

Sudden cardiac arrest is a major clinical problem. Approximately 63% of all cardiac deaths are attributed to sudden cardiac arrest, which equates to 300,000 to 400,000 deaths annually.¹ Mortality among patients who have out-of-hospital cardiac arrests varies from 5% to 18% and depends upon the presenting rhythm.²



CPR GUIDELINES INTRODUCED

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Breathing

To avoid the risk of cross-contamination, mouth to mask breathing is recommended and incorporated in basic life support instruction for healthcare providers. Breaths should be delivered over a one second period at estimated normal tidal volumes (enough air to make the chest rise). These changes minimize gastric distention, which occurs in approximately 17% of resuscitation cases, and reduce the risk of vomiting and aspiration.³ Rescue breathing, in the presence of a pulse, is administered at a rate of 10 to 12 breaths per minute for adults and 12 – 20 breaths per minute for infants and children (Table 1). The heart rate should be reassessed every 2 minutes during this maneuver.

Table 1. Rate of Rescue Breathing

Adult	Child	Infant
10 – 12 breaths/minute	12 – 20 breaths/minute	12 – 20 breaths/minute
1 breath every 5 – 6 seconds	1 breath every 3 – 5 seconds	1 breath every 3 – 5 seconds

Circulation

The new guidelines standardized the compression:ventilation ratio for all ages. A universal compression:ventilation ratio of 30:2 is recommended. For unwitnessed cardiac arrest, immediate assessment of the cardiac rhythm by an automatic external defibrillator (AED) is recommended. External cardiac compressions at a compression:ventilation ratio of 30:2 should be performed until an AED is obtained, (Table 2). Care should be taken to avoid shallow chest compressions, which may not produce adequate blood flow. Effective compressions are performed at a depth of 1 ½ - 2 inches for adults, and 1/3 – 1/2 the anterior posterior diameter of the chest for infants and children. The rate of compressions does not vary with age and is standardized at 100 times per minute. To maximize refilling of blood within the heart, the chest should recoil completely after each compression. Interruptions in chest compressions should be kept to a minimum, not more than 10 seconds, and reserved for assessment of spontaneous breathing, palpable pulse and rhythm analysis.

Table 2. Compression:Ventilation Ratio

	Adult	Child	Infant
1 – rescuer	30:2	30:2	30:2
2 – rescuers	30:2	15:2	15:2

In an attempt to improve the rate of survival from sudden cardiac arrest, the International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science examined current practice and data supporting use of CPR, along with changes in the management of sudden cardiac death. The consensus conference, hosted by the American Heart Association, convened in Dallas, Texas in 2005. As a result, new guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care were established. These new evidence-based guidelines include substantial changes to algorithms for basic life support to improve circulation to vital organs, such as the heart and brain, restore a normal cardiac rhythm, and minimize the risk of aspiration. The focus on circulation is reflected in the implementation of a new step to the resuscitation process, or the addition of a “D” to the ABC’s of resuscitation. The four main components of basic cardiopulmonary resuscitation are **A**irway, **B**reathing, **C**irculation and **D**efibrillation.

Airway

The use of the Tilt-Chin lift maneuver is recommended to relieve airway obstruction in an unresponsive victim. During this maneuver, care should be taken to avoid closing the victim’s mouth completely or causing an inadvertent airway obstruction by pressing too deeply into the soft tissue under the chin.

continued on page 8

¹ Zheng ZJ., Croft JB, Giles WH, Mensah GA. “Sudden cardiac death in the United States 1989 to 1998.” *Circulation*. 2001; 104: 2158 – 2163.

² Rea TD, Eisenburg MS, Sinibaldi G, White RD. “Incidence of EMS-treated out-of-hospital cardiac arrest in the United States.” *Resuscitation*. 2004; 63:17 – 24.



CPR GUIDELINES INTRODUCED

continued from page 7

Defibrillation

Once an Automatic External Defibrillator (AED) is obtained, chest compressions are briefly interrupted to facilitate analysis of the cardiac rhythm. Guidelines for defibrillation have also changed. Immediate defibrillation is no longer recommended for an unwitnessed cardiac arrest. Recommendations also do not include the use of stacked defibrillations. Rather, defibrillation should proceed two minutes of CPR with external cardiac compressions. During rhythm analysis, should the AED detect a rhythm which will respond to defibrillation, such as ventricular fibrillation, the administration of one defibrillation is recommended. External cardiac compressions should then be resumed if no palpable pulse is detected. The changes are a result of research which reports significantly better outcomes when effective chest compressions precede electrical defibrillation.⁴ The outcomes were also enhanced when interruptions in the resuscitation process are minimized. The process of performing external cardiac compressions and ventilations, at a ratio of 30:2, should be resumed for 2 minutes, after which CPR should be interrupted briefly for rhythm analysis by the AED.

