Are you up to date on the latest BLS and ACLS

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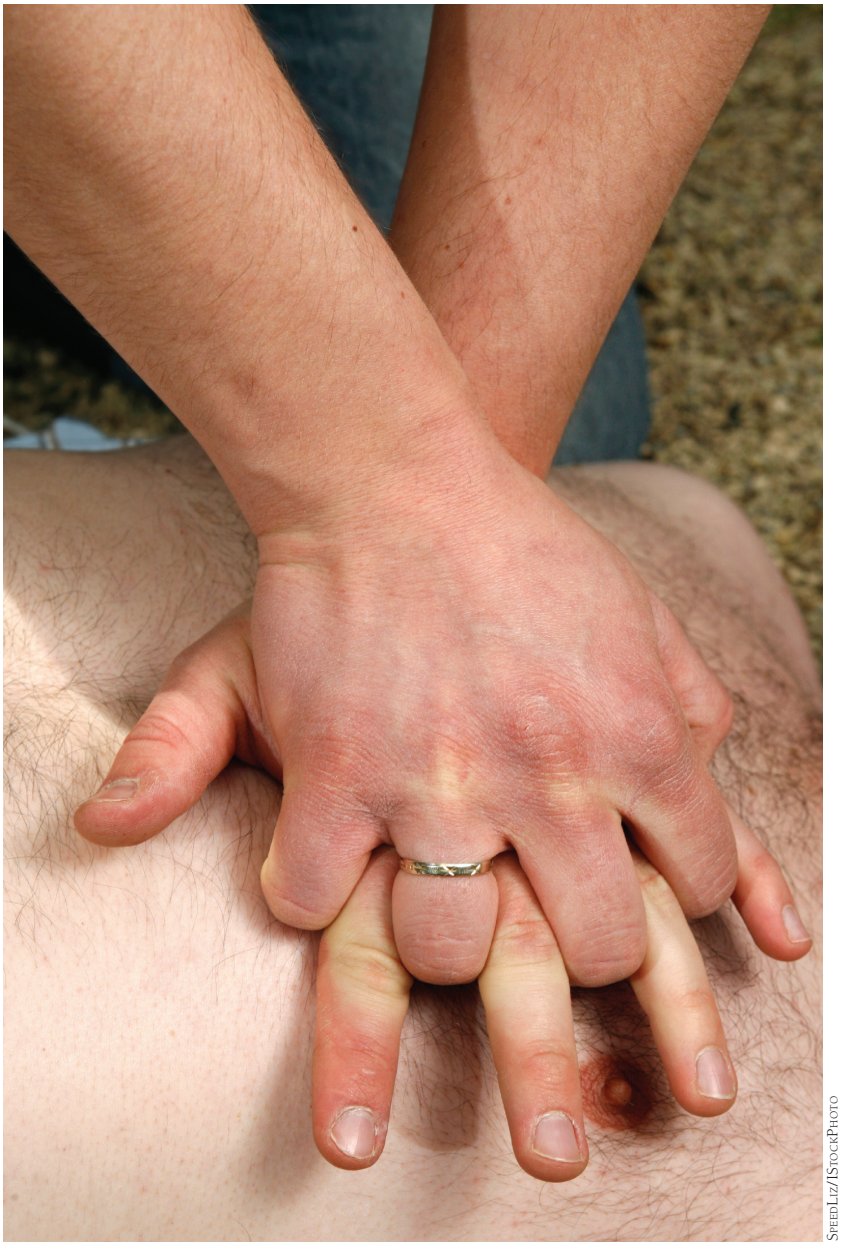

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IN 2010, THE AMERICAN Heart Association (AHA) released updated guidelines for basic life support (BLS) and advanced cardiovascular life support (ACLS). Several changes have been made to the guidelines as well as the standard algorithms to improve resuscitation practice. This article will provide an overview of the newest additions and deletions so you're up to date on the most recent advances in emergency cardiovascular care for adults. A future article will cover guideline changes in pediatric life support. To see the complete AHA guidelines, visit http://static.heart.org/eccguidelines/2010-guidelines-for-cpr.html.

