### Guidelines for Performing a 12-Lead ECG

The only way to learn how to obtain a 12-lead ECG is to practice with the equipment itself. Here are some guidelines to help ensure that the ECGs you obtain are of the highest quality possible.

- The patient should be supine. If the patient feels short of breath in that position, you may elevate the back of the stretcher about 30°.
- Make sure the patient does not become chilled, because shivering will produce artifact in the ECG tracing. Note that 12-lead ECGs are more sensitive to artifact than 3-lead monitoring ECGs.
- Prepare the patient's skin as you would for placing monitoring electrodes.
- Connect the four limb electrodes. Double-check that the correct electrode is on each limb (the "LA" electrode on the left arm, the "RA" electrode on the right arm, and so on). Confirm that the limb electrodes are on the arms and legs and *not* on the trunk of the body, as sometimes is the case in a 3-lead ECG.
- Connect and apply the precordial leads as indicated in Table 27-20 ▾.
- Ensure the patient remains very still and the arms and legs are resting. The 12-lead ECG is more susceptible to movement artifact.
- Record the ECG.
- Acquiring a 12-lead tracing should not normally prolong scene time or transport more than 2 minutes.

**Table 27-20 Applying the Precordial Leads**

| Lead | Placement |
|---|---|
| **Standard 12-lead** | |
| $V_1$ | Fourth intercostal space at right sternal border |
| $V_2$ | Fourth intercostal space at left sternal border |
| $V_3$ | Equidistant between $V_2$ and $V_4$ |
| $V_4$ | Fifth intercostal space in left midclavicular line |
| $V_5$ | Anterior axillary line (same horizontal plane as $V_4$) |
| $V_6$ | Midaxillary line (same horizontal plane as $V_4$) |
| **Modified 15-lead ECG** | |
| $V_4$ becomes $V_4R$ | Fifth intercostal space at right midclavicular line (same as $V_4$ but on right side of chest) |
| $V_5$ becomes $V_8$ | Level with $V_{4-6}$ at left midscapular line |
| $V_6$ becomes $V_9$ | Level with $V_{4-6}$ at left paravertebral |

## Management of Adult Cardiac Arrest

Nothing gets the adrenaline pumping more furiously—in paramedics, even if not in the patient—than a "code," or cardiopulmonary arrest. Most adult cardiac arrest victims have evidence of atherosclerosis or other underlying cardiac disease. However, cardiac arrest can also occur after electrocution, drowning, and other types of trauma. Indeed, many cardiac arrest victims have no warning before the event occurs. No matter what the cause, cardiac arrest is a stressful event for paramedics.

Management of cardiac arrest requires you to deploy a great many of the advanced life support (ALS) skills that you have learned and to do so under very urgent circumstances in which minutes may mean the difference between life and death. It is very difficult to think clearly in such stressful circumstances, especially when there are likely to be other stressed and panicky people at the scene (the patient's family, for example). For these reasons, it is absolutely essential for you to follow an orderly, systematic approach to cardiac arrest emergencies. That approach needs to be rehearsed repeatedly in a team setting, until it is nearly automatic, and must include the steps of BLS and ALS.

### BLS: A Review

The techniques and sequences of adult BLS should be very familiar to all paramedic students. Here, we will simply review the guidelines for ensuring maximally effective (and minimally damaging) CPR to adults in cardiac arrest. For a complete review of this skill, see Appendix A.

- Concentrate on high-quality compressions (deep enough, fast enough, and with full chest recoil) with a minimum of interruptions.
- Avoid excessive inflation pressures in artificial ventilation. Inflate just enough to observe visible chest rise.
- Keep your compressions smooth, regular, and uninterrupted.
  1. The compression depth must be at least 5 cm in adults, maintaining each compression for at least half the compression-release cycle.
  2. Avoid bouncing or jerky compressions,
  3. Keep your shoulders directly over the patient's sternum, and keep your elbows straight.
  4. Maintain proper hand position: fingers off the chest, and hands coming up off the sternum slightly between compressions to allow for complete chest recoil.
  5. Change the person doing the compressions every 2 minutes to ensure that fatigue does not affect the quality of compressions.
- As a single rescuer, give 30 compressions to two ventilations at a rate of at least 100 compressions per minute. Once an advanced airway is placed, compressions continue at a rate of at least 100 beats/min uninterrupted with 8 to 10 ventilations given with 100% supplemental oxygen.
- Do not interrupt CPR compressions except for advanced airway placement, defibrillation, or moving the patient. In all cases, minimize the duration of the interruption to as close

to 10 to 15 seconds as possible. Any stop in compressions also stops perfusion—and perfusion is what it is all about!