It is imperative to select the correct defibrillation setting and use the appropriate size electrode pads. A special setting may be available on some AEDs for children. It is preferable to select the “child” mode for individuals 1 – 8 years of age. However, the adult mode may be used if this special feature is not available. Electrode pads, for AEDs are available in 2 sizes. Adult pads should be used for victims 8 years of age or older. Child pads, if available, are recommended for use with children 1 to 8 years of age. The current recommendations do not include the use of an AED for unwitnessed arrests in children less than one year of age.

Sequencing Resuscitation Efforts

Listed below are the new steps for cardiopulmonary resuscitation.

Step	Adult	Child	Infant
1	Assess responsiveness <ul style="list-style-type: none"> Shout for help Lone rescuers should leave the victim to activate the emergency response system and obtain an AED. 	Assess responsiveness <ul style="list-style-type: none"> Shout for help. Lone rescuers should perform 5 cycles of CPR before attempting to leave the victim to activate the emergency response system and obtain an AED. 	Assess responsiveness <ul style="list-style-type: none"> Shout for help. Flick the heel of the infant’s foot. Do not shake the infant. Lone rescuers should perform 5 cycles of CPR before attempting to leave the victim to activate the emergency response system and obtain an AED.
2	Secure an airway <ul style="list-style-type: none"> Perform head tilt-chin lift maneuver Assess for spontaneous respirations (5 – 10 seconds) 	Secure an airway <ul style="list-style-type: none"> Perform head tilt-chin lift maneuver Assess for spontaneous respirations (5 – 10 seconds) 	Secure an airway <ul style="list-style-type: none"> Perform head tilt-chin lift maneuver Assess for spontaneous respirations (5 – 10 seconds)
3	Perform rescue breathing <ul style="list-style-type: none"> Give 2 breaths – enough to allow the chest to rise. Deliver breath over 1 second. Allow the victim to completely exhale before delivering the next breath. 	Perform rescue breathing <ul style="list-style-type: none"> Give 2 breaths – enough to allow the chest to rise. Deliver breath over 1 second. Allow the victim to completely exhale before delivering the next breath. 	Perform rescue breathing <ul style="list-style-type: none"> Give 2 breaths – enough to allow the chest to rise. Deliver breath over 1 second. Allow the victim to completely exhale before delivering the next breath.
4	Assess heart rate <ul style="list-style-type: none"> Check for the presence of a carotid pulse. (5 – 10 seconds) 	Assess heart rate <ul style="list-style-type: none"> Check for the presence of a carotid pulse. (5 – 10 seconds) 	Assess heart rate <ul style="list-style-type: none"> Check for the presence of a brachial pulse. (5 – 10 seconds)
5	Perform cardiac compressions <ul style="list-style-type: none"> Complete 5 cycles of compressions and ventilations at a ratio of (30:2). Reassess breathing and heart rate. 	Perform cardiac compressions <ul style="list-style-type: none"> Complete 5 cycles of compressions and ventilations at a ratio of (30:2) for one-rescuer and (15:2) for two-rescuer. Reassess breathing and heart rate. 	Perform cardiac compressions if no pulse is palpable or if the heart rate is < 60 beats per minute and signs of poor tissue perfusion are present. <ul style="list-style-type: none"> Complete 5 cycles of compressions and ventilations at a ratio of (30:2) for one-rescuer and (15:2) for two-rescuer. Reassess breathing and heart rate.

Summary

Highlights from this round of changes emphasize the following points:

- Rescue breathing is best done mouth to mask
- There is a new standardized compression:ventilation ratio of 30:2 when one rescuer is present
- Compressions should be skillfully done with enough force to eject blood from the heart and permit an effective recoil of the chest wall so the heart can refill
- AED use includes
 - rhythm detection
 - choosing appropriate defibrillation settings
 - choosing pads of appropriate size

What This Means for Credentialing Candidates

Items on NBRC credentialing examinations are job-related, which implies that content will be presented in a clinical context rather than as isolated facts. New items are included with each new version of an examination to encourage examination content that reflects current practice. Content related to clinical presentations that includes resuscitation will follow new guidelines effective in June 2008. Individuals who interact with candidates are encouraged to share this fact with candidates so they do not become confused between old and new CPR guidelines. ■

³ Oschatz E, Wunderbaldinger P, Sterz F, Holzer M, Kofler J, Slatin H, Janata K, Eisenburger P, Bankier AA. “Cardiopulmonary resuscitation performed by bystanders does not increase adverse effects as assessed by chest radiography.” *Anesth Analg*. 2001; 93(1):128-133.

⁴ Li Y, Bisera J, Tang W, Weil MH. “Automated detection of ventricular fibrillation to guide cardiopulmonary resuscitation.” *Crit Pathw Cardiol* 2007;6(3):131-134.