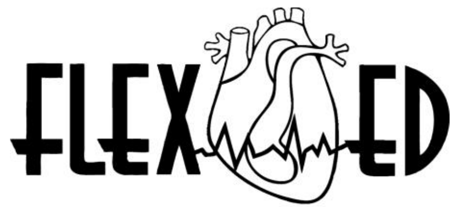

Overview of the American Heart Association's 2010 CPR Guideline Changes

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Overview of the American Heart Association's 2010 CPR Guideline Changes

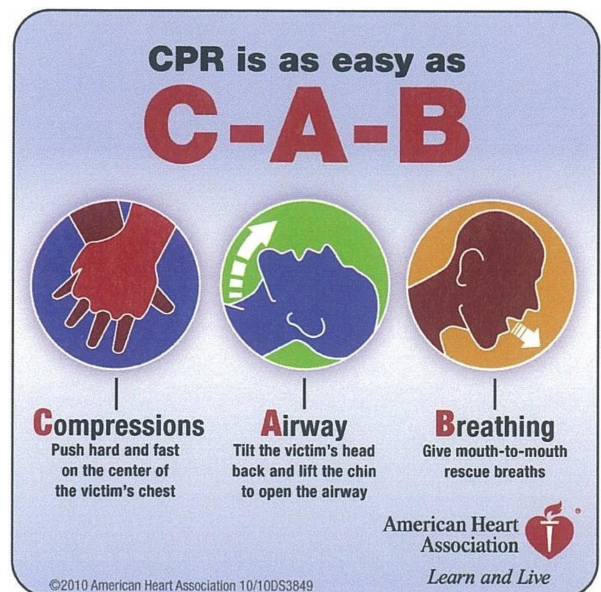
The 2010 Guidelines for CPR and ECC contain the expert recommendations made by these international experts. The 2010 Guidelines will continue to focus on the quality of compressions, measures to improve survival rates outside of the hospital through quality bystander CPR and improved EMS systems, as well as a new emphasis on post-cardiac arrest care.

Continued Emphasis on High Quality CPR
The 2010 Guidelines continue to emphasis the importance of high quality CPR:

- Compression rate of 30:2 for single rescuers with adults, children and infants *(remains the same)*
- Rate > 100/min: A compression rate of **AT LEAST 100/min** *(a change from the previous "approximately" 100 compressions per minute)*
- Compress at least 2 inches in adults *(no longer 1-1/2 to 2 inches)*
- Compress 1/3 of the anterior-posterior diameter of the chest in infants and children: Approximately 1.5 inches for infants, and 2 inches for children *(deeper than previous compression depths)*
- Allow for complete chest recoil after each compression
- Minimize interruptions in chest compressions
- Avoid excessive ventilations: Give a breath over 1 second, and no more than 8-10 breaths per minute)
- Once advanced airway in place, give continuous compressions with a breath every 6-8 seconds. Do not stop compressions to give breaths.

The New Sequence: Follow your CABs

The 2010 Guidelines recommend a change in the CPR sequence from the old ABC (airway-breathing-compressions) to the new sequence CAB (compressions-airway-breathing) for adults, children and infants *(the sequence change does not apply to neonates, the American Academy of Pediatrics' recommendations for neonatal resuscitation still apply).*



The highest rate of survival after cardiac arrest occurs in patients of all ages that experience a witnessed arrest and an initial cardiac rhythm of ventricular fibrillation or pulseless ventricular tachycardia. In these patients, it is imperative that early compressions and defibrillation are the first priority of care. In an ABC sequence, compressions are delayed as the rescuer seeks to open the airway, position a barrier device, and deliver breaths. By changing the sequence to CAB, compressions will be initiated sooner and the delay in ventilation will be minimal since it will take about 18 seconds to deliver the first cycle of 30 compressions. If 2 rescuers are present, the delay will be even shorter. In a two rescuer sequence, one rescuer will begin compressing while the second rescuer opens the airway and gets ready to ventilate.

Since many bystanders find opening the airway and delivering ventilations to be one of the more difficult aspects of CPR, the change to CAB will hopefully encourage more people to get involved and intervene.

