

## 2005 AHA GUIDELINES FOR CPR AND ECG

### NEW, BUT IMPROVED?

#### Updating of CPR Guidelines

As this issue of *Critical Care Nurse* went to press, the American Heart Association (AHA) issued its newly revised *Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care*.<sup>1</sup> Based on the most comprehensive review of published and peer-reviewed resuscitation research ever compiled, these *Guidelines* are the product of rigorous documentation, analysis, and evaluation of existing scientific literature related to cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) by 380 international experts on resuscitation convened by the International Liaison Committee on Resuscitation over a 3-year period preceding the 2005 Consensus Conference on CPR and ECC.<sup>2</sup> (The evidence evaluation worksheets prepared at this conference are available at the AHA Web site, [www.c2005.org](http://www.c2005.org).)

An editorial published with the revised *Guidelines* opens with a description of the context within which this research evidence was analyzed and these guidelines were revised:

... [the scientists involved] ...began and ended the process aware of the limitations of the resuscitation scientific evidence, optimistic about emerging data that documents the benefits of high-quality ... [CPR], and determined to make recommendations that would increase survival from cardiac arrest and life-threatening emergencies.<sup>3</sup> (pIV-206)

While acknowledging both the boundaries of the research process as well as opportunities to incorporate new scientific evidence into practice, the editorial both acknowledged the current worldwide survival rate for out-of-hospital CPR as 6%

or less and characterized the following as “a striking finding” of the evidence presented at the most recent Consensus Conference:

... the contrast of data that showed the critical role of early, high-quality CPR in increasing rates of survival from cardiac arrest with data that show that few victims of cardiac arrest receive CPR and even fewer receive high-quality CPR.<sup>3</sup> (pIV-206)

As my previous Editorial<sup>4</sup> noted, although a wide array of variables may singly or jointly contribute to the alarmingly and chronically low rate of CPR survival regardless of the setting where arrest occurs or the attributes of the rescuer, one distinguishing commonality documented in all CPR provision circumstances is the rapid evaporation of prowess in CPR skills. If few of us trained to perform CPR procedures actually perform them correctly when it counts, then all the new data and revised guidelines generated in global cooperation will not likely raise that single digit survival rate. An alternative consideration proposed in the editorial to help mitigate the decay of CPR skills and improve survival rates was simplification of CPR performance procedures so they could be more readily learned, retained, and demonstrated.

It is discomfoting to even consider that ever-evolving science that continually tweaks at how to best perform this fundamental lifesaving skill might be hindering rather than helping to improve its success in saving lives, but some alternate explanation surely seems warranted for the 94% of victims who do not survive following provision of CPR. This Editorial is dedicated to

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**Table 1** 2005 CPR-ECC Guidelines: synopsis of changes for all CPR rescuers

Aspect	Change for 2005	KISS Index* (0, 1, 2)
Effective chest compressions	<ul style="list-style-type: none"> <li>• Push hard, allowing chest to fully recoil before next compression, using approximately equal time for compressions and relaxations, and avoiding interruptions in compressions.</li> <li>• Push fast (~ 100/min)<sup>†</sup></li> </ul>	0
Compression to ventilation ratio for lone rescuers	<ul style="list-style-type: none"> <li>• Compression:ventilation ratio of 30:2 for all single rescuers with victims of all ages from infants and older<sup>†</sup></li> </ul>	2 More standardized approach
Rescue breathing	<ul style="list-style-type: none"> <li>• Every rescue breath should be given over 1 second</li> <li>• Every rescue breath should produce a chest rise visible to the rescuer</li> </ul>	1 Simple, straightforward
After defibrillation	<ul style="list-style-type: none"> <li>• Deliver 1 shock and follow immediately with CPR, starting with chest compressions.</li> <li>• Check ECG only after ~5 CPR cycles (~ 2 minutes)</li> </ul>	0
Use of AEDs with children age ≥ 1 year	<ul style="list-style-type: none"> <li>• Reaffirmation of 2003 ILCOR statement</li> </ul>	0
Mean KISS score		3/5 or 0.6

Abbreviations: AED, automatic external defibrillator; CPR, cardiopulmonary resuscitation; ECC emergency cardiovascular care; ECG, electrocardiography; ILCOR, International Liaison Committee on Resuscitation.