We shall now consider how to integrate these well-rehearsed steps of BLS into the sequences of ACLS.

## Advanced Cardiac Life Support

We defined BLS as maintenance of the airway, breathing, and circulation—the ABCs—without adjunctive equipment. Basic life support is a holding action only and is unlikely to restore the heart to effective activity. You will be called on to deliver more definitive therapy as well, so the skills of ACLS must also become second nature, to be deployed swiftly and systematically in the event of cardiac arrest.

### What Is ACLS?

The Heart and Stroke Foundation has defined ACLS for a patient in cardiac arrest (or a patient at immediate risk of cardiac arrest) as consisting of the following elements:

- Effective and minimally interrupted chest compression (for cardiac arrest)
- Use of adjunctive equipment for ventilation and circulation
- Cardiac monitoring for arrhythmia recognition and control
- Establishment and maintenance of an IV or IO (intraosseous) infusion line
- Use of definitive therapy, including defibrillation and drug administration, to:
  1. Prevent cardiac arrest
  2. Aid in establishing an effective cardiac rhythm and circulation when cardiac arrest occurs
  3. Stabilize the patient's condition
- Transportation with continuous monitoring

We have already discussed the use of airway adjuncts and equipment for artificial ventilation. In this section, we focus on the sequence of actions in ACLS. The last section of the chapter will describe some of the specific techniques—such as defibrillation—for restoring an effective cardiac rhythm.

### The Universal Algorithm

The approach to every patient in cardiac arrest will start with the same steps. These basic steps are always deployed as soon as a person is found unresponsive and possibly in cardiac arrest. The BLS health care provider algorithm includes measures that bystanders should take before your arrival (such as "phone 9-1-1 or emergency number"), so we need to modify the universal algorithm a bit to make it applicable to emergency medical services personnel.

Whenever you are called for a case that might be a cardiac arrest (such as "man down," "unconscious woman," "choking," "stopped breathing"), carry the defibrillator with you on your first trip from the ambulance to the patient. You should also carry a portable oxygen cylinder and a "jump kit" that contains equipment for managing the airway. If you have enough help—for example, a three-person crew—by all means take the intubation kit, the IV equipment, and the drug box as well. But if you're shorthanded, don't spend the time carting every piece of equipment from the ambulance to the patient. You can send someone to the ambulance for other equipment later.

As soon as you reach the patient, one paramedic should ready the monitor-defibrillator while the other carries out the following steps:

1. **Assess responsiveness.** If the patient is *not* responsive *and there is no pulse, start CPR.* CPR should continue for 2 minutes or 5 cycles of 30 compressions and two ventilations. As CPR continues, the second paramedic should attach the monitor-defibrillator. At the end of 2 minutes, pause CPR and:
2. **Check the rhythm on the monitor.** At this point, all you want to know is the answer to one question: Is *VF* or *VT* present?
   - *If VF or VT is present* on the monitor-defibrillator, follow the VF/VT arm of the algorithm.
   - *If VF or VT is not present* on the monitor-defibrillator, *resume CPR immediately.*

What you see on the monitor at this point will determine which side of the algorithm you will now follow. If the patient is still in cardiac arrest, he or she may be in any of the following situations:

- VF or pulseless VT
- PEA (that is, you can see an organized rhythm on the monitor, but there is no detectable pulse)
- Asystole

Each of these situations requires a different, specific approach (a different pathway down the pulseless arrest algorithm).

Experienced paramedics will note that rescue breathing and ventilation are deemphasized. The traditional "ABC" approach to basic and advanced cardiac life support maneuvers has changed to "CAB." Chest compressions can be started immediately, whereas positioning the head and achieving a seal for bag-valve-mask rescue breathing takes time. Animal studies have shown that delaying chest compressions reduces survival, so such delays should be avoided. If there is only one rescuer, starting compressions is the priority. If there is more than one rescuer, the first rescuer starts compressions and subsequent rescuers can open the airway and begin rescue breathing. Rescue breathing no longer needs to be synchronized to chest compressions.