A New Link in the Chain of Survival
Quality after-care for victims of cardiac arrest is also imperative for increasing survival rates. With this in mind, the 2010 Guidelines introduce a 5th link in the Chain of Survival: Integrated Post-Cardiac Care. A new section on Post Cardiac Care and Education, Implementation and Teams has been added. The following diagram illustrates the five links in the chain of survival with a summary of what each link stands for:

THE CHAIN OF SURVIVAL:

1. Immediate recognition of cardiac arrest and activation of the EMS system
2. Early CPR with emphasis on chest compressions
3. Rapid defibrillation
4. Effective advanced life support
5. Integrated post-cardiac arrest care

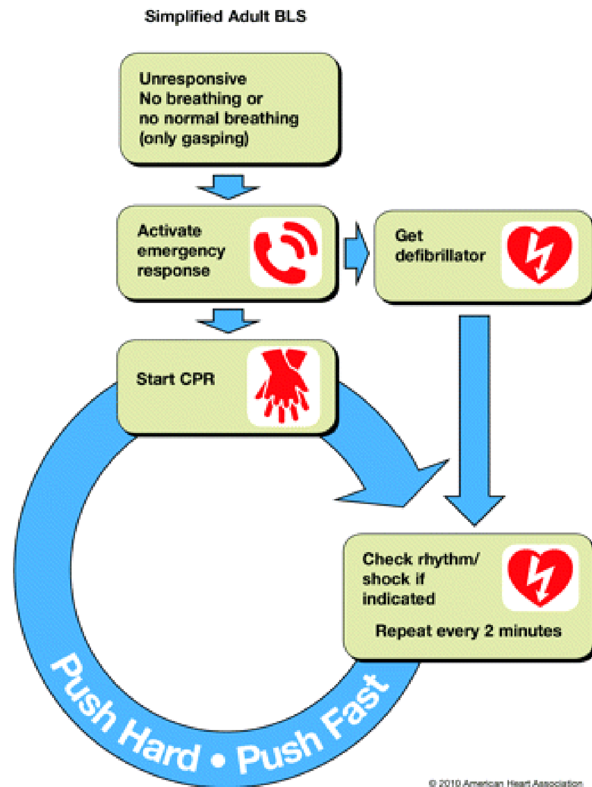
(American Heart Association, 2010)

Changes to Lay Rescuer and Health Care Provider BLS
In order to simplify the BLS process and encourage more of the public to get involved when they discover a victim of cardiac arrest, a new BLS algorithm has been created. The old "Look, Listen, and Feel" has been eliminated. If the victim is unresponsive and not breathing or has no normal breathing pattern, the Emergency Medical Services system is activated immediately. There has been a change for the lone rescuer. Instead of returning to the victim to open the airway, initiate breathing and then compressions (the old ABC sequence), there is a new CAB

sequence in which compressions are initiated for a cycle of 30 compressions prior to the initiation of the first breaths. If an AED is present, the rescuer would immediately place the AED and evaluate for the need for defibrillation.

Compression depth has changed from 1-1/2 to 2" to a new recommendation of at least 2 inches. The compression rate is AT LEAST 100 compressions per minute.

If a bystander is not trained in CPR, the emphasis will be to push hard and fast in the center of the chest or to follow the direction of the EMS dispatcher. "Hands only CPR" is continued until the AED arrives or until EMS or other responders are available to take over.
(American Heart Association, 2010)



Changes in Electrical Therapies

The 2010 Guidelines have been updated to reflect current research on the use of defibrillation and cardioversion for rhythm disturbances. There have been no major changes in the recommendations for electrical therapy. More research has been done in relation to defibrillating the pediatric patient. The lowest and maximum energy doses for effective pediatric/infant defibrillation are not yet known, but doses of >4 J/kg (as high as >9 J/kg) have effectively defibrillated children without significant adverse effects. Also, automated external defibrillators with relatively high-energy doses have been successfully used on infants with no clear adverse effects. To summarize current recommendations:

- **Availability and Use of AEDs:**
    - Increase availability of AEDs in public places
    - Whenever an un-witnessed arrest occurs, it is feasible to begin compressions while the AED is being set up, and evaluate for defibrillation as soon as the machine is available and ready.
    - Consider placing AEDs in areas of the hospital where staff do not have rhythm recognition skills or the code team is not instantly available

- **Shock first** rather than CPR first in instances where AED/defibrillator is present

- **1 shock instead of the 3 shocks in ventricular fibrillation:** Studies since 2005 have indicated that this recommendation from 2005 is valid and does improve outcomes.

