

CPR Guidelines Reveal Major Revisions in 2010

Changing the CPR sequence for adults and kids allows all rescuers to begin chest compressions first.

BY MICHELE G. SULLIVAN
FROM CIRCULATION

An updated guideline for emergency cardiovascular care has changed the A-B-C mnemonic of cardiopulmonary resuscitation to C-A-B, emphasizing the need to start chest compressions as quickly as possible and worry about the airway second.

It's the biggest – and most important – change in the 2010 update of the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, said coauthor Dr. Michael Sayre, chairman of the American Heart Association's Emergency Cardiovascular Care (ECC) Committee.

"For more than 40 years, CPR training has emphasized the ABCs of CPR, which instructed people to open a victim's airway by tilting their head back, pinching the nose and breathing into the victim's mouth, and only then giving chest compressions," Dr. Sayre said in a press statement. "This approach was causing significant delays in starting chest compressions, which are essential for keeping oxygen-rich blood circulating through the body. Changing the sequence from A-B-C to C-A-B for adults and children allows all rescuers to begin chest compressions right away."

Any delay in chest compression, either by bystanders squeamish about mouth-to-mouth or clinicians searching for ventilation equipment, increases the risk of death, the statement noted. This change correlates with a British study published

recently in *Lancet*, which found that nonprofessional rescuers are most effective when they use compression-only CPR (*Lancet* 2010 [doi:10.1016/S0140-6736(10)61454-7]).

The AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care were last updated in 2005, the authors said. Since then, a plethora of evidence has changed the clinical approach to emergency cardiovascular care. The committee, which included 356 resuscitation experts from 29 countries, produced 411 new evidence-based reviews, from which the updates were drawn.

The new recommendations also call for an increase in the rate of chest compressions, to at least 100/minute. "Rescuers should push deeper on the chest, compressing at least two inches in adults and children and 1.5 inches in infants," the statement notes. "Between each compression, rescuers should avoid leaning on the chest to allow it to return to its starting position."

The guidelines recommend the new C-A-B approach for adults, teens, and children who suddenly collapse and stop breathing, or display ineffective respiration during collapse. For neonates with no known cardiac etiology, however, the A-B-Cs remain in effect. Ventilation with room air is best for term babies in arrest; to avoid the negative impact of pure oxygen on newborns, the statement calls for a blend of room air and oxygen for infants who need supplemental oxygen. For these babies, the recommendation

for a 3:1 chest compression–ventilation ratio remains in effect, because ventilation is critical to reversing neonatal asphyxia arrest.

Advanced Life Support

In addition to providing information for bystander rescue attempts, the guidelines suggest some changes in the way cardiac arrest and stroke patients are treated by emergency medical services, emergency physicians, and those involved with postincident care.

In keeping with the new C-A-B format, the document urges EMS personnel to minimize interruptions in chest compression to what is necessary for rescue ventilation. Even taking time for pulse checks is no longer advised, since pulse is not an effective indicator of cardiac status when blood pressure is low or absent.

Electrical therapy should be employed as soon as possible after CPR begins, but CPR should not cease while readying the defibrillator, the guidelines say. "Rescuers should minimize the interval between stopping compressions and delivering shocks, and should resume CPR immediately after shock delivery."

The statement recommends an initial biphasic energy dose of 120-200 joules for atrial fibrillation and 50-100 joules for atrial flutter or other supraventricular tachycardias. If the initial shock fails, providers should increase the dose in a stepwise fashion.

For patients with symptomatic arrhythmias, the updates now recommend adenosine for diagnosing and treating stable undifferentiated wide-complex tachycardia when the rhythm is regular and the QRS wave is monomorphic. For symptomatic or unstable bradycardia,

intravenous chronotropic agents can be an effective alternative to external pacing if adenosine is ineffective.

The guidelines include a major new class I recommendation for adult airway management: the use of quantitative waveform capnography for confirmation and monitoring of endotracheal tube placement. Additionally, they no longer endorse the routine use of cricoid pressure during airway management.