#### Treatment for VF or Pulseless VT

Managing VF or pulseless VT is probably the most important pathway down the algorithm for you to know because patients found in VF or VT are the most likely to be successfully resuscitated—*if* they receive timely and appropriate treatment. The steps in managing VF and pulseless VT are as follows:

- *Initiate resuscitation* based on the BLS algorithm (see Appendix A).
- *Perform CPR for 2 minutes while the defibrillator is being attached.*
- *Confirm VF or VT on the monitor-defibrillator.*
- *Resume CPR while charging the defibrillator.*
- *Clear the patient and then defibrillate* the VF or VT:
  1. If using a biphasic defibrillator, set it to 120 to 200 joules (J). This energy level depends on the

manufacturer's recommendation. If the recommendation is unknown and the defibrillator is biphasic, use 200 J for all shocks.

2. If using a monophasic defibrillator, set it to 360 J for all shocks.

As soon as the defibrillator discharges, immediately resume CPR. It is important not to delay resuming CPR at this time to determine the rhythm or check for a pulse. Continue CPR for 2 minutes or 5 cycles. Recent research indicates that even if an organized rhythm appears in the postresuscitation period, the presence of an immediate pulse is unlikely. It has also been shown that 2 minutes of postresuscitation CPR is unlikely to cause a return of VF. Only stop CPR during this 2 minutes if you have obvious signs of life. After 2 minutes or five cycles, stop CPR, and assess the patient's circulation and check the rhythm on the monitor.

- If a rhythm other than VF or VT appears on the monitor screen:
  1. *Identify the new rhythm.*
  2. If there is no pulse, move to the asystole-PEA pathway down the algorithm and resume CPR immediately.
  3. If there is a pulse, move to the appropriate algorithm for the new rhythm.
- If the rhythm is persistent VF or VT, *resume CPR while charging the defibrillator.*
- *Clear the patient and then defibrillate* the VF or VT:
  1. Use the same energy setting as previously discussed.
  2. *Resume CPR immediately,* and continue for 2 minutes after the shock. The CPR compressor and ventilator should change positions at the end of each 2-minute session of CPR (while the rhythm and pulse are being checked) to avoid fatigue, which can reduce the effectiveness of chest compressions.
  3. During this 2 minutes of CPR, you should *insert an advanced airway if the BLS airway is not adequate.* Advanced airways include the endotracheal tube, laryngeal mask airway, laryngeal tube, and Combitube. After intubation, verify placement using multiple methods and secure the tube. Once the patient has been intubated, it is no longer necessary to pause CPR compressions for ventilation to be administered. Ventilations should be administered at a rate of 8 to 10 breaths per minute (one breath every 6 to 8 seconds). The rate of compressions is at least 100/min.
  4. *Start an IV* with normal saline.
  5. *If unable to establish IV access, consider establishment of intraosseous (IO) access* via an adult IO access system. If IV access is not obtained but IO access is, all drugs and fluids that would normally be administered via IV should be administered via IO until IV assess is established.
  6. As soon as IV or IO has been established, *administer a vasopressor drug.* The two recommended vasopressor drugs are epinephrine and vasopressin. *Epinephrine (1:10,000) is given as 1 mg IV push;* this dose should be repeated every 3 to 5 minutes as long as a pulse is absent. *Vasopressin is an alternative given as 40 units IV push, one time only.* Vasopressin can be given in place of the first or second dose of epinephrine (but not both). Whenever you give a medication through a peripheral IV line during CPR, follow it immediately with a 20- to 30-ml bolus of IV fluid and then elevate the extremity to facilitate delivery of the medication to the central circulation (which may take 1 to 2 minutes).
- *At the end of 2 minutes of CPR, pause compressions to check for circulation and check the rhythm on the monitor.*
- If VF or VT is still present, *resume CPR while charging the defibrillator.*
- *Clear the patient and then defibrillate* the VF or VT:
  1. Use the same energy setting as before.
  2. Resume CPR immediately, and continue for 2 minutes after the shock. Remember to change CPR compressors after each rhythm check.
  3. During this 2 minutes of CPR, you should *consider the administration of an antiarrhythmic medication.* The preferred antiarrhythmic medication is *amiodarone,* which is given as a 300-mg bolus during CPR. Amiodarone may be repeated once at 150 mg in 3 to 5 minutes after the initial dose. If amiodarone is unavailable, you may administer *lidocaine,* 1 to 1.5 mg/kg IV push. Lidocaine can be repeated at 0.5 to 0.75 mg/kg every 5 to 10 minutes until the maximum dose of 3 mg/kg has been reached. It is important not to combine these two antiarrhythmic medications because this practice can actually cause arrhythmias.
- *At the end of 2 minutes of CPR, pause compressions to check for circulation and check the rhythm on the monitor.*
- If VF or VT is still present, *resume CPR while charging the defibrillator.*
- *Clear the patient and then defibrillate* the VF or VT:
  1. Use the same energy setting as the third shock.
  2. Resume CPR immediately, and continue for 2 minutes after the shock. Remember to change CPR compressors after each rhythm check.
  3. If VF or VT is still present, consider making a transport decision with the advice of direct medical control. Continue the cycle of defibrillation followed by immediate CPR for 2 minutes while administering repeated doses of medications.
- If at any point during this sequence there is a return of spontaneous circulation:
  1. Assess the patient's vital signs.
  2. Support the airway and breathing, as required.
  3. Provide medications as indicated for regulating the HR, controlling cardiac arrhythmias, and maintaining the blood pressure.