- **Pediatric defibrillation:** The optimal defibrillation dosage is not known. A dose of 2-4 J/kg is recommended. For ease of teaching, the standard of 2 J/kg can be utilized. For subsequent shocks, the dosage of 4 J/kg should be used (not to exceed 10 J/kg).

- **AED use in infants:**
  - For age 1-8, use pediatric dose-attenuator system if available. If not available, use a standard AED
  - For infants <1 year, a manual defibrillator is preferred. If one is not available, a pediatric dose-attenuator is recommended. If not available, a regular AED can be used

- **Electrode placement:** The anterior-lateral pad position is still a reasonable default location to place the pads for defibrillation. There are three alternative pad placement recommendations that can be utilized depending on the specific requirements of a specific patient:
  - Anterior-posterior
  - Anterior-left infrascapular
  - Anterior-right infrascapular

- **Defibrillation with implantable cardiac cardioverter-defibrillators in place:** The anterior-lateral locations are generally acceptable if the patient has an implanted pacemaker in place. Avoid placing the pads directly over the implanted device.

- **Atrial fibrillation:** The biphasic dosage recommendations for conversion have changed from 100-200 J to the new recommendation of 120-200 J. For moniphasic machines, begin with dosages of 200 J.

- **Atrial flutter and other supraventricular rhythms**: These rhythms require less energy. An initial dose of 50-100 J with either a biphasic or monophasic machine is often sufficient. If the initial dose fails, increase the dosage incrementally.

- **Stable monomorphic VT** responds well to monophasic or biphasic waveform conversion (synchronized) shocks at initial energies of 100 J. If there is no response to the first shock, incremental increases of shocks can be administered.

- Do not use synchronized cardioversion for ventricular fibrillation, pulseless ventricular tachycardia, or polymorphic ventricular tachycardia (irregular VT). These rhythms require high-energy unsynchronized shocks (defibrillation doses).

CPR Technique and Devices

So far to date, there has been no research that indicates utilizing a device to assist with CPR is superior to the standard conventional (manual) CPR for out-of-hospital arrests, and no device outside of a defibrillator has improved long term survival in the hospital setting.

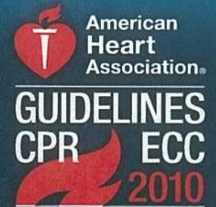
- **Precordial Thump:** The precordial thump should not be utilized for unwitnessed out of hospital cardiac arrest. The thump may be considered in cases of WITNESSED, monitored, unstable V tach, (including pulseless VT). IF A DEFIBRILLATOR IS NOT READILY AVAILABLE. Reported complications of the precordial thump include sternal fracture, osteomyelitis, stroke, and triggering of malignant arrhythmias. The use the thump should not delay the initiation of compressions or defibrillation.

- **Impedence Threshold Devices:** The use of these devices improved return of spontaneous cardiac rhythms (ROSC) and short-term survival in adults of out-of-hospital cardiac arrest, but it has not been shown to improve long term survival rates.

- **Devices for compressions:** Studies have been evaluated to compare the use of a load-distributing band or a mechanical piston device to perform compressions versus the traditional method of doing compressions by hand. There has been no indication that survival has increased with these devices, and they may only prove useful when compressions are needed in a diagnostic study or other situation that makes manual compressions difficult.

Highlights of the 2010 American Heart Association

Guidelines for CPR & ECC



Summary of Key BLS Components for Adults, Children, and Infants*

	Recommendations		
Component	**Adults**	**Children**	**Infants**
Recognition	Unresponsive (for all ages)		
	No breathing or no normal breathing (ie, only gasping)	No breathing or only gasping	
	No pulse palpated within 10 seconds for all ages (HCP only)		
CPR sequence	C-A-B		
Compression rate	At least 100/min		
Compression depth	At least 2 inches (5 cm)	At least ⅓ AP diameter About 2 inches (5 cm)	At least ⅓ AP diameter About 1½ inches (4 cm)
Chest wall recoil	Allow complete recoil between compressions HCPs rotate compressors every 2 minutes		
Compression interruptions	Minimize interruptions in chest compressions Attempt to limit interrruptions to <10 seconds		
Airway	Head tilt–chin lift (HCP suspected trauma: jaw thrust)		
Compression-to-ventilation ratio (until advanced airway placed)	30:2 1 or 2 rescuers	30:2 Single rescuer 15:2 2 HCP rescuers	
Ventilations: when rescuer untrained or trained and not proficient	Compressions only		
Ventilations with advanced airway (HCP)	1 breath every 6-8 seconds (8-10 breaths/min) Asynchronous with chest compressions About 1 second per breath Visible chest rise		
Defibrillation	Attach and use AED as soon as available. Minimize interruptions in chest compressions before and after shock; resume CPR beginning with compressions immediately after each shock.		