\*KISS Index: a subjective measurement of the degree to which the change simplifies CPR procedures, making them easier to learn, retain, and perform correctly; ranges from 0 = no evidence of simplification; 1 = some/limited simplification; 2 = clear evidence of simplification.

<sup>†</sup>Except newborns.

**Table 2** 2005 CPR-ECC Guidelines: synopsis of changes for lay CPR rescuers

Aspect	Change for 2005	KISS Index*
Airway opening	<ul style="list-style-type: none"> <li>• Use head tilt-chin lift for <i>all</i> victims (discontinue use of jaw thrust even if spinal injury suspected)</li> </ul>	2 More standardized approach
Check for spontaneous breathing	<ul style="list-style-type: none"> <li>• Only check on unresponsive victims and then, for no more than 10 seconds</li> </ul>	1 Fewer unwarranted actions
Before rescue breath	<ul style="list-style-type: none"> <li>• Take a normal (not deep) breath</li> </ul>	1 Easier to do
Rescue breathing	<ul style="list-style-type: none"> <li>• Give each breath over 1 second, verifying that chest rises</li> <li>• All rescue breathing<sup>†</sup> is accompanied by chest compressions</li> </ul>	0
Lack of chest rise	<ul style="list-style-type: none"> <li>• Repeat head tilt-chin lift before next breath</li> </ul>	1 Consistency
After first 2 rescue breaths	<ul style="list-style-type: none"> <li>• Do <i>not</i> check for circulation</li> <li>• Immediately start chest compressions</li> </ul>	2 Consistent CPR cycles
Compression: ventilation	<ul style="list-style-type: none"> <li>• Use same 30:2 ratio for all victims</li> </ul>	2 Consistency
Compressions for child Compressions for infant	<ul style="list-style-type: none"> <li>• Compress at nipple line with 1 or 2 hands compress just below nipple line with 2 fingers</li> </ul>	1 Reduces some variances related to victim's size and age
When to phone 911 for unresponsive child, infant	<ul style="list-style-type: none"> <li>• If sole rescuer, administer ~5 compression:ventilation cycles (~2 min) first</li> </ul>	0
Obstructed airway	<ul style="list-style-type: none"> <li>• Only 2 (versus 3) degrees of obstruction (mild, severe) to act on</li> <li>• Only 1 question (Are you choking?) to ask victim (versus 2)</li> </ul>	2 Less complicated
After AED shock	<ul style="list-style-type: none"> <li>• Immediately start CPR</li> </ul>	0
First aid	<ul style="list-style-type: none"> <li>• Some additional recommendations offered, eg, stabilization of spine, snakebites, poisoning</li> </ul>	0
Mean KISS score		12/12 or 1.0

Abbreviations: AED, automatic external defibrillator; CPR, cardiopulmonary resuscitation; ECC emergency cardiovascular care.

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<sup>†</sup>Except for Heartsaver Pediatric First Aid.

that majority of CPR recipients. Here I'll attempt to offer both a synopsis of changes incorporated in the 2005 CPR-ECC *Guidelines* most relevant to critical care nurses and briefly estimate the extent to which the revised guidelines were simplified.

### Notable Changes in CPR – ECC Guidelines

The major changes incorporated in the 2005 CPR-ECC *Guidelines* can be divided into 3 segments<sup>5</sup>:

1. Changes relevant to all CPR rescuers

2. Changes pertaining to lay CPR rescuers

3. Changes relevant to healthcare providers of CPR and ECC in basic cardiovascular life support (BCLS) and advanced cardiovascular life support (ACLS)

The most important changes in the 2005 CPR-ECC *Guidelines* for all CPR providers (except newborn resuscitation) are summarized in Table 1. Emphasis on provision of effective CPR is highlighted so that when CPR is administered, its quality adheres to AHA guidelines and thereby affords victims the best chance for survival and recovery.

