2005 American Heart Association Guidelines
for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
Comparison chart of Changes Affecting HEALTHCARE PROVIDERS

2005 Recommendation	***2000 Recommendation***	***Explanation***
Child CPR guidelines for healthcare providers apply to victims from 1 year of age to the onset of adolescence or puberty as defined by the presence of secondary sex characteristics.	Child CPR guidelines applied to victims 1 to 8 years old.	There is no single anatomic or physiologic characteristic that distinguishes a "child" victim from an "adult" victim and no scientific evidence that identifies a precise age to begin adult rather than child CPR techniques. Healthcare providers will continue to use the cutoff of 8 years old for use of AED child pads.
The single healthcare provider will "phone first" (and get an AED if available and then provide CPR and use the AED) for an unresponsive adult. In general, the single healthcare provider will provide "CPR first" and activate the emergency response system after about 5 cycles or 2 minutes of CPR for an unresponsive infant or child. If a victim of any age has a SCA, the collapse is likely to be cardiac in origin and the healthcare provider should activate the emergency response system, get an AED and return to the victim to provide CPR and use the AED when appropriate. If a victim of any age has a likely hypoxic arrest, the single healthcare provider should give 5 cycles (about 2 minutes) of CPR before leaving the victim to activate the emergency response system and retrieve the AED.	Tailoring of provider response to the likely cause of arrest was mentioned but not emphasized.	SCA in a victim of any age is likely to be cardiac in origin and early defibrillation is needed in addition to CPR. Victims of hypoxic arrest need immediate CPR, including ventilations and chest compressions, before the single healthcare provider leaves the victim to phone for help and get an AED.
The healthcare provider should use the head tilt-chin lift technique to open the airway of a trauma victim unless cervical spine injury is suspected. If a cervical spine injury is suspected, the healthcare provider should open the airway using a jaw thrust without head extension. If this maneuver does not open the airway, the healthcare provider should use a head tilt-chin lift technique because opening the airway is a priority for the unresponsive trauma victim.	The jaw thrust without head tilt was taught to both lay rescuers and healthcare providers.	The jaw thrust is a difficult maneuver to learn and perform. It is impossible to perform on manikins. The jaw thrust may not effectively open the airway and it may cause spinal movement. Opening the airway is a priority when a trauma victim is unresponsive. Healthcare providers treating a victim with a suspected cervical spine injury should attempt to open the airway with the jaw thrust, but if the healthcare provider cannot open the airway with the jaw thrust, the provider should use the head tilt-chin lift.
The BLS healthcare provider checks for adequate breathing in adult victims. If adequate breathing is not present, the rescuer should give 2 rescue breaths. The BLS healthcare provider checks for presence or absence of breathing in the infant or child and gives 2 breaths if the infant or child not breathing.	The healthcare provider checked for adequate breathing for victims of all ages.	BLS healthcare providers should be prepared to administer rescue breaths if the victim is not breathing adequately. Healthcare providers should not wait until adult respiratory arrest occurs to give rescue breaths. The pediatric science experts feel that assessment of "adequate" breathing in an infant or child is a challenging skill that is more consistent with an advanced provider.

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Healthcare providers should try "a couple of times" to deliver 2 effective breaths (breaths that cause visible chest rise) to the infant and child	Healthcare providers were told to move the child's head through a variety of positions to obtain optimal airway opening and effective rescue breaths.	The most common mechanism of cardiac arrest in infants and children is asphyxia so the infant and child in cardiac arrest is likely to be hypoxic. Rescuers must be able to provide effective rescue breaths.
If the unresponsive victim is not breathing but has a pulse, the healthcare provider will give rescue breathing without chest compressions. The provider will deliver 10 to 12 breaths per minute for an adult (1 breath every 5 or 6 seconds) and 12 to 20 breaths per minute for an infant or child (1 breath every 3 to 5 seconds)	Healthcare providers delivered 10 to 12 breaths per minute for the adult and 20 breaths per minute for the infant and child.	The wider range of acceptable breaths for the infant and child will allow the provider to tailor support to the patient (if the healthcare provider is assisting a lay rescuer)
All rescuers should deliver each rescue breath during CPR over 1 second. The volume of each rescue breath should be sufficient to produce visible chest rise. Rescuers should avoid delivering more breaths than are recommended or breaths that are too large or too forceful.	Rescuers were taught to deliver rescue breaths over 1 to 2 seconds.	Less ventilation than normal is needed during CPR. During the first few minutes of CPR for VF SCA, the oxygen content in the blood initially remains adequate. Therefore rescue breaths are not as important as effective chest compressions that create blood flow. During CPR, blood flow to the lungs is only about 25% to 33% of normal so less ventilation is needed to provide oxygen. Hyperventilation during CPR is not necessary and can be harmful. The positive pressure in the chest that is created by rescue breaths will decrease venous return to the heart. This limits refilling of the heart reducing cardiac output created by subsequent chest compressions. Large tidal volumes and forceful breaths in the airway are also likely to cause gastric inflation.
