thumb, finger, or hand over the orange tip.

Administer Epinephrine

- Position the EpiPen® near the middle of the person's outer thigh. It may be administered through clothing or on bare skin.
- Swing and firmly push the orange tip at a 90-degree angle against thigh so it clicks.
- For a child, hold the leg to prevent movement prior to and during injection.
- Hold the device firmly on the thigh for approximately 3 seconds to deliver epinephrine.

Remove EpiPen®

- Pull the device straight out.
- The needle will retract underneath the safety cap.
- Firmly massage the injection area for about 10 seconds.

A single dose of epinephrine may not relieve the symptoms. The beneficial effect of epinephrine can also wear off over time.

When a patient with anaphylaxis does not respond to the initial dose, and arrival of advanced care will exceed 5-10 minutes, consider a repeat dose. An epinephrine autoinjector is a single-use device. Use of a second autoinjector will be necessary to deliver a second dose. **Do not administer a second dose at the same site as the first.**

Used EpiPens® may be disposed of as regular medical waste, placed in a sharps container or a medical red bag according to local medical protocol for sharps disposal.

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section six

APPENDIX

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BLS TERMINAL LEARNING OBJECTIVES

Here is what you should know and be able to do after successfully completing this BLS training program:

- Recognize the elements of high-quality CPR for an adult, child, and infant, and their importance on survival from cardiac arrest.
- Identify the links in the chains of survival for inside and outside the hospital.
- Recognize how to apply the BLS procedures in the chains of survival.
- Recognize when high-quality CPR is required.
- Identify the steps to correctly use an AED.
- Recognize the value of team roles during high-performance resuscitation.
- Recognize and provide treatment for a choking adult, child, or infant.

BLS CERTIFICATION REQUIREMENTS

To successfully complete this program and earn a BLS certification card, a knowledge and skill evaluation is required.

BLS WRITTEN EXAM	THE PASSING SCORE ONE THE 21-QUESTION EXAM IS 74%
BLS Performance Evaluation	Demonstrate skill competency as indicated by the skill criteria on the following performance evaluation sheets: ✓ Adult CPR and AED ✓ Infant CPR

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