From ABC to CAB

The fundamental aspects of BLS, which remain unchanged, include recognition of arrest, activation of an emergency response system (ERS), early CPR, and rapid defibrillation. But the sequence of BLS has changed from the familiar ABC (airway, breathing, circulation) to CAB (compressions, airway, breathing). This change was made because research showed that in the ABC sequence, chest compressions are often delayed while the responder opens the airway to give ventilations, retrieves a barrier device, or gathers and assembles ventilation equipment. When the sequence is CAB, chest compressions are started sooner and the delay in ventilation is

guidelines ?

minimized. Most victims of out-of-hospital cardiac arrest don't receive bystander CPR, and one reason may be the ABC sequence, which starts with procedures that rescuers find most difficult (opening the airway and delivering breaths). Starting with chest compressions may encourage more rescuers to begin CPR.[1] The sequence now looks like this:

Recognition. "Look, listen, and feel" has been removed from the BLS algorithm; instead, you'll need to determine unresponsiveness and absence of *normal* breathing, such as absent or gasping respirations. Once the patient is determined to be unresponsive, activate the ERS and get an automated external defibrillator (AED)/defibrillator or send a second rescuer (if available) to do this.

Compressions. Pulse checks have been de-emphasized due to the difficulty in determining the presence or absence of a carotid pulse. If you don't feel a definite pulse within 10 seconds, begin cycles of 30 compressions and 2 breaths, beginning with chest compressions, and use an AED/defibrillator as soon as it becomes available.[1] In an adult, 1 cycle of CPR equals 30 compressions and 2 ventilations.

If you're alone and you witnessed the patient's arrest, activate the ERS and try to obtain an AED. If you're alone but didn't witness the patient's arrest, complete 2 minutes (5 cycles of 30 compressions and 2 breaths), beginning with chest compressions, before activating the ERS and obtaining the AED/defibrillator.

The new guidelines recommend a compression rate of at least 100 per minute and a compression depth of the adult sternum of at least 2 inches (5 cm).[2] Hand placement remains the same; place the heel of both hands on the lower half of the sternum, between the nipples. To ensure adequate compressions, allow the chest to recoil completely between compressions and minimize interruptions. If possible, rotate rescuers performing compressions every 2 minutes to prevent fatigue.

Airway. After performing 30 compressions, open the airway using a head-tilt–chin-lift maneuver. If you suspect a cervical spine injury, use a jaw thrust.

Breathing. After opening the airway, give 2 breaths, each over 1 second. You should see the chest rise. Avoid excessive ventilation because it can cause gastric distention and regurgitation, increase intrathoracic pressure, decrease venous return to the heart, and decrease cardiac output.

If only rescue breathing is required, give rescue breaths at a rate of 10 to 12 per minute (1 breath every 5 to 6 seconds), rechecking the pulse every 2 minutes. If an advanced airway is in place, one ventilation should be given every 6 to 8 seconds (8 to 10 breaths per minute).

Quick guide to major changes in BLS[1]

Recognition: Unresponsive, no breathing or no normal breathing (only gasping), no pulse palpated within 10 seconds
CPR sequence: Compressions–Airway–Breathing
Compression rate: At least 100 per minute
Compression depth: At least 2 inches (5 cm)
Ventilations (when rescuer is untrained or trained and not proficient): Compressions only

Note: These changes apply to adult patients.

The new guidelines support the use, when indicated (with minimal interruption in CPR), of supraglottic airway devices such as a laryngeal mask airway, esophageal-tracheal tube, and a laryngeal tube. Confirmation of advanced airway placement still includes both clinical assessment and devices, such as exhaled carbon dioxide detectors.

