

AED Provider Pre-reading

Welcome to Active Canadian Emergency Training Cardiac Arrest Management program. With this course you will receive practice in Cardiac Arrest Management including CPR and the use of Automated External Defibrillators.

Sudden cardiac arrest affects over 40,000 Canadians each year. The survival rate for cardiac arrest remains, unfortunately, quite low. However, by providing immediate CPR and early defibrillation, the patient is given an optimum chance for survival.

The Chain of Survival

The Heart and Stroke Foundation of Canada provides us with the Chain of Survival. By understanding and following the steps of the Chain of Survival you can provide optimum care to cardiac arrest patients.

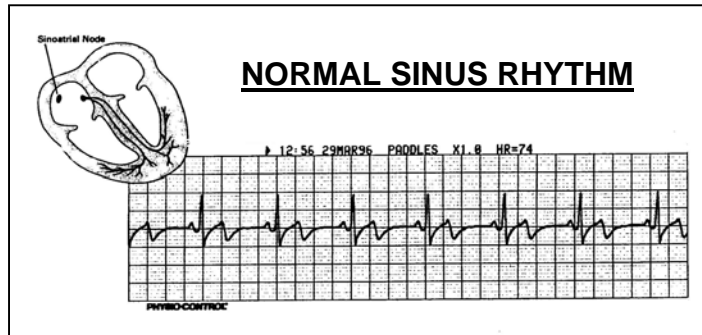


1. **Early Access** to emergency medical services (EMS) by calling 911 brings trained medical help to the scene. If you're in a public place, they may have an emergency response plan that can also be activated through communication to an employee.
2. **Early CPR** is started as soon as possible on a person who does not have visible signs of circulation to ensure that the vital organs receive oxygen until trained professionals arrive.
3. **Early Defibrillation** shocks a heart that has stopped beating effectively and allows the heart to re-set to a normal rhythm.
4. **Early Advanced Care** by trained health care professionals may be provided at the scene, on the way to the hospital, or at the hospital.

Anatomy & Physiology

The cardiovascular system is made up primarily of two components: an electrical system (the sino-atrial node or pacemaker) and a pump (the ventricles). Blood is received into the **right atrium** via the **superior vena cava**, passes through to the **right ventricle** into the **pulmonary artery** and into the **lungs**. In the lungs, the blood exchanges oxygen for carbon dioxide returns to the **left atrium** via the **pulmonary vein**. It then passes through the left atrium to the **left ventricle** where it is pumped into the **aorta** and out to the rest of the body.

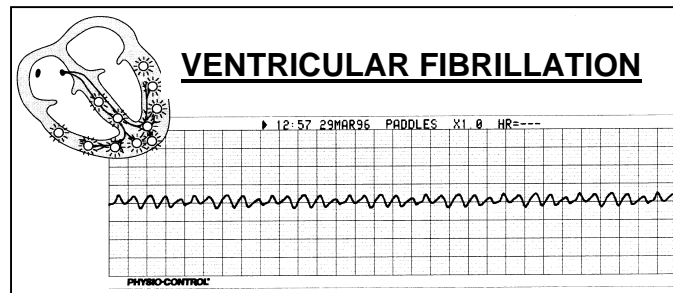
The pumping is regulated by the **sino-atrial node**, which fires about 60-80 times a minute, causing the ventricles to contract and subsequently pump blood. This appears in an ECG as a **normal sinus rhythm**.



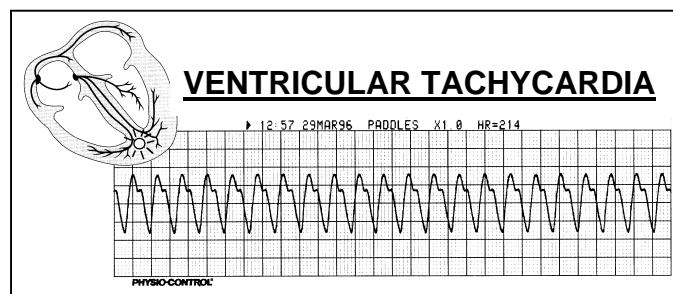
Cardiac Arrest Heart Rhythms

When sudden cardiac arrest occurs, there is an interruption to the flow of blood through the heart and the ventricles no longer pump effectively. This can be due to a variety of reasons.

When the sino-atrial node stops firing the ventricles usually begin to quiver in a rapid unorganized rhythm that is incapable of actually pumping any blood out of the heart. This appears as **ventricular fibrillation**. This is the most common initial rhythm associated with cardiac arrest.

