

# 2005 American Heart Association Guidelines for CPR and ECC

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The 2005 American Heart Association Guidelines for CPR and Emergency Cardiac Care (ECC) include major changes from the guidelines last revised in 2000. These guidelines are a product of the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiac Care hosted by the American Heart Association in Dallas, Texas, January 2005. The changes are too extensive to discuss comprehensively here, but some of them are especially relevant for anesthesiologists involved in resuscitation of patients who arrest in the hospital. It is important to review these new guidelines. The changes are based on accumulating evidence and may help improve outcomes. In addition, familiarity with the changes will reduce confusion when we interact with other caregivers trying to implement the new patterns of intervention.

Since it has been so difficult to demonstrate benefit from drug administration to arrest victims, most of the 2005 changes focus on the quality of CPR. In contrast to studies of resuscitation drugs, survival rates for out-of-hospital (at airports, casinos, and programs involving police supervision) arrests have increased dramatically when the quality of CPR was improved by organized programs of early lay rescuer CPR with AEDs. Studies of in-hospital resuscitations have documented suboptimal CPR efforts with inadequate number and depth of compressions that, along with interruptions of compressions and excessive ventilation, impair the effectiveness of CPR by decreasing cardiac output and coronary and cerebral blood flow. These observations indicate plenty of room for improvement of the quality of in-hospital CPR. The guidelines encourage rescuers to push hard and fast during compressions and allow complete recoil after each compression. A compression to ventilation ratio of 30:2 is recommended until incubation. When a patient has an advanced airway in place, it is recommended that compressions continue at a rate of 100 per minute and breaths should be provided at a rate of 8-10 per minute, without pause for ventilation. It is emphasized that hyperventilation impairs the quality of CPR and should be avoided. Throughout the resuscitation, efforts should be made to limit interruptions of chest compressions, such as avoiding pauses for ventilation or to check for pulse after shocks (see below).

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Fatigue has also been identified as a factor limiting the quality of CPR. Effectiveness has been found to deteriorate after two minutes of chest compressions. As a consequence, it is recommended that rescuers delivering chest compressions be relieved every two minutes.

Significant changes have been made in recommendations for treatment of ventricular fibrillation (VF). In the past, standard practice has been to provide defibrillation as soon as possible for all VF victims. However, in two of three recent studies of out-of-hospital VF, a period of CPR before defibrillation improved survival rates when the time from the call to EMS and delivery of the initial shock was more than four to five minutes (the third study was equivocal). The theoretical explanation is that a short period of perfusion by CPR will provide oxygen and energy substrate to the ischemic tissues and improve response to defibrillation. The consensus was that, although there is insufficient data to recommend CPR before defibrillation for all VF victims, EMS rescuers may give five cycles (about two minutes) of CPR before defibrillation when the call to arrival time is more than four to five minutes. The data are insufficient to make recommendations regarding when CPR should be provided before defibrillation of in-hospital-arrest victims. Presently, it is a matter of clinical judgment whether to delay defibrillation for a period of CPR when there is a delay between arrest and treatment. That decision should be influenced by the knowledge that after a period of stasis, CPR and perfusion of the myocardium may improve response to defibrillation.

Other significant changes have been made in the way defibrillation shocks are delivered. ECC Guidelines 2000 recommended a stacked sequence of up to three shocks of increasing energy. The 2005 Guidelines have changed this recommendation, based on the availability of new technology. The three shocks were needed with older defibrillators that deliver monophasic shocks. New defibrillators utilize various biphasic waveforms and have better first shock efficacy. If the first shock does not eliminate ventricular fibrillation (VF), a second shock probably won't either, unless there is some other change. The consensus is that after an unsuccessful first shock, there is greater likelihood of benefit from a period of CPR delivering oxygen and energy substrate than a second and third shock delivered without CPR. Also, after termination of VF, most victims will have a nonperfusing rhythm (pulseless electrical activity or asystole). As a result, it is recommended that CPR efforts resume immediately after the shock without a pause and continue for about two minutes (five cycles) before checking for rhythm or pulse. For in-hospital settings this sequence may be modified at a physician's discretion, as with patients who are continuously monitored.

## 2005 AHA Guidelines (cont'd)

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A few less noteworthy changes have been made in recommendations for drug therapy during resuscitation. The 2000 Guidelines stated that there was no evidence to support the use of vasopressin as an alternative to epinephrine in the treatment of asystole or pulseless electrical activity. Since then, multiple studies have failed to show significant differences in outcome between arrest patients treated initially with either 1 mg of epinephrine or 40 units of vasopressin. As a result, the 2005 Guidelines state that one dose of 40 units of vasopressin IV/IO may replace either the first or second dose of epinephrine in the treatment of pulseless electrical activity (Class Indeterminate).

A new aqueous formulation of amiodarone does not contain vasoactive solvents that may have caused hypotension associated with rapid administration of amiodarone. In clinical trials of patients with ventricular tachycardia, aqueous amiodarone produced no more hypotension than lidocaine. The 2005 Guidelines state that amiodarone (300 mg IV/IO) may be given for VF or pulseless ventricular tachycardia unresponsive to CPR, shock, and a vasopressor (Class IIb).

For additional information about the 2005 AHA Guideline changes, see the complete guidelines document: *Circulation*, Volume 112, Supplement Issue 24, December 13, 2005. Also recommended is the 2005 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care with Treatment Recommendations. Both publications are available free of charge at [www.circulationaha.org](http://www.circulationaha.org).

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