



AMERICAN SAFETY & HEALTH INSTITUTE



BASIC LIFE SUPPORT

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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.

Figure 4: Out-of-Hospital Chain of Survival

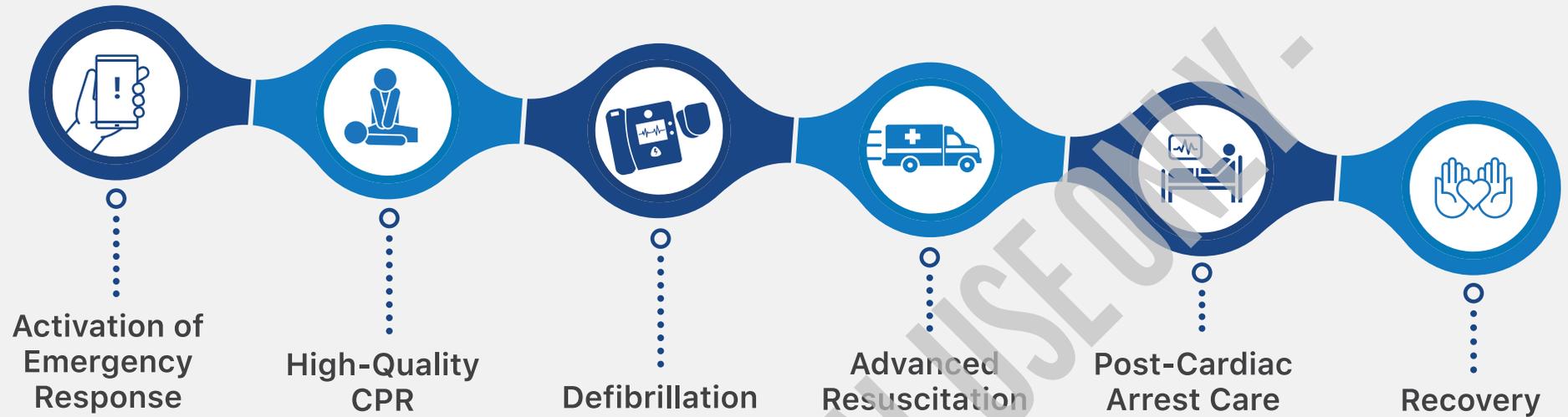
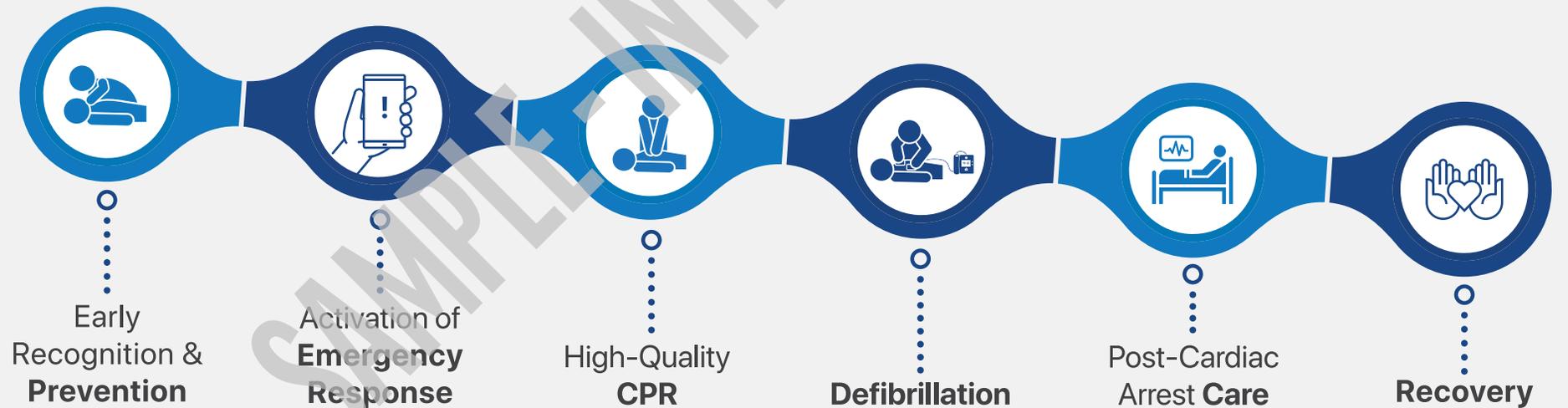


Figure 5: In-Hospital Chain of Survival



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.





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.

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.

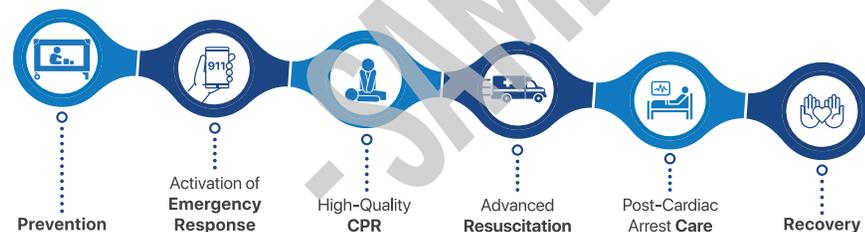
Causes of respiratory failure or respiratory arrest, and subsequent cardiac arrest, include airway obstruction, lung infections or diseases, drowning, choking, and shock resulting from injuries such as motor vehicle accidents, burns, falls, and child abuse.

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.

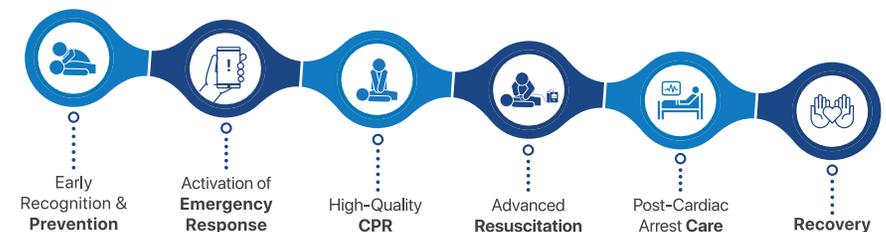
In-Hospital Chain of Survival

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.

Figure 7: Pediatric In-Hospital Chain of Survival



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.



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.



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.





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	Airway
Airway	Breathing
Breathing	Circulation

Health & Safety Institute
1450 Westec Drive
Eugene, OR 97402 USA
800-447-3177

hsi.com/brands

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