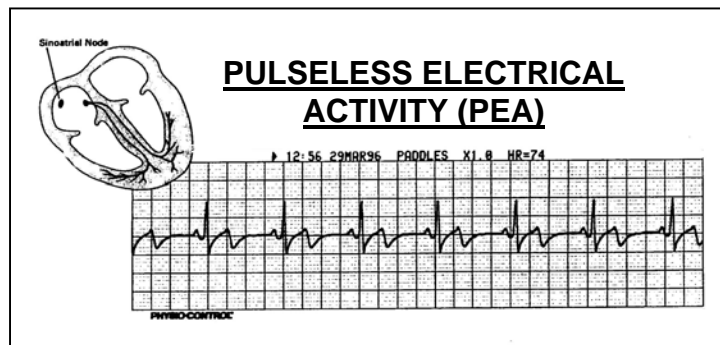


Another common rhythm associated with sudden cardiac arrest is **ventricular tachycardia**. In this rhythm, the sino-atrial node has failed and the ventricles are pumping so rapidly that they do not have time to fill with blood and therefore are not pumping any out of the heart.

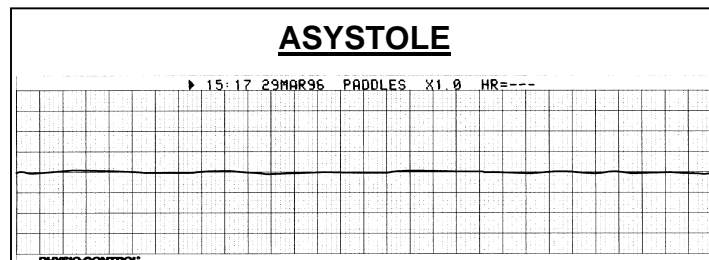


Ventricular fibrillation and ventricular tachycardia are best treated with CPR and defibrillation. Because **all cardiac arrests are different**, there is no standard amount of time that either of these rhythms will last. It could be two minutes or it could be twenty minutes. This is why early defibrillation is key.

Pulseless Electrical Activity (PEA) is a rhythm that is seen when the cardiac arrest has occurred due to a failure of the pump (ventricles) rather than the electrical system (sino-atrial node). The sino-atrial node still fires in an organized pattern; however, the ventricles have ceased contracting and are therefore not pumping any blood out of the heart. PEA looks just like a normal sinus rhythm; however, no pulses will be felt on the patient. CPR should be continued and it should be noted that PEA is considered a survivable rhythm but is treated with cardiac medications rather than defibrillation.



A flat-line, or **asystole**, is another rhythm found in cardiac arrest patients. In an asystolic rhythm there is no evidence of electrical or pump function whatsoever in the heart and therefore defibrillation is not useful. CPR should be continued as it has been shown in some cases to convert asystolic rhythms to ventricular fibrillation.



CAM Algorithm for the AED Provider

As with any emergency situation, always begin with a **Scene Assessment** and use the appropriate personal protective equipment (gloves and mask). Determine level of responsiveness and activate EMS by calling 911.

Open the airway using a head-tilt chin lift. You may insert an oropharyngeal airway if you are trained to do so. Assess the patient for **normal** breathing for no more than 10 seconds; if absent, give two breaths. Assess for signs of circulation by checking (**Look Listen & Feeling**) for breathing, movement or coughing. Also assess skin colour and temperature for signs of circulation.

If no signs of circulation, begin CPR using a 30:2 compressions to ventilations ratio. Perform CPR until the AED arrives.

Power up the device and follow the voice/visual commands. Continue CPR and rhythm analysis as directed by the AED until medical help takes over