The steps of the VF/VT pathway down the pulseless arrest algorithm are presented schematically in Figure 27-83 ›.

### Treatment for Pulseless Electrical Activity

The term pulseless electrical activity (PEA) refers to an organized cardiac rhythm (other than VT) on the monitor that is not accompanied by any detectable pulse. This category includes what was once called electromechanical dissociation and

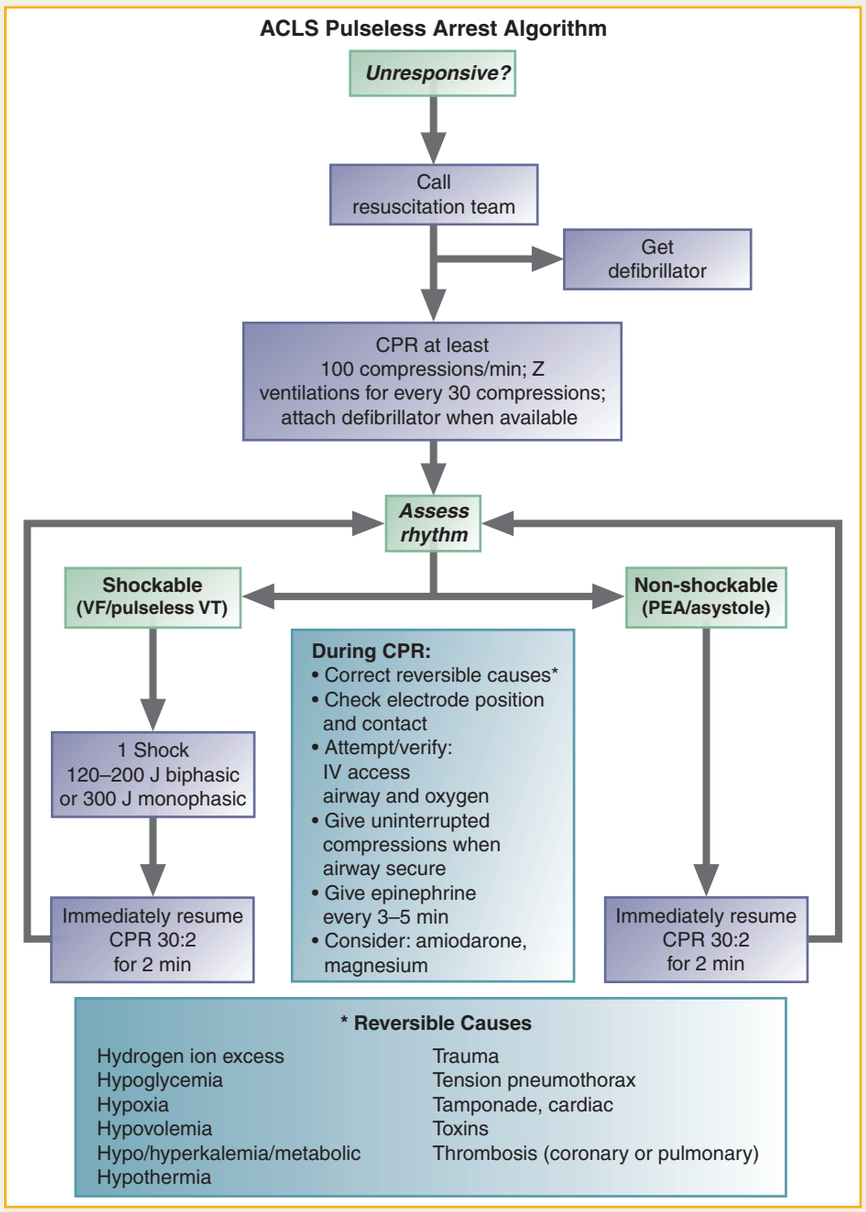


**Figure 27-83** ACLS Algorithm for Pulseless Arrest.

Modified from *Adult Advanced Life Support Algorithm*. Copyright European Resuscitation Council. www.erc.edu Approval #2009/011.

1. *Immediately resume CPR.*
2. *Insert an advanced airway if the BLS airway is not adequate.*
3. *Start an IV* with normal saline.
4. *If you are unable to establish IV access, consider establishing IO access.*
5. As soon as IV or IO access has been established, *administer a vasopressor drug.* The two recommended vasopressor drugs are epinephrine and vasopressin. *Epinephrine (1:10,000) is given as 1 mg IV push;* this dose should be repeated every 3 to 5 minutes for as long as a pulse is absent. *Vasopressin is an alternative and is given as 40 units IV push, one time only.* Vasopressin can be given in place of the first or second dose of epinephrine (but not both). Whenever you give a medication through a peripheral IV line during CPR, follow it immediately with a 20- to 30-ml bolus of IV fluid and then elevate the extremity to facilitate delivery of the medication to the central circulation (which may take 1 to 2 minutes).
6. Search for and treat the possible causes Table 27-21. If you are unable to identify and treat the possible underlying causes, the patient is unlikely to survive.
7. *At the end of 2 minutes of CPR, pause the compressions to check for circulation and check the rhythm on the monitor.*
8. If PEA is still present:
   - *Continue CPR immediately.*
   - Repeat epinephrine every 3 to 5 minutes, as indicated.
   - If no reversible cause is found, consider termination of resuscitation with consultation from direct medical control.