In addition to clinical assessment, continuous waveform capnography reliably confirms endotracheal tube placement and monitors placement during patient transport and transfer. Continuous waveform capnography will also provide information about the adequacy of CPR and the return of spontaneous circulation (ROSC). The use of capnography to monitor supraglottic airway placement, however, hasn't been studied.[3]

The recommended compression-to-ventilation ratio in an adult is 30:2 with 1 or 2 rescuers. CPR is administered in 2-minute time frames consisting of 5 cycles of CPR. Synchronization of ventilations and compressions isn't necessary once an advanced airway is in place (meaning that the compressor no longer pauses after every 30 compressions to allow delivery of 2 rescue breaths).

The new guidelines no longer recommend the routine use of cricoid pressure (applying pressure to the cricoid cartilage to move the trachea posteriorly and compress the esophagus against the cervical vertebrae). Studies suggest that cricoid pressure can make placing an advanced airway more difficult and impede ventilation.

Defibrillation basics

After cardiac rhythm analysis, electrical therapy (defibrillation) is recommended if indicated, using either monophasic or biphasic energy. Although biphasic energy has been shown to be more effective, the use of monophasic energy is still acceptable.[4]

The new guidelines recommend that interruptions in compressions be kept to a minimum, with resumption of CPR, beginning with compressions, immediately after the shock for 2 minutes or 5 cycles. The rhythm is then reanalyzed and another shock is administered if needed. There is no change from the 2005 recommendation regarding the 1-shock compared with a 3-shock protocol. Research supports the recommendation of single shocks followed by immediate CPR rather than stacked shocks for attempted defibrillation.

The 2005 recommendations regarding fixed and escalating energy are also unchanged. The optimal biphasic energy level for first or subsequent shocks has not been determined. On the basis of available evidence, if the initial biphasic shock is unsuccessful in terminating ventricular fibrillation (VF), subsequent energy levels should be at least equivalent, and higher energy levels may be considered, if available.[1] The general recommendations for shock energy continue to include following the manufacturer's recommendation for biphasic defibrillators: 120 to 200 joules (J) for the initial shock; if unknown, use the maximum available; second and subsequent doses should be equivalent, and higher doses may be considered. For monophasic defibrillators, the recommendation continues to be 360 J for both initial and subsequent shocks. See *Quick guide to major changes in BLS* and *Quick guide to major changes in ACLS* for an overview of these guideline updates.

Foreign body airway obstruction (FBAO): Signs of FBAO include the

Quick guide to major changes in ACLS[1]

- Continuous quantitative waveform capnography is recommended to confirm endotracheal tube placement and to monitor effectiveness of resuscitation efforts.
- An increased emphasis is placed on physiologic monitoring of the patient to optimize CPR quality and detect ROSC.
- Atropine is no longer recommended for routine use in managing PEA/asystole and has been removed from the ACLS Cardiac Arrest Algorithm.
- Adenosine is recommended for treatment and diagnosis in the initial management of undifferentiated regular, monomorphic, wide-complex tachycardia.
- Systematic postcardiac arrest care after ROSC should continue in a CCU with expert multidisciplinary management and assessment of the neurologic and physiologic status of the patient (which often include therapeutic hypothermia).

Note: These changes apply to adult patients.

sudden onset of respiratory distress, such as stridor or wheezing. If the patient is making sounds and coughing, a mild obstruction is the cause and there's no need to intervene. If the obstruction is severe, cough becomes silent with increased respiratory difficulty and stridor. In this case, perform abdominal thrusts until the object is expelled or the victim loses consciousness. Chest thrusts are recommended for pregnant women and obese patients.

If the patient loses consciousness, ease the patient to the ground (protecting the head), send someone to activate the ERS, and begin CPR, starting with compressions. Don't perform a pulse check. After 30 compressions, open the mouth; if you see a foreign body that can be easily removed, remove it and attempt to give 2 breaths, but don't perform a blind finger sweep.

It goes around

Algorithms for adult BLS and ACLS are now presented in two forms: the traditional box line form and a new circular format. Both formats are simplified, emphasize high-quality CPR, and de-emphasize the use of devices, drugs, and other distracters.[1] The circular format places an emphasis on teams and teamwork in emergency cardiovascular care.

Let's review the newest guideline updates in ACLS.