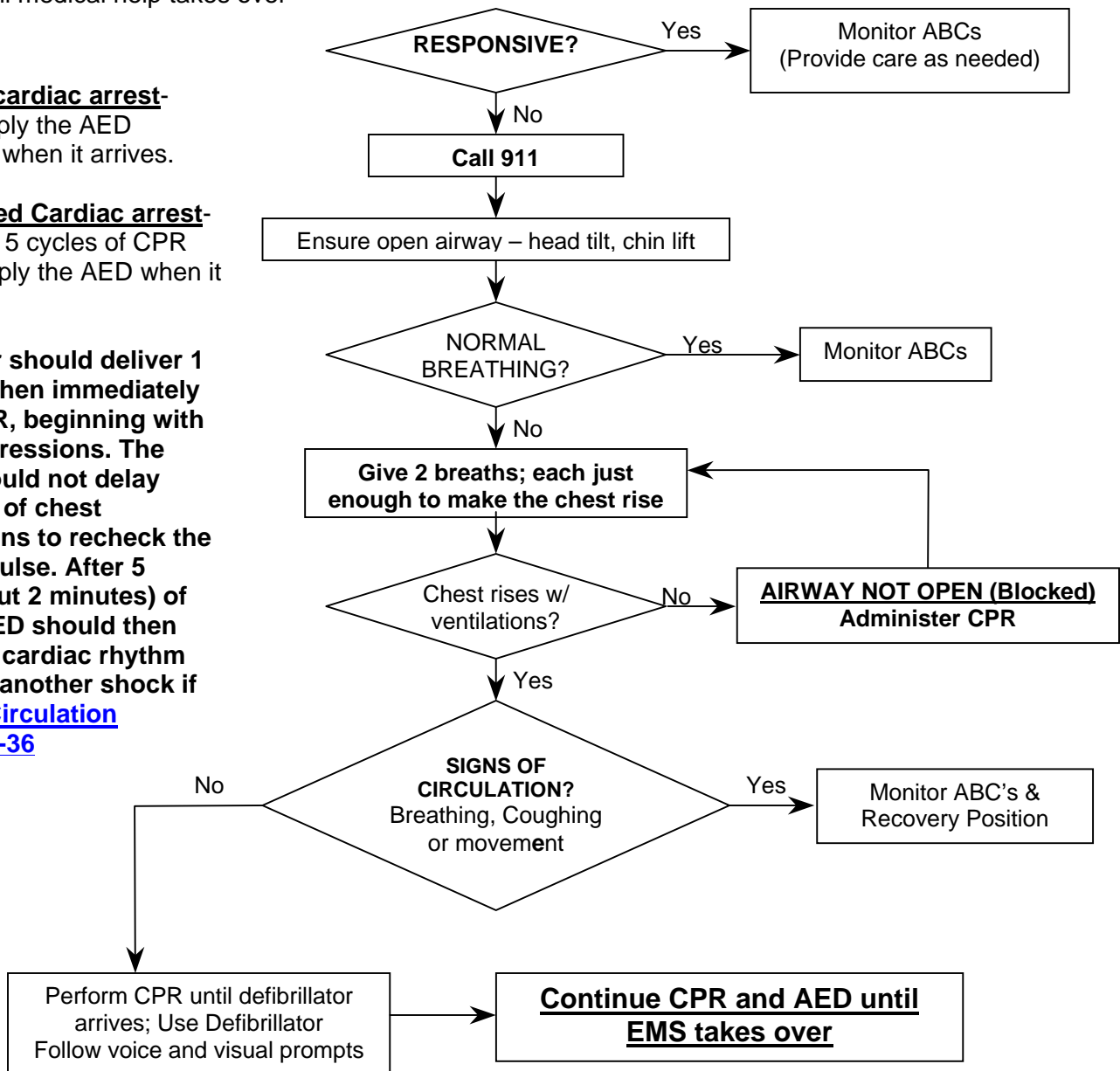
Witnessed cardiac arrest-

CPR and apply the AED immediately when it arrives.

Un-witnessed Cardiac arrest-

2 minutes or 5 cycles of CPR first, then apply the AED when it arrives.

The rescuer should deliver 1 shock and then immediately resume CPR, beginning with chest compressions. The rescuer should not delay resumption of chest compressions to recheck the rhythm or pulse. After 5 cycles (about 2 minutes) of CPR, the AED should then analyze the cardiac rhythm and deliver another shock if indicated. [Circulation 2005;112;IV-36](#)



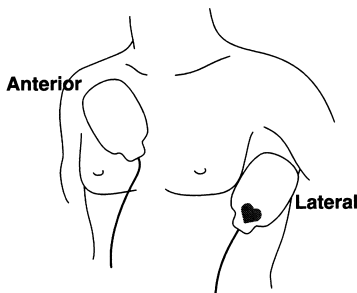
CPR and Defibrillation

Cardiopulmonary resuscitation (CPR) is the manual compression of the chest combined with artificial respiration in a **30:2 ratio** (30 compressions followed by 2 ventilations) at a rate of 100 compressions per minute. The chest should be compressed approximately 2 inches by pushing on the sternum with the heel of one hand with the other hand on top. Compressions should be paused for ventilations.