**Table 3** 2005 CPR-ECC Guidelines: synopsis of changes for healthcare providers of BCLS

Aspect	Change for 2005	KISS Index*
Airway opening with suspected cervical spine injury	<ul style="list-style-type: none"> <li>• First, try jaw thrust without head extension</li> <li>• Use head tilt-chin lift if jaw thrust not effective</li> </ul>	0
Check for spontaneous breathing	<ul style="list-style-type: none"> <li>• Check for adequate ventilation in victims of all ages</li> </ul>	2 More standardized approach
Volume of rescue breath	<ul style="list-style-type: none"> <li>• Should be sufficient to cause a visible chest rise</li> <li>• Avoid larger or forcefully delivered breaths</li> </ul>	2 More standardized approach
Chest compressions	<ul style="list-style-type: none"> <li>• Provide at adequate rate (~100/min)</li> <li>• Provide at adequate depth (38-51 mm)</li> <li>• Allow full chest recoil between compressions</li> <li>• Interruptions should not exceed 10 seconds</li> <li>• With ≥ 2 rescuers, rotate compressor role every 2 minutes</li> </ul>	0
Compression:ventilation ratio	<ul style="list-style-type: none"> <li>• 30:2 for single rescuer with victims of all ages</li> <li>• 30:2 for 2 rescuers with adult victims</li> <li>• 15:2 for 2 rescuers with infants and children</li> <li>• For 2 rescuers when advanced airway in place: continuous compressions without pauses at 100/min, with 8 to 10 rescue breaths/min (about every 7 s)</li> </ul>	0 Consistent only for adults without airway
Foreign body obstructed airway	<ul style="list-style-type: none"> <li>• Same simplifications as for lay rescuers: only 2 degrees of obstruction to act on only 1 question to ask victim</li> <li>• Blind finger sweeps and tongue-jaw lift no longer used</li> </ul>	2 Less complicated and fewer procedures
Operational definition of "child" for BCLS purposes	<ul style="list-style-type: none"> <li>• "Child" victim age range 1 year to onset of puberty (about 12 to 14 years)</li> </ul>	2 Clarification
<i>Infants, children:</i> effective rescue breathing	<ul style="list-style-type: none"> <li>• Airway opening and effective ventilation may require a few attempts before chest rise is visible</li> </ul>	0
<i>Infants, children:</i> chest compression	<ul style="list-style-type: none"> <li>• Provide with symptomatic bradycardia (heart rate &lt; 60/min with signs of poor perfusion despite adequate ventilation and oxygenation)</li> <li>• Provide at adequate depth (1/3 to 1/2 chest depth)</li> <li>• Single rescuer: <ul style="list-style-type: none"> <li>◆ Child, compress using 1 or 2 hands on sternum at nipple line</li> <li>◆ Infant, compress using 2 fingers on sternum just below nipple line</li> </ul> </li> <li>• Two rescuers: infant compressions using 2 thumbs-encircling hands technique with thoracic squeeze</li> </ul>	0
<i>Infants, children:</i> compression:ventilation ratio	<ul style="list-style-type: none"> <li>• 15:2 for 2 rescuers with infants and children</li> </ul>	0
When to phone 911 as single rescuer	<ul style="list-style-type: none"> <li>• CPR first (~5 cycles or 2 min) for all likely victims of hypoxic arrest (drowning, drug overdose)</li> <li>• Call 911 first for all victims with out-of-hospital sudden collapse. Then get the automatic external defibrillator and start CPR</li> </ul>	1 Better clarification
Mean KISS score		9/11 or 0.82

Abbreviations: BCLS, basic cardiovascular life support; CPR, cardiopulmonary resuscitation; ECC emergency cardiovascular care.

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**Table 4** 2005 CPR-ECC Guidelines: synopsis of changes for healthcare providers of ACLS