After the Cardiac Arrest

The recommendations don't stop when the patient regains spontaneous circulation. An entire section of the document is devoted to post-cardiac arrest care, pushing for an integrated, multidisciplinary approach. "Patients with suspected acute coronary syndrome should be triaged to a facility with reperfusion capabilities and a multidisciplinary team prepared to monitor patients for multi-organ dysfunction and initiate appropriate post-cardiac arrest therapy, including hypothermia."

The guidelines deal with stroke separately, summarizing what should occur during out-of-hospital care through the first hours of therapy. One new recommendation is that acute stroke patients be triaged to a stroke center or dedicated stroke unit within 3 hours of presentation. The guidelines also expand the time window for administration of recombinant tissue plasminogen activator, and recommend it also be used in patients with acute ischemic stroke.

Many of the 33 writing members of the guidelines committee disclosed financial relationships, which are listed on the last page of the executive summary (*Circulation* 2010;122:S640-56). ■

STEMI Transport More Cost Effective Than New PCI Centers

BY MARY ANN MOON

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CARDIOVASCULAR QUALITY AND
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Transporting emergency services patients with ST-segment myocardial infarction to only those hospitals that already have percutaneous coronary intervention capability increases access to the procedure and is much more cost effective than constructing new or expanding existing PCI centers and staffing them, according to a computer-simulated study.

"Our results strongly suggest that construction and staffing of new PCI [facilities] may not be warranted if an [emergency medical service] strategy is both available and feasible," wrote Thomas W. Concannon, Ph.D., of the Center for Cardiovascular Health Services Research, Tufts Medical Center, Boston, and his associates.

In the study, researchers used mathematical modeling to compare the benefits and costs of various approaches for improving patient access to PCI. "We simulated EMS transport, reperfusion strategy, clinical outcomes, and costs for 2,000 patients, representing approximately 1 year of STEMIs in a municipal area the size of Dallas County, Texas," they said.

This region encompasses an ethnically diverse population residing in urban, suburban, and rural areas.

The models incorporated predicted rates of post-MI stroke, congestive heart failure, reinfarction, and mortality at 30 days and 6 months.

The investigators compared outcomes between a strategy in which EMS providers transported patients to existing PCI-

capable hospitals only, and another in which EMS providers transported patients to the nearest hospital, regardless of PCI capability. They assessed 13 sce-

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narios in which either hospital PCI capability was constructed from scratch or existing PCI services were expanded incrementally (for example, from part-time to full-time operating hours, from basic to fuller staff coverage, and from providing no backup coronary artery bypass surgery suite to providing an on-site CABG suite).

All models increased patient access to PCI. However, the strategy in which patients were taken

only to hospitals with PCI capability was by far the best, allowing 1,391 of the 2,000 patients to receive PCI, the investigators wrote (*Circ. Cardiovasc. Qual. Outcomes* 2010;3:506-13). This strategy also was the most cost effective, with a cost per quality-adjusted life-year (QALY) saved of \$506.

In comparison, the most cost effective of the 13 hospital-based scenarios – to expand existing part-time PCI centers within the two highest-volume hospitals so that they had on-call staff covering nights and weekends – allowed only 913 of the 2,000 patients to receive PCI, at a cost per QALY saved of \$10,000.

All the remaining scenarios increased the number of patients who received PCI to varying degrees, but did so at much higher costs of up to

\$85,000 per QALY saved.

None of these models explored an approach in which the STEMI patients were stratified so that only those most likely to benefit from PCI would be diverted to PCI-capable hospitals. "We believe an even stronger case could be made for a strategy that involves selective transport of only those patients who are individually predicted to benefit," the authors said.

"Our results suggest that regional planners should consider EMS strategies for increasing access to PCI before adopting strategies involving new construction or increased staffing of PCI hospitals," they said.

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