CPR

Cardiac Arrest
- The complete cessation of mechanical activity of the heart
  - Absence of a central (usually carotid) pulse
- Was terminal before CPR and external defibrillation were developed in the 1960s

Few cardiac arrest patients survive outside a hospital without a rapid sequence of events.
- Chain of survival:
  1. Early recognition and activation of EMS
  2. Immediate bystander CPR
  3. Early defibrillation
  4. Early advanced cardiac life support
  5. Integrated post-arrest care

Defibrillation
- Defibrillation "re-sets" the heart by passing a large charge of electricity through it.
- CPR prolongs period during which defibrillation can be effective.
- Has resuscitated patients with cardiac arrest from ventricular fibrillation (quivering of the heart muscle).
- Nontraditional responders are being trained in AED use.

CPR/AED
- “Hearts and Brains are going to die”
  - Peter Safar MD
- EMS has the most opportunity to perform CPR, so we should perform CPR perfectly!

CPR/AED
- Why is CPR Important
  - Studies have shown that the general population will start CPR only 1/3 of the time and only 15% of that total is done correctly.
    - Any victim who is unresponsive with no normal breathing and no pulse requires CPR.
  - Chest compressions can be started within 18 seconds of arriving at the patient, whereas airway first can delay compressions by 1-2 minutes or more.

Adult CPR/AED
1. Make sure the scene is SAFE!
  - You should initially ensure that the scene is safe whenever you first see a potential victim.
2. Check responsiveness and breathing
3. If alone, call 911 and get an AED
4. Check for a pulse and if no pulse present begin CPR
  - Always start CPR with compressions first!
  - Ten (10) seconds is the maximum amount of time you should take to check for a pulse.
• Chest compressions and breaths are the same for adults, child, and infant if you are alone.
  - Adult age starts at the onset of puberty (12-14 years of age).
  - Child is age 1 year to the onset of puberty.
  - Infant is anyone under the age of 1 year.
  - At least one hundred (100) compressions per minute is the recommended rate for performing chest compressions for victims of all ages.
• During two (2) rescuer CPR, one rescuer provides chest compressions while the second rescuer maintains an open airway and give breaths.

Compressions
• Place your hands on the lower half of the breastbone.

Compressions
• Push hard and fast.
  - An adult victim's chest should be compressed at least 2 inches (5 centimeters) during chest compressions.
  - Adequate depth of compression is needed to create blood flow during compressions.
• Rate should be at least 100 per minute.
• Thirty (30) chest compressions to two (2) ventilations (30:2) is the compression-ventilation ratio for 1-rescuer adult CPR.
• Make sure you allow the chest to re-expand completely at the end of each compression.

Breathing
5. Open the airway with head tilt-chin lift.
  - The head tilt–chin lift is the best way to open the airway of an unresponsive victim with no suspected neck injury.
6. Place the mask on the patient’s face.
  - A bag-mask device is NOT recommended for a single rescuer to provide breaths during CPR.

Breathing
5. Use the E-C clamp technique.
6. Deliver each breath over 1 second.
7. To minimize the risk of air entering the victim’s stomach (gastric inflation) during bag-mask ventilation, the rescuer should give a breath just until you see the chest rise.

AED
• CPR is done to prolong cardiac muscle life in anticipation of defibrillation. Therefore, the AED should be applied as soon as possible to the patients bare chest.
  - Make sure the pads adhere to the skin.
    • Remove all clothing from the area where the pads need to be placed.
    • Remove any medication patches from the area.
    • Shave any chest hair, the pads need to be on as much bare skin as possible.
    • If the patient has an implanted pacemaker, place the pad at least inch away.

• While there are many styles of AEDs, they all work the same.

Using an AED

Using an AED
Using an AED

Integration

• Other life-supporting and testing measures are implemented between shocks.
• The process of merging CPR, defibrillation and these other measures is known as "integration".

Integration

• Insert an airway adjunct.
  – The correct compression and ventilation rates for two (2) rescuer CPR in the presence of an advanced airway in an adult victim is a compression rate of at least one hundred (100) per minute, with one (1) breath every six to eight (6 to 8) seconds.
• Administer oxygen.
• Apply a pulse oximeter.
• Check for pulse during compressions (testing effectiveness of CPR).
• Check for pulse during ventilations (testing for spontaneous return of pulse).
• Auscultate breath sounds.
• Gain additional patient history.
• Check for gastric distention.

Back to the AED

• After five cycles (2 minutes) of CPR, reanalyze the cardiac rhythm. Do not interrupt chest compressions for more than 10 seconds.
• If shock is advised, clear the patient, push the Shock button, and immediately resume CPR. If no shock is advised, immediately resume CPR.
• Transport, and contact medical control as needed

After AED Shocks

• If no breathing, continue CPR and transport.
• If the patient is breathing independently, administer oxygen and check a central pulse.
• If a patient has a pulse but breathing is inadequate, assist ventilations.

Emergency Medical Care for Cardiac Arrest

Pediatric CPR/AED

1. Make sure the scene is SAFE!
2. Check responsiveness and breathing.
3. If alone call 911 and get an AED.
4. Check for a pulse and if no pulse present begin CPR.
   • Always start CPR with compressions first!
   • If despite adequate ventilation and oxygenation, pulse is < 60, begin chest compressions.
   • If pulse > 60, but not breathing, give rescue breaths WITHOUT chest compressions.

Child Compressions

• One rescuer: Begin cycles of 30 chest compressions and 2 breaths.
• Two rescuers: Begin cycles of 15 chest compressions and 2 breaths.
• Rate should be at least 100 per minute.

Child Ventilations
• You should give breaths at a rate of one (1) breath every three to five (3 to 5) seconds when administering breaths using a bag-mask device for a child who is not breathing but does have a pulse.

Performing CPR on a Child
• Place the heel of one or both hands in the center of the chest, in between the nipples, avoiding the xiphoid process.
• Compress the chest one third the anterior-posterior diameter of the chest at a rate of at least 100 times/min. Coordinate compressions with ventilations in a 30:2 ratio (one rescuer) or 15:2 (two rescuers), pausing for ventilations.

Performing CPR on a Child
Performing Infant Chest Compressions
Infant Ventilations
• When trying to determine if rescue breaths for an infant victim are effective, you should observe a visible rise of the chest with each rescue breath.

Infant Compressions
• When trying to determine if rescue breaths for an infant victim are effective, you should observe a visible rise of the chest with each rescue breath.
• The 2 thumb-encircling hands technique is the preferred technique for providing chest compressions during two (2) rescuer CPR for an infant.
• The compression-ventilation ratio for two (2) rescuer infant CPR is fifteen (15) compressions to two (2) ventilations (15:2).

AED for Infants and Children from 1 to 8 Years of Age
• There are some safety considerations with the use of an AED on children:
  ◦ If the AED has child pads, use these on children between the ages of 1-8 years.
  ◦ A manual defibrillator is preferred for defibrillation of infants.
  ◦ Some AEDs have a key or switch that will deliver a child shock dose.

AED for Infants and Children from 1 to 8 Years of Age
• Adult defibrillator pads and dosing may be used for children less than 8 years of age if pediatric pads or a dose attenuator are not available.
• Use of adult pads and dose is better than no attempt at defibrillation!

Relief of Choking
• If a victim of foreign-body airway obstruction becomes unresponsive, send someone to activate the emergency response system and immediately start CPR, beginning with compressions.
• The best action to relieve severe choking in a responsive infant is to begin cycles of 5 back slaps, followed by 5 chest thrusts.