VF or pulseless ventricular tachycardia (VT): After rhythm identification, administer 1 shock, then 2 minutes of CPR while inserting a vascular access device. Check the rhythm and administer another shock, if indicated, and continue with 2 minutes of CPR. During that time, administer I.V. or intraosseous (I.O.) epinephrine or vasopressin (no changes to dosing of these vasopressors). If the patient needs an advanced airway, minimize interruptions of CPR during insertion. Initiate continuous quantitative waveform capnography monitoring. Check the rhythm, administer another shock (if indicated), and follow with 2 minutes of CPR.

During this time, identify and treat any reversible causes (see *Remember the H's and T's*) and

Remember the H's and T's

The H's and T's are common, reversible causes of cardiac arrest. They include:

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypo-/hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

administer amiodarone. This is the preferred first-line antiarrhythmic; lidocaine should be given only if amiodarone isn't available. No changes have been made to amiodarone dosing. Continue 2-minute CPR periods followed by rhythm reevaluation and appropriate treatment, including defibrillation, if indicated, until the return of ROSC.

The 2010 guidelines provide new recommendations for postarrest care, including neurologic and cardiopulmonary support. Interventions such as therapeutic hypothermia and percutaneous coronary intervention (PCI) may be used. Electroencephalograms may be performed to monitor patients who remain comatose after resuscitation as well as patients who develop seizures postarrest. These postarrest interventions have been shown to improve survival to hospital discharge.[3]

Pulseless electrical activity (PEA)/asystole: The use of atropine in the treatment of PEA/asystole is no longer indicated in the 2010 guidelines. Evidence suggests that the routine use of atropine during PEA/asystole is unlikely to have a therapeutic benefit. However, I.V./I.O. epinephrine (or vasopressin in place of the first or second dose of epinephrine) is still recommended. Don't forget the H's and T's in evaluating this patient for reversible causes. As in VF/pulseless VT, use continuous waveform capnography.

Symptomatic bradycardia: Defined as a heart rate usually less than 50 beats per minute, associated with serious signs and symptoms related to the bradydysrhythmia such as hypotension, acute mental status changes, signs of shock, ischemic chest discomfort, or acute heart failure, the initial recommended treatment remains atropine. If atropine is ineffective, however, transcutaneous pacing, or an infusion of dopamine or epinephrine, is recommended.[3]

Stable tachycardia with a pulse: The new guidelines recommend administering adenosine for the initial diagnosis and treatment of the patient with regular, narrow-complex tachycardia as well as in a regular, monomorphic, wide-complex tachycardia. With regular, narrow-complex tachycardia, management includes vagal maneuvers, adenosine, a beta-blocker or calcium channel blocker, and expert consultation.

Regular, monomorphic, wide-complex tachycardia (QRS over 0.12 second) management now includes adenosine and expert consultation. There are no changes to adenosine dosing.

Unstable narrow-complex tachycardia with a pulse: Synchronized cardioversion is advised for these patients. Adenosine may be considered to treat unstable regular, narrow-complex tachycardia. While considering sedation, determine initial energy selection based on the guidelines. If the rhythm is narrow and regular, use 50 to 100 J. If the rhythm is irregular (such as in atrial fibrillation), the 2010 guidelines recommend an initial biphasic synchronized cardioversion energy dose of 120 to 200 J or the monophasic dose of 200 J.

Unstable wide-complex tachycardia with a pulse: The new guidelines recommend energy levels of 100 J for synchronized cardioversion of regular, wide-complex tachycardia. Note, however, that wide-complex, irregular tachycardia is treated with defibrillation, not synchronized cardioversion. When using synchronized cardioversion, monophasic or biphasic waveforms can be administered with a stepwise increase in energy levels as needed for subsequent shocks.

Know your guidelines

The 2010 guidelines for ACLS and BLS include the addition of new technology such as continuous waveform capnography, a change in drug regimens for PEA/asystole, a plan for evaluation and treatment of the patient in the postarrest period, and a change to the "ABCs" of CPR. Be sure to read the complete AHA guidelines to ensure you're up to date on all of the changes. ■

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