If despite adequate oxygenation and ventilation, the heart rate of the infant or child is <60 bpm with signs of poor systemic perfusion, the healthcare provider should begin chest compressions.	This same recommendation was contained in the 2000 Guidelines; however it was not incorporated into BLS training.	Bradycardia is a common terminal rhythm in infants and children. The healthcare provider should not wait for the development of pulse less arrest to begin chest compressions.
Effective chest compressions are essential to provide blood flow during CPR. The 2005 guidelines emphasize that the rescuer should "push hard, push fast, and allow the chest to recoil after each compression." The most effective chest compressions are produced if rescuers push hard, push fast at a rate of 100 per minute, allow full chest recoil after each compression and minimize interruptions of compressions. Healthcare providers should interrupt chest compressions as infrequently as possible and should limit interruptions to no more than 10 seconds at a time except for specific interventions such as insertion of an advanced airway or use of a defibrillator.	The recommendations for depth and rate of chest compressions were the same. Less emphasis was given to the need for adequate depth of compression, complete recoil of chest and minimizing interruptions.	Studies of CPR performed by healthcare providers showed that half of the chest compressions provided was too shallow and no compressions were provided during 24% to 49% of CPR time. Allowing complete chest recoil after each compression allows blood to return to the heart to refill the heart. If the chest is not allowed to recoil, there will be less venous return to the heart and filling of the heart is reduced. As a result cardiac output produced by subsequent chest compressions will be reduced. When chest compressions are interrupted blood flow stops and coronary artery perfusion pressure falls quickly and reduces the victim's chance of survival.

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When more than 1 rescuer is present, rescuers should change "compressor" roles about every 2 minutes or 5 cycles of CPR.	When the first rescuer performing chest compressions becomes fatigued, the rescuers should change positions with minimal interruptions in chest compressions.	Rescuer fatigue, as demonstrated by inadequate chest compression rate or depth and inadequate chest recoil, developed in as little as 1 to 2 minutes. However, rescuers did not report feeling fatigued for 5 minutes or longer.
For chest compressions on children, rescuers should use the heel of 1 or 2 hands to compress the lower half of the sternum to a depth of one third to one half the chest diameter. If 2 hands are used, hand placement is the same as that used for compression of adult victims. Rescuers should compress at about the nipple line.	In children, compress the chest with the heel of 1 hand.	Children as well as rescuers come in all sizes. Rescuers should use the technique that will enable them to give effective chest compressions.
Healthcare providers should use the 2 thumb-encircling hands technique for 2-rescuer CPR for infants.	No change from 2000 Guidelines.	There is additional evidence that the 2 thumb-encircling hands technique produces higher coronary artery perfusion pressure.
Single healthcare providers should use a compression-to-ventilation ratio of 30:2 for infants, children and adults. Rescuers performing 2-rescuer CPR should use a 15:2 ratio for infants and for children.	A compression-to-ventilation ratio of 15:2 for adults and 5:1 for infants and children were recommended.	This change was made to simplify lay rescuer training and reduce interruptions in chest compressions by all rescuers.
Healthcare providers should deliver cycles of compressions and ventilations during CPR when there is no advanced airway. Once an advanced airway is in place for infant, child or adult victims, 2 rescuers no longer deliver cycles of compressions interrupted with pauses for ventilation. The "compressor" should deliver 100 compressions per minute continuously without pauses for ventilation. The rescuer delivering breaths should give 8 to 10 breaths per minute and be careful to avoid delivering an excessive number of ventilations.	Former guidelines recommended "asynchronous" compressions and ventilations during CPR when an advanced airway is in place.	Once an advanced airway is in place, ventilation can be accomplished during compressions so rescuers no longer need to pause chest compressions to allow delivery of ventilation. Rescuers should be careful to avoid delivery of an excessive number of breaths. Several studies of actual CPR by healthcare providers showed that victims receive too many breaths.
