2005 AHA Guidelines for CPR and ECC

- Based on the largest review of resuscitation literature ever published
- The process was organized by the International Liaison Committee on Resuscitation (ILCOR)
- Involved 380 international resuscitation experts
- 36-month period
- Final debate and discussion was in January 2005 at an international conference hosted by the American Heart Association

Changes include:
Simplifying and Emphasizing the role of basic life support as fundamental to improving survival from cardiac arrest.

All rescuers must deliver high-quality CPR:
- Rescuers must provide compressions of adequate depth and number, allow adequate chest recoil after each compression, and minimize interruptions in chest compressions.

The most important message in the 2005 guidelines is that high-quality (i.e. properly performed) CPR will save lives, and all victims of cardiac arrest should receive high-quality CPR.
The 5 major changes in the 2005 guidelines are these:

- Emphasis on, and recommendations to improve, delivery of effective chest compressions
- A single compression-to-ventilation ratio for all single rescuers for all victims (except newborns)
- Recommendation that each rescue breath be given over 1 second and should produce visible chest rise
- A new recommendation that single shocks, followed by immediate CPR, be used to attempt defibrillation for VF cardiac arrest. Rhythm checks should be performed every 2 minutes.
- Endorsement of the 2005 ILCOR recommendation for use of AEDs in children 1 to 8 years old (and older); use a child dose reduction system if available.

Negative Effect of Delaying Chest Compressions

This ECG series shows the negative effect of delaying chest compressions after shock delivery. This continuous series was downloaded from an AED used for resuscitation of a victim of sudden cardiac arrest on a golf course. The ECG begins at 22:37:22 when the AED is attached and continues through 22:39:01 when CPR is resumed.

The first segments were recorded when the AED was turned on and attached (time is 22:37:22) The rhythm is labeled as “coarse VF”
In the second segment, a shock is advised and is delivered (at 22:37:44), 22 seconds after the pads were attached. The shock eliminates the VF; the initial post-shock rhythm is Asystole. The AED then analyzes the rhythm.

This third ECG segment depicts the post-shock rhythm through the next 21 seconds. Asystole is present, and the AED is analyzing the rhythm so no CPR is provided and there is no blood flow.
This fourth segment depicts rebrillation (at 22:38:09), 25 seconds after the first shock successfully eliminated VF. Note that no CPR was performed during the 25 seconds. The AED then analyzes the rhythm and recommends a shock. A shock is delivered (at 22:38:43), asystole follows, and the AED then analyzes those rhythms. CPR is finally recommended and begins at 22:39:01, a total of 1 minute, 17 seconds after the first shock.

The victim survived

Recommendations for EMS Systems

Improvement in Response Intervals When Feasible

Recommendations for EMS Systems

EMS Medical Directors May Recommend CPR Before Shock

- **2000 (Old):** EMS providers attempted defibrillation as soon as cardiac arrest was identified
- **2005 (New):** EMS system medical directors may consider implementing a protocol that would allow EMS responders to provide about 5 cycles (about 2 minutes) of CPR before attempted defibrillation when the EMS system call-to-response interval is >4 to 5 minutes.
### CPR Guidelines Changes & Rationale

Areas of the CPR Guidelines have been changed:
- Age Range
- Assess/Alert
- Airway
- Breathing
- Circulation
- CPR Compression to Ventilation Ratio
- CPR for Infants/Children
- AED (Automatic External Defibrillators)
- AED for Infants & Children
- Foreign Body Airway Obstruction (FBAO)

### New Age Guidelines

- **2000 (Old):** Child CPR guidelines applied to victims 1 to 8 years old
- **2005 (New):** Child CPR guidelines for *healthcare providers* apply to victims from about 1 year of age to the onset of adolescence or puberty (about 12 to 14 years old), as defined by the presence of secondary sex characteristics (e.g., breast development in girls, armpit hair in boys).