Aspect	Change for 2005	KISS Index*
Relative import of BCLS versus ACLS	<ul style="list-style-type: none"> <li>Potential benefits of any ACLS therapy on patient outcomes are dwarfed by the potential benefits from immediate, high-quality CPR and early defibrillation.<sup>5</sup></li> <li>High-quality CPR includes chest compressions of adequate depth, allowing full chest recoil, at sufficiently fast rate (100/min), with minimal interruptions.</li> </ul>	2 Clarifies priorities
Artificial airways	<ul style="list-style-type: none"> <li>ET intubation limited to providers with adequate training, experience, and expertise</li> <li>Other advanced airways (eg, LMA, combitube) can be used and provide ventilation as effective as an ET tube.</li> <li>Correct placement of all advanced airways needs primary verification by both clinical and device (eg, exhaled carbon dioxide detector) data.</li> </ul>	1 Clarifies options more fully
Algorithm for treatment of pulseless arrest	<ul style="list-style-type: none"> <li>Reorganized to include VF, pulseless VT, asystole, PEA</li> <li>Priority is provision of uninterrupted effective chest compressions</li> <li>Warranted interruptions ideally limited to shock delivery and rhythm checks (while defibrillator recharging)</li> <li>After 1 shock, pulse and rhythm are <i>not</i> checked; rather, CPR resumed and continued for ~ 2 minutes before checks are performed</li> </ul>	1 Reinforces same priorities
Drug administration	<ul style="list-style-type: none"> <li>IV or IO routes preferred to ET</li> <li>Should occur as soon as possible after rhythm checks, without disrupting compressions</li> </ul>	0
Preferred drugs	<ul style="list-style-type: none"> <li>Vasopressors or epinephrine for VF or pulseless VT when IV or IO line in place</li> <li>Antiarrhythmics: amiodarone preferred over lidocaine for VF and VT</li> <li>Epinephrine or vasopressin and then atropine for asystole and PEA</li> <li>Symptomatic bradycardia: For high-degree AV block, transcutaneous pacing should be instituted without delay. In the interim, administer atropine, epinephrine, or dopamine.</li> </ul>	0
Single algorithm for tachycardia	<ul style="list-style-type: none"> <li>Unstable victim: immediate synchronized cardioversion</li> <li>Stable patient: 12-lead ECG to distinguish narrow or wide QRS tachycardia with regular or irregular rhythm</li> </ul>	2 Distills multiple algorithms
Mean KISS score		6/6 or 1.0

Abbreviations: ACLS, advanced cardiovascular life support; CPR, cardiopulmonary resuscitation; ECC, emergency cardiovascular care; ECG, electrocardiography; ET, endotracheal; IO, intraosseous; IV, intravenous; LMA, laryngeal mask airway; PEA, pulseless electrical activity; VF, ventricular fibrillation; VT, ventricular tachycardia.

\*KISS Index: a subjective measurement of the degree to which the change simplifies CPR procedures, making them easier to learn, retain, and perform correctly; ranges from 0 = no evidence of simplification; 1 = some/limited simplification; 2 = clear evidence of simplification.

More than a dozen substantive changes were made in the 2005 *Guidelines* that relate to lay rescuer CPR for victims of all ages (except neonates). A summary of those revisions is provided in Table 2.

Tables 3 and 4 summarize 2005 changes in the CPR-ECC *Guidelines* directed at healthcare staff who provide BCLS and ACLS. As in all other sections of these *Guidelines*, the underscored emphasis is on provision of high-quality CPR, characterized as push hard, push fast, allow full chest recoil following each compression, and minimize interruptions to compression.

### Evidence of Simplification in 2005 CPR – ECC Guidelines

When the most recent iteration of the CPR-ECC *Guidelines* are considered for their scientific merit, one

cannot deny their inestimable value in affording the best and the brightest contributions to evidence-based practice of CPR. Rigorous criteria for what qualifies as evidence as well as for categorizing the strength of that evidence were employed throughout the evaluation process to serve as a basis for recommended changes in the *Guidelines*. This state-of-the-science notwithstanding, however, can we reasonably expect that these newly disseminated *Guidelines* will improve the CPR survival rate?

As the previous editorial suggested, simplification of CPR procedures might offer some promise for provision of CPR according to AHA recommendations by making the guidelines easier to learn, retain, and apply when needed. In an admittedly cursory attempt to make this judgment, I've designed a wholly subjective and completely unscientific keep it simple, smartie (KISS) index

for rating the degree to which the new *Guidelines* appear to reflect simplification in CPR procedures. The ratings range as follows:

0 = No evidence of simplification

1 = Some/limited evidence of simplification

2 = Clear evidence of simplification

As Tables 1 through 4 indicate, the average of my initial assignment of KISS scores ranged from 0.6 for the changes affecting all rescuers to 1.0 for the changes pertaining to lay rescuers and to healthcare providers of ACLS. Although other evaluators could readily make different judgments on this variable, one encouraging finding is that of the 34 aspects of CPR-ECC in which changes were highlighted, ratings of 1 or 2 (indicating at least some evidence of simplification) were assigned to 19% or 56%, respectively, of those aspects. That may not represent a scientific healthcare milestone, yet it may reflect a few beginning avenues toward merging the science of CPR with the science of education so that performance of CPR can be more effectively learned, retained, and provided to victims of cardiac arrest. Between now and the next revision of these guidelines, we await research evidence that supports or disproves this assertion.

#### References

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4. Alspach JG. CPR—The vanishing competency. *Crit Care Nurse*. December 2005;25:8, 10-12.
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