Key Skills for CPR – The 3 'P's

Push hard ~ Push fast ~ Pause little

- Push hard & fast on the chest (100/minute)
- Ensure full chest recoil
- Minimize interruptions in chest compressions
- 1 cycle = 30 compressions & 2 breaths
- Avoid hyperventilation



Anterior-lateral placement

Defibrillation electrodes are attached to the cardiac arrest patient's bare chest at the right anterior chest pectoral area below the clavicle and at the left lateral flank area below the nipple line. The machine measures the impedance of the heart, analyzes the rhythm and will advise a shock if ventricular fibrillation or ventricular tachycardia is detected. **Be sure to verbally and visually clear the area around the patient before you push the shock button. If your unit is fully automatic, be sure to clear the patient while the machine is analyzing and stay clear until the device has delivered the shock.**

In order to use the AED, the patient must be unresponsive, not breathing, have no signs of circulation, and be at least 1 year of age.

Use child pads/child system if available for child 1 to 8 years. If child pads/system is not available, use adult AED and pads with appropriate pad placement for small children (anterior/posterior). Do not use child pads/child system on an adult patient (over the age of 8).

2005 ECC Guidelines mean that single shocks are followed with 2 minutes of immediate CPR. Only reassess for signs of life if/when there is change in the patient's circulation (movement, return of colour or breathing). If you have an older AED, shocks may be delivered in a series of no more than three in a row, followed by one minute of CPR. Shocks are usually delivered between 120 to 200 joules for the first shock, 140 to 300 joules for the second shock, and 200 to 360 joules for the third (depending on the specific device used). Once the AED reaches the third shock, it will continue to shock at this level as long as a shockable rhythm is detected. Note that different AED units may have different energy level protocols.

Note: The introduction of new guidelines does not mean that old guidelines are dangerous or wrong. Rescuers should perform CPR as they have been trained and follow the prompts of the AED they are using.

Should signs of circulation return assess normal breathing and place the patient into the recovery position. Signs of circulation should be monitored frequently and the AED should be left powered on with the electrodes attached. The machine will continue to analyze every minute and should the patient re-arrest, the AED protocol should be continued until medical aid takes over.

Transfer of Care

Once Emergency Medical Services (EMS) arrives on scene, continue with CPR and your AED protocol until instructed by EMS to stop. The responders may ask several questions regarding the patient. In your brief report, be sure to include: length of time down (without a pulse) if known, length of time of your resuscitative efforts, number of shocks delivered and whether or not there was a return of any signs of circulation. Any known medical history is also important information to pass along.

Special Considerations

Hairy Chest: if the patient is exceptionally hairy, the chest may need to be shaved before applying the electrodes, or, apply and rapidly remove electrodes to remove the hair. If the latter is done, use a new set of electrodes for defibrillation.

Pregnant Patient: the AED can be used on pregnant women in cardiac arrest.

Metal Surface: the AED can be used on a metal surface such as a stretcher or bleacher. Care should be taken to ensure the electrodes are not in contact with the metal.

Wet Surface: the AED can be used on a wet surface such as the side of a swimming pool or wet pavement. Care should be taken to ensure the patient is not in standing water and the chest may need to be dried off prior to attaching the electrodes.

Pacemaker: the AED can be used on patients with an implanted pacemaker or internal defibrillator. Care should be taken to ensure the electrodes are not placed directly on top of the pacemaker. Pacemakers can be seen as a small rectangular bulge (about the size of a cigarette lighter) just under the skin.

Traumatic Arrest: the AED can be used on patients who are in cardiac arrest as a result of trauma such as a fall from a height or a motor vehicle incident.

Troubleshooting

As with all machines, there is the possibility of a malfunction. The AED has warning lights, and/or audible warnings, that should indicate, "service required" or "low battery". A low battery will still initially deliver several shocks. Should the warning lights, and/or audible warnings, come on; continue to follow the commands on the machine as it may still work. Should it fail to work, power it off and power it back on again while continuing to do CPR. If it still does not work, continue with CPR alone.

Standing Order

Now that you have completed your AED course, you have a standing order under The Medical Director of Active Canadian Emergency Training to administer the AED protocol to patients who are **unresponsive, not breathing (Coughing Movement) with no signs of circulation (skin colour & temperature) and is approximately over a year of age**. Your certification is valid for one year. Self directed skill updates every 3-6 months are recommended.

Special Thanks to Global Medical Services for the use of this document
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