### ASSESS/ALERT (2000)

- If Rescuer is alone with victim
  - Phone First in SCA
- Phone Fast in other cases (i.e. SOB/Trauma/FBAO)
**ASSESS/ALERT**

*2005*

- Rescuer who is alone should alter sequence of rescue based on most likely cause
- SCA — Activate EMS, Get AED, DO CPR
- Hypoxic Arrest (i.e asphyxia)
  - 5 cycles of CPR (~2 minutes) before alerting EMS

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**Airway**

*2000*

Open airway through the Jaw-thrust technique without head tilt:
- Safest initial approach (in case of neck injury)
- Carefully Support head without tilting backward

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**Airway**

*2005*

If a cervical spine injury is suspected:
- Open airway using a jaw-thrust without head extension
- Use head tilt/chin lift if jaw thrust does not open airway
- Healthcare providers should manually stabilize the head and neck rather than use immobilization devices during CPR for victims with suspected spinal injury
Checking for Breathing
(2000)

The healthcare provider checked for adequate breathing for victims of all ages.

Checking for Breathing
(2005)

- The BLS healthcare provider checks for adequate breathing (lay rescuers check for “normal” 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 is not breathing.

Breathing
(2000)

- Many different tidal volumes were recommended for rescue breaths with and without oxygen.
- Breaths were to be delivered in 1 second or over 1 to 2 seconds.
Breathing (2005)

- Each rescue breath should be given over 1 second.
- Each rescue breath should make the chest rise (rescuers should be able to see the chest rise)
- All rescuers should give the recommended number of rescue breaths
- All rescuers should avoid delivering too many breaths (more than the number recommended) or breaths that are too large or too forceful

Circulation (2000)

- Pulse check
- Assess signs of circulation
- If not confident, begin chest compression immediately

Circulation (2005)

Try to palpate a pulse
- Infant: Brachial/Femoral
- Adult: Carotid
- If a pulse is not definitely felt in 10 seconds:
  Proceed to chest compressions
CPR Compression to Ventilation Ratio (2000)

- Adult: 15:2
- Infant: 5:1
- Speed: 100 Compressions per minute

CPR Compression to Ventilation Ratio (2005)

**Single rescuer CPR:**
- All ages: 30:2

**2-rescuer CPR:**
- Adult: 30:2
  1. Until advanced airway is in place
  2. Once advanced airway in place:
     - Continuous chest compressions
     - No pauses for 8 to 10 breaths per minute
  3. Change rescuers every 2 minutes to avoid fatigue
  4. Infant/Child: 15:2

Rescue Breathing Without Chest Compressions (2000)

Healthcare providers delivered 10 to 12 breaths per minute for the adult and 20 breaths per minute for the infant or child.
**Rescue Breathing Without Chest Compressions (2005)**

- 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 (approximately 1 breath every 5 or 6 seconds) and 12 to 20 breaths per minute for an infant or child (approximately 1 breath every 3 to 5 seconds).

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**CPR Priorities for the Healthcare Provider**

**CALL FIRST** (dial the emergency number or begin rescue breathing if you are a lone rescuer with a victim of likely asphyxial arrest). Your team may include all adults and children who do not have a medical, witnessed collapse.

- Use an AED as soon as it is available except if you are in the out-of-hospital setting with an unresponsive child who did not have a medical witnessed arrest. With such children you should perform 30:2 compressions and 2 ventilations of CPR prior to using an AED.
- Use a breath-protected mask (the adult is already unresponsive when you arrive) and give an immediate airway with a vision-controlled internal airway tube if necessary. This may be inserted in 2 to 5 seconds or about 2 minutes of CPR before using the AED.

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Various tidal volumes were recommended and rescuers were taught to deliver them over 1 to 2 seconds. The recommended tidal volume for rescue breaths for adults was approximately 700 to 1000 mL.
Rescue Breaths With Chest Compressions (2005)

- All rescuers should deliver each rescue breath during CPR (via mouth to mouth, mouth to shield, mouth to mask, or bag mask, or via advanced airway, with or without supplementary oxygen) 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.
- It is impossible to estimate the tidal volume delivered during rescue breaths

Chest Compressions (2000)

Importance of quality and rate of chest compressions, importance of complete chest wall recoil, and need to minimize interruption of chest compressions were not emphasized

Chest Compressions (2005)

Effective chest compressions produce blood flow during CPR. The guidelines note the following about chest compressions during CPR:
- To give effective chest compressions, all rescuers should “push hard and push fast.” Compress the chest at a rate of about 100 compressions per minute for all victims.
- Allow the chest to recoil (return to normal position) completely after each compression, and use approximately equal compression and relaxation times.
- Try to limit interruptions in chest compressions. Every time you stop chest compressions, blood flow stops.
CPR Compression to Ventilation Ratio