conditions in which the heart beats so weakly that it cannot produce a palpable pulse, which may occur, for example, in cardiogenic or hypovolemic shock, cardiac tamponade, massive pulmonary embolism, disturbances of electrolyte imbalance, or drug overdose. Providing the appropriate treatment depends on identifying the cause of PEA in a specific case.

When the monitor is applied to a pulseless patient and a rhythm (other than VF or VT or asystole) is seen:

### Asystole Treatment

A flat line on an ECG monitor may or may not be asystole. Thus, one of the first things to do when you see a flat-line ECG is to rule out causes other than asystole. Possible causes of a flat-line ECG include leads that are not connected to the patient, loose leads, leads that are not connected to the monitor-defibrillator, an incorrect monitor setting, very-low-voltage VF, and true asystole.

**Table 27-21 Possible Causes and Treatment of PEA**

| Possible Cause of PEA | Clues to Cause | Treatment |
|---|---|---|
| Hypovolemia | Patient history | Volume infusion |
| Hypoxemia | Cyanosis, airway problem | Intubation and ventilation with 100% oxygen |
| Hypoglycemia | Blood glucose level, < 4 mmol/l | Dextrose 50% in water, 25 g (50 ml of $D_{50}W$) |
| Hypothermia | History of exposure to cold | See hypothermia algorithm |
| Hyperkalemia, hypokalemia, hydrogen ions (acidosis) | History, ECG changes | Immediate transport Consider sodium bicarbonate if certain of acidosis. Consider calcium chloride if hyperkalemia is strongly suspected. |
| Tension pneumothorax | History, no pulse with CPR, unequal breath sounds with hyperresonance to percussion on affected side | Needle decompression of the affected side of the chest |
| Cardiac tamponade | History, no pulse with CPR, jugular venous distension | Pericardiocentesis (immediate transport) |
| Others: Drug overdose, trauma, massive MI, pulmonary embolism | History | Immediate transport |

When the monitor is applied to a pulseless patient and asystole is seen:

1. *Immediately resume CPR,* assuming you are not presented with a valid advance directive indicating *not* to perform CPR ("do not resuscitate" orders).
2. *Confirm asystole by checking for other causes of the flat line.* Make sure that all monitoring electrodes are firmly fastened to the patient and that the cables are hooked into the monitor. Switch to another lead to detect low-voltage VF. If the rhythm is asystole, you need to be aware that the prognosis is grim and the chances for successful resuscitation are poor.
3. *Insert an advanced airway if the BLS airway is not adequate.*
4. *Start an IV* with normal saline.
5. *If unable to establish IV access, consider establishing IO access.*
6. As soon as IV or IO access has been established, *administer a vasopressor drug.* The two recommended vasopressor drugs are epinephrine and vasopressin. *Epinephrine (1:10,000) is given as 1 mg IV push;* this dose should be repeated every 3 to 5 minutes for as long as a pulse is absent. *Vasopressin is an alternative and is given as 40 units IV push, one time only.* Vasopressin can be given in place of the first or second dose of epinephrine (but not both).

   Whenever you give a medication through a peripheral IV line during CPR, follow it immediately with a 20- to 30-ml bolus of IV fluid and then elevate the extremity to facilitate delivery of the medication to the central circulation (which may take 1 to 2 minutes).
7. *At the end of every 2 minutes of CPR, pause the compressions to check for circulation and to check the rhythm on the monitor.*
8. If asystole is still present:
   - *Immediately resume CPR.*
   - Search for and treat possible causes. Possible causes are the same as for PEA and are listed in Table 27-21.
   - *Seriously consider termination of the resuscitation with advisement from direct medical control.*

## Postresuscitative Prehospital Care

If an effective cardiac rhythm is restored in the prehospital environment, your next task is to make sure that the rhythm *stays* restored and that optimal conditions are provided to promote recovery of the patient's brain from the hypoxic insult of cardiac arrest.

First, the HR should be stabilized. If the rhythm is bradycardic or tachycardic in the postresuscitation period, the bradycardia or tachycardia algorithms should be followed.

Next, cardiac rhythm should be stabilized to the degree possible. If the arrest rhythm was VF or VT, consider administering a bolus of an antiarrhythmic drug, followed by an infusion of the same drug. Historically, lidocaine has been given in this situation, but if amiodarone was given to the patient in arrest, then an infusion of amiodarone should be started and lidocaine should not be used. If severe bradycardia is present in the postarrest period, atropine or TCP may be required, and the hospital should be alerted to prepare a transcutaneous pacemaker.

Once the cardiac rhythm is stable, attention turns to the brain itself and to ameliorating the effects of cardiac arrest on it. Marked hypotension needs to be corrected rapidly because the brain will not be adequately perfused so long as the blood pressure is very low. If the patient has marked hypotension and the transport time to the hospital will be prolonged, the physician may order an infusion of dopamine or norepinephrine. In an intubated patient, avoid tracheal suctioning unless absolutely necessary; suctioning tends to increase intracranial pressure. Finally, consider elevating the patient's head to about 30° to increase cerebral venous drainage. Therapeutic hypothermia of comatose patients with return of spontaneous circulation may be very beneficial, with initiation typically taking place upon arrival to the ED. Some EMS systems may consider initiation of cooling with cold IV fluids and ice packs during transport.

Postresuscitative care is complex and best carried out in a critical care setting where careful monitoring and titrated therapy can most effectively be given. Thus, transport to the hospital should not be delayed for patients who are resuscitated from cardiac arrest. If an effective cardiac rhythm is restored in the prehospital environment, transport immediately. Only when transport will be significantly prolonged (such as a cardiac arrest occurring far from the hospital) should additional

postresuscitative measures be started in the prehospital environment as directed by medical control.

The following is a summary of usual postresuscitative prehospital care to be used en route:

1. Stabilize the cardiac rhythm (give an antiarrhythmic drug for post–VF or post–VT; give atropine or use a transcutaneous pacemaker for symptomatic bradycardia).
2. Normalize the blood pressure (give a dopamine or norepinephrine infusion to raise the systolic pressure to at least 100 mm Hg).
3. Elevate the patient's head to 30° if the blood pressure allows.
4. Monitor oxygen saturation and titrate inspired oxygen concentrations to maintain a saturation of at least 94%.