Abbreviations: AED, automated external defibrillator; AP, anterior-posterior; CPR, cardiopulmonary resuscitation; HCP, healthcare provider.
*Excluding the newly born, in whom the etiology of an arrest is nearly always asphyxial.

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Summary of BLS Changes (American Heart Association, 2010)

	NEW	OLD	RATIONALE
CPR	**Chest compressions, Airway, Breathing (C-A-B)** New science indicates the following order: 1. Check the patient for responsiveness. 2. Check for no breathing or no normal breathing. 3. Call for help. 4. Check the pulse for no longer than 10 seconds. 5. Give 30 compressions. 6. Open the airway and give 2 breaths. 7. Resume compressions	**Airway, Breathing, Chest Compressions (A-B-C)** Previously, after responsiveness was assessed, a call for help was made, the airway was opened, the patient was checked for breathing, and 2 breaths were given, followed by a pulse check and compressions.	Although ventilations are an important part of resuscitation, evidence shows that compressions are the critical element in adult resuscitation. In the A-B-C sequence, compressions are often delayed.
	Compressions should be initiated within 10 seconds of recognition of the arrest.	Compressions were to be given after airway and breathing were assessed, ventilations were given, and pulses were checked.	Although ventilations are an important part of resuscitation, evidence shows that compressions are the critical element in adult resuscitation. Compressions are often delayed while providers open the airway and deliver breaths.
	Compressions should be given at a rate of at least 100/min. Each set of 30 compressions should take approximately 18 seconds or less.	Compressions were to be given at a rate of about 100/min. Each cycle of 30 compressions was to be completed in 23 seconds or less.	Compression rates are commonly quite slow, and compressions >100/min result in better perfusion and better outcomes.
	Compression depths are as follows: • Adults: **at least** 2 inches (5 cm) • Children: **at least** one third the depth of the chest, approximately 2 inches (5 cm) • Infants: **at least** one third the depth of the chest, approximately 1½ inches (4 cm)	Compression depths were as follows: • Adults: 1½ to 2 inches • Children: one third to one half the diameter of the chest • Infants: one third to one half the diameter of the chest	Deeper compressions generate better perfusion of the coronary and cerebral arteries.
Airway & Breathing	Cricoid pressure is no longer routinely recommended for use with ventilations during cardiac arrest.	If an adequate number of rescuers were available, one could apply cricoid pressure.	Randomized studies have demonstrated that cricoid pressure still allows for aspiration. It is also difficult to properly train providers to perform the maneuver correctly.
	"Look, listen, and feel for breathing" has been removed from the sequence for assessment of breathing after opening the airway. Healthcare providers briefly check for no breathing or no normal breathing when checking responsiveness to detect signs of cardiac arrest. After delivery of 30 compressions, lone rescuers open the victim's airway and deliver 2 breaths.	"Look, listen, and feel for breathing" was used to assess breathing after the airway was opened.	With the new chest compression–first sequence, CPR is performed if the adult victim is unresponsive and not breathing or not breathing normally (ie, not breathing or only gasping) and begins with compressions (C-A-B sequence). Therefore, breathing is briefly checked as part of a check for cardiac arrest. After the first set of chest compressions, the airway is opened and the rescuer delivers 2 breaths.
AED	For children from 1 to 8 years of age, an AED with a pediatric dose-attenuator system should be used if available. If an AED with a dose attenuator is not available, a standard AED may be used. For infants (<1 year of age), a manual defibrillator is preferred. If a manual defibrillator is not available, an AED with a pediatric dose attenuator is desirable. If neither is available, an AED without a dose attenuator may be used.	This does not represent a change for children. In 2005 there was not sufficient evidence to recommend for or against the use of an AED in infants.	The lowest energy dose for effective defibrillation in infants and children is not known. The upper limit for safe defibrillation is also not known, but doses >4 J/kg (as high as 9 J/kg) have provided effective defibrillation in children and animal models of pediatric arrest, with no significant adverse effects. AEDs with relatively high energy doses have been used successfully in infants in cardiac arrest, with no clear adverse effects.