Focus on "effective" chest compressions to maximize quality of CPR

Push HARD, Push FAST to allow complete chest "recoil" & minimize interruptions

- Adult: 1-1½ inches depth of chest, 100 compressions/minute
- Infant: ⅓ - ½ inches depth of chest, 100 compressions/minute
- Rescuer: Squeeze chest when using 2-thumb encircling hands technique
- Compression time = Recoil time

Rescuers Should Change Compressors Every 2 Minutes (2000)

When the first rescuer performing chest compressions becomes fatigued, the rescuers should change positions with minimal interruptions in chest compressions.

- Rescuers Should Change Compressors Every 2 Minutes
- When more than 1 rescuer is present, rescuers should change "compressor" roles about every 2 minutes or 5 cycles of CPR (1 cycle of CPR = 30 compressions and 2 rescue breaths).
- Rescuers should try to complete the switch in 5 seconds or less
Compression-to-Ventilation Ratios for Infants and Children (2000)

- A compression-to-ventilation ratio of 15:2 for adults and a compression-to-ventilation ratio of 5:1 for infants and children were recommended.
- Provide chest compressions when:
  - No observed signs of circulation
  - Heart rate < 60 beats/minute in presence of poor systemic perfusion

Compression-to-Ventilation Ratios for Infants and Children (2005)

- Lone healthcare providers should use a compression-to-ventilation ratio of 30:2 for infants, children, and adults.
- Rescuers performing 2-rescuer CPR (e.g., all healthcare providers should use a 15:2 ratio for infants and for children (aged 1 year until the onset of puberty).
- Provide chest compressions when:
  - Heart rate is < 60 beats/minute despite effective ventilation with oxygen

Autotomated External Defibrillators (AED)

- The changes recommended in the 2005 guidelines are designed to minimize interruptions in chest compressions.
- In addition, they acknowledge the high first-shock success of biphasic waveforms in eliminating VF or rapid ventricular tachycardia (VT).
Major Changes in Defibrillation

- Immediate defibrillation is appropriate for all rescuers responding to sudden witnessed collapse with an AED on site (for victims ≥1 year of age).
- Compression before defibrillation may be considered when EMS arrival at the scene of sudden collapse is >4 to 5 minutes after the call.
- One shock followed by immediate CPR, beginning with chest compressions, is used for attempted defibrillation. The rhythm is checked after 5 cycles of CPR or 2 minutes.

For attempted defibrillation of an adult the dose using a monophasic manual defibrillator is 360 J.
- The ideal defibrillation dose using a biphasic defibrillator is the dose at which the device waveform has been shown to be effective in terminating VF. The initial selected dose for attempted defibrillation using a biphasic manual defibrillator is 150 J to 200 J.

AED (2000)

AED provides a series of 3 shocks:
- Rescuer should NOT interrupt/interfere with equipment.
- AEDs are programmed to pause after each group of 3 shocks & allow 1 minute of CPR.
AED (2005)

AED provides 1 shock followed by:
- Immediate CPR beginning with chest compressions
- Recheck rhythm after 5 cycles of CPR (2 minutes)

AEDs for Infants and Children (2000)

Since 2003 AEDs have been recommended for children in cardiac arrest 1 to 8 years old.

AEDs for Infants and Children (2005)

- AEDs are recommended for use in children 1 year of age and older.
- The evidence is insufficient to recommend for or against the use of AEDs in infants under 1 year of age
AEDs for Infants and Children (2005)

- For sudden witnessed collapse in a child, use the AED as soon as it is available.
- For unwitnessed cardiac arrest in the out-of-hospital setting, use the AED after about 5 cycles (about 2 minutes) of CPR.
- If you are giving CPR to a child (older than 1 year) and the available AED does not have child pads or a way to deliver a smaller dose, use a regular AED with adult pads. DO NOT use child pads or a child dose for adult victims of cardiac arrest.


- Drugs were administered immediately after a post-shock rhythm check, in a “Drug—CPR—shock” (repeat as needed) cycle.
- CPR was provided for about a minute after drug administration to circulate the drug prior to the next rhythm check. Rhythm checks were performed about every minute during attempted resuscitation, resulting in frequent interruptions in chest compressions.