### When to Stop CPR

Since the dawn of paramedic-staffed ambulances in the early 1970s, many communities have *not* permitted the termination of CPR in the prehospital environment. That policy was established because, in most jurisdictions, only a physician is authorized to declare a person dead (stopping CPR is considered equivalent to declaring a person dead). Cardiac arrest patients who were not successfully resuscitated at the scene were invariably transported urgently to the hospital, with some semblance of CPR occurring en route.

With the accumulation of vast experience from EMS systems throughout the United States and Canada, it soon became clear that transport to the ED of adults who did not respond to an adequate trial of prehospital ACLS was an exercise in futility. Fewer than 1% who did not respond to prehospital ACLS ultimately survived. This policy was also given as the example of an unethical practice in the  guidelines because it instills false hope in the family. Furthermore, rapid transport of patients in cardiac arrest, with CPR en route, involves considerable hazards to paramedics. The risks of vehicular crashes or of injuries while working in a moving ambulance are greatly increased during urgent transport.

Many EMS systems in Canada allow paramedics to contact direct medical control after failed initial ACLS resuscitation (eg, 10 to 20 minutes or 2 to 3 rounds of medications) for consideration to cease resuscitation in the prehospital environment. Where this is in place, the physician and paramedic discuss the specific case to determine if the resuscitation is truly futile (< 1% chance of survival) prior to ceasing resuscitation.

There may also be a role for ceasing resuscitation in certain situations with a provider equipped with an AED but no other ACLS care. A Canadian-derived Termination of Resuscitaton prediction rule outlines a subgroup of out-of-hospital cardiac arrests managed by AED-trained paramedics where futility may exist and it may be appropriate to stop resuscitative efforts in the prehospital setting. This rule found that only 0.5% of cardiac arrest patients survived if the arrest was not witnessed by paramedics, no shocks were administered, and there was no return of spontaneous circulation in the prehospital environment (three analyses). This rule would reduce the number of transports by 50%. Contact with direct medical control in these situations allows the paramedic and physician to discuss the specific patient and situation prior to ceasing resuscitation.

Provincial legislation and/or medical authority approval is required to permit cease of resuscitation at the scene by a paramedic. Each EMS system will have to formulate its own criteria and protocols for the termination of resuscitation in the prehospital setting.

Gaining permission to stop CPR in the prehospital environment will not necessarily make your life easier. Delicate issues are involved, such as the expectations of the patient's family, breaking bad news, and the disposition of the body. You may face pressure from bystanders to continue resuscitative efforts long after there is any medical justification for doing so. Stopping CPR may also be difficult for you; you will find yourself in the unaccustomed role of having to tell a family, "Your husband [or father, and so forth] is dead; there is nothing more that can be done." It is much easier to go careening off to the hospital with red lights flashing and sirens blaring and leave the ED staff with the "expectation of providing a miracle" and the unpleasant business of breaking bad news.

If your EMS system is allowed to terminate CPR in the prehospital environment, it will be a good idea to meet with your medical director and "walk through" some of the scenes you may have to face. Role-play exercises can be particularly useful in helping you to pinpoint situations in which you feel uncomfortable and develop strategies in advance for dealing with those situations.

## Management of Symptomatic Bradycardia

A patient who presents with or develops symptomatic bradycardia needs to be treated in a manner that will increase the HR and improve CO. Symptoms such as altered mental status and hypotension are common indications for treatment of bradycardic patients. If the patient is asymptomatic, then the bradycardia does not require immediate therapy and should be monitored en route. Assuming that airway and breathing have been supported:

1. Establish an IV line of normal saline.
2. Administer atropine, 0.5-mg IV bolus (unless the patient is in a second-degree type II or third-degree heart block, then you should proceed directly to step 3). You may repeat this dose every 3 to 5 minutes until the heart reaches the desired rate (usually 60 beats/min or faster) or until the maximum total dose of 0.04 mg/kg has been reached.
3. If the patient is in a severely compromised condition or doesn't respond to the administration of atropine, establish TCP as quickly as possible. If the patient is in a second-degree type II or third-degree heart block, TCP is the first-line treatment.
4. If atropine and TCP are unsuccessful (or if TCP is unavailable), consider the administration of a sympathomimetic drug—most commonly, dopamine or epinephrine, albeit only as a drip in this situation. Dopamine is administered at its usual dose of 5 to