Rescuers should act if they observe signs of severe airway obstruction: poor air exchange and increased breathing difficulty, a silent cough, cyanosis or inability to speak or breath. Rescuers should ask 1 question: "Are you choking?" If the victim becomes unresponsive, all rescuers are instructed to activate the emergency response number and provide CPR. Every time the rescuer should look in the mouth and remove an object if one is seen. The tongue-jaw lift is no longer taught and blind finger sweeps should not be performed.	Rescuers were taught to recognize partial airway obstruction with good air exchange, partial airway obstruction with poor airway exchange and complete airway obstruction. Rescuers were taught to ask 2 questions: "Are you choking?" and "Can you speak?" In treating the unresponsive victim with FBAO, the healthcare provider was taught a sequence that included abdominal thrusts.	The goal if these revisions are simplification. Experts could find no evidence that a complicated series of maneuvers is any more effective than simple CPR. Some studies showed that chest compressions performed during CPR increased intrathorasic pressure as high as or higher than abdominal thrusts. Blind finger sweeps may result in injury to the victim's mouth and throat or to the rescuer's finger with no evidence of effectiveness.

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When any rescuer witnesses an adult cardiac arrest and an AED is on site, the rescuer should use the AED as soon as possible. When any healthcare provider witnesses a child collapse suddenly, the provider should phone the emergency response number, begin CPR and attach an AED as soon as possible. When using an AED for an unresponsive child who did not have witnessed collapse, a rescuer should give 5 cycles or about 2 minutes of CPR before using an AED. When EMS personnel arrive at the scene of an out-of-hospital cardiac arrest that they have not witnessed, it is reasonable for them to give about 5 cycles of CPR before checking the ECG rhythm and attempting defibrillation.	The AHA recommended the use of an AED as soon as it was available for all adult victims of SCA. When use of AEDs for children 1 to 8 years of age was recommended in 2003, the AHA recommended the use of an AED after 1 minute of CPR.	Studies showed that 1 ½ to 3 minutes of EMS CPR before attempted defibrillation improved survival for victims of VF SCA *if the EMS providers arrived at the scene 4 to 5 minutes or longer after the EMS call.* There was no difference in survival for victims when responders arrived in less than 4 to 5 minutes. When VF cardiac arrest is present for several minutes, the heart has probably used up most of the available oxygen needed to pump effectively. A period of CPR before shock will provide some blood flow to the heart making a shock more likely to eliminate VF and resume an effective rhythm.
To treat cardiac arrest associated with VF or pulseless VT, the 2005 guidelines recommend delivery of single shocks followed immediately by a period of CPR beginning with chest compressions. Rescuers should not interrupt chest compressions to check circulation until about 5 cycles or 2 minutes of CPR have been provided after the shock.	The use of a "stacked" sequence of 3 shocks was recommended for the treatment of VF/pulseless VT.	The 3-shock recommendations were based on the use of monophasic defibrillators. Repeated shocks were necessary because the first shock was often unsuccessful and several shocks were needed to eliminate VF. Modern biphasic defibrillators have a much higher first-shock success rate so VF is likely to be eliminated with 1 biphasic shock. In 2005, the rhythm analysis for a 3 shock sequence performed by AEDs resulted in delays of 19 to 37 seconds or longer between first shock and first post-shock compression. This long hands-off time cannot be justified when VF is unlikely to be present and victims need CPR.
The initial shock dose for adults is 150 J to 200 J for a biphasic truncated exponential waveform or 120 J for a rectilinear biphasic waveform. The second does should be the same or higher.	In 2000 the recommended dose for an initial shock using a monophasic waveform was 200 J, with the second dose of 200 to 300 J and the third and subsequent doses of 360 J.	The goal is to simplify and support the use of device-specific doses of proven effectiveness.
For sudden witnessed arrest in the child or adult in the out-of-hospital setting, the single healthcare provider should phone the emergency response number, retrieve the AED and return to the victim to perform CPR and use the AED. Lay rescuers and healthcare providers responding to an unwitnessed or nonsudden cardiac arrest in the child in the out-of-hospital setting should use the AED after giving 5 cycles or about 2 minutes of CPR.	Use of AEDs in children 8 years of age and older was recommended.	Evidence published since 2000 has established the safety of biphasic waveforms and the ability of most AEDs to recognize shockable rhythms in infants and children.