Timing of Drug Administration During Pulseless Arrest (2005)

- When drug administration is indicated, the drugs should be administered during CPR, as soon as possible after the rhythm is checked.
- A drug may be administered during the CPR that is performed while the defibrillator is charging, or during the CPR performed immediately after the shock is delivered.
- Drug delivery should not interrupt CPR.
2-Rescuer CPR With an Advanced Airway (2000)

- Former guidelines recommended “asynchronous” compressions and ventilations (compressions and ventilations not timed with one another) during CPR when an advanced airway is in place.
- A ventilation rate of 12 to 15 per minute was recommended for adults during CPR with an advanced airway
- Rescuers were taught to recheck for signs of circulation “every few minutes.”
- The recommendations to avoid overventilation focused on prevention of gastric inflation.

2-Rescuer CPR With an Advanced Airway (2005)

- Healthcare providers should deliver cycles of compressions and ventilations during CPR when there is no advanced airway be careful to avoid delivering an excessive number of ventilations.
- A ventilation rate of about 8 to 10 breaths per minute will be the equivalent of giving 1 breath about every 6 to 8 seconds.

FBAO - Unresponsive (2000)

1. Activate EMS at proper time of CPR sequence
   - If available, send 2nd rescuer and remain with victim
2. Lie victim face up
3. Perform tongue-jaw lift
4. Finger sweep to remove object
5. Open airway and try to ventilate
   - If chest does not rise, reposition head and attempt ventilation again
   - If chest does not rise AGAIN, consider FBAO:
5.1. Straddle victims thighs
5.2. Perform Heimlich maneuver/abdominal thrust (up to 5 times)
5.3. Repeat sequence until obstruction is cleared & chest rises
If adult victim with FBAO is unresponsive:
1. Rescuer should carefully support patient to ground
2. Immediately activate EMS
3. Begin CPR
- When airway is open, rescuer should look for object in victim’s mouth and remove it

CPR Demos
- Adult One Rescuer
- Adult breaths with mask
- Adult compressions with mask
- Adult assessment
- Adult rescue breathing with BVM
- 2 Rescuer CPR
- 2 Rescuer CPR with AED
- 2 Rescuer CPR with Advanced Airway
- Child CPR Sequence

REMAC Protocol Change Summary
BLS Protocol Changes

- Updated Adult NT Cardiac Arrest Protocol to reflect 2005 AHA CPR/AED Guidelines
- Updated Stroke Protocol:
  - Updated Stroke Center Criteria
  - Added transportation criteria
- Delete Syrup of Ipecac
- Updated Pediatric NT Cardiac Arrest Protocol to reflect 2005 AHA CPR/AED Guidelines
- Emphasize severe bradycardia with S/S
- Decompensated Shock as a criteria for CPR

ALS Protocol Changes - General

- Lidocaine is not used on any cardiac protocol
- Lidocaine is only used to pre-medicate a head trauma patient requiring intubation
- Adult NT Cardiac Arrest protocols reflect 2005 AHA Guidelines
- Asystole and PEA/EMD are one protocol
- Introduction of Intra Nasal Narcan for AMS

ALS NT Cardiac Arrest

- Defibrillation pads – 1” from pacemaker/AICD
- Delete Hi-dose Epi
- Delete Lidocaine
- Delete D50
- Delete Narcan
- Delete Dopamine
- Delete TCP
- Add Calcium Chloride for suspected hyperkalemia or Calcium Channel Blocker OD
ALS Cardiac Arrhythmias
- Delete Lidocaine
- Add Calcium Chloride – see NT CA
- Change in energy setting for synchronized cardioversion
- Dosage changes for Atropine, Epi, Dopamine
- Add Amioderone as a SO for VT with a pulse

ALS Head Injuries
- Added Prehospital Sedation Procedure – including Etomidate
- Reversed order of Cardiac Monitoring and starting an IV

What’s Coming Next?
- Eliminate breathing in CPR? – long range
- Update ALS pediatric NT cardiac arrest protocol for 2005 AHA Guidelines
- Add the use of Adult I/O – Very shortly.
Questions?