Module 4: Circulation
Lesson 4-1 Circulation

Objectives

Objectives Legend

C=Cognitive P=Psychomotor A=Affective

1 = Knowledge level
2 = Application level
3 = Problem-solving level

Cognitive Objectives

At the completion of this lesson, the CFR (CFR) student will be able to:

4-1.1 List the reasons for the heart to stop beating (C-1)
4-1.2 Define the components of cardiopulmonary resuscitation (C-1)
4-1.3 Describe each link in the chain of survival and how it relates to the EMS system. (C-2)
4-1.4 List the steps of one-rescuer adult CPR (C-1)
4-1.5 Describe the technique of external chest compressions on an adult patient. (C-1)
4-1.6 Describe the technique of external chest compressions on an infant. (C-1)
4-1.7 Describe the technique of external chest compressions on a child. (C-1)
4-1.8 Explain when the CFR is able to stop CPR. (C-2)
4-1.9 List the steps of two-rescuer adult CPR (C-1)
4-1.10 List the steps of infant CPR (C-1)
4-1.11 List the steps of child CPR (C-1)
4-1.12 Describe the purpose of an AED (C-1)
4-1.13 List the criteria for when to use the AED (C-1)
4-1.14 Describe the roles for CFR with an AED (C-1)
4-1.15 List the four universal steps required to operate AEDs (C-1)
4-1.16 Describe the details of the four universal steps (C-1)
4-1.17 Describe the proper procedure for attaching AED electrode pads in the proper position on a patient's chest (C-1, 2)
4-1.18 Explain why no one should touch while the AED is analyzing, charging, or shocking the victim (C-1, 2)
4-1.19 List three special conditions that might change the CFR's actions when using an AED (C-3)
4-1.20 Describe the proper actions to take when the AED indicates "no shock indicated or advised" (C-2, 3)
4-1.21 Describe proper care and maintenance of the AED (C-1, 2)

Affective Objectives

At the completion of this lesson, the CFR student will be able to:

4-1.12 Respond to the feelings that the family of a patient may be having during a cardiac event. (A-3)
4-1.13 Demonstrate a caring attitude towards patients with cardiac events who request emergency medical services. (A-3)

4-1.14 Place the interests of the patient with a cardiac event as the foremost consideration when making any and all patient care decisions. (A-3)
4-1.15 Communicate with empathy with family members and friends of the patient with a cardiac event. (A-3)

Psychomotor Objectives

At the completion of this lesson, the CFR student will be able to:

4-1.16 Demonstrate the proper technique of chest compressions on an adult.
4-1.17 Demonstrate the proper technique of chest compressions on a child.
4-1.18 Demonstrate the proper technique of chest compressions on an infant.
4-1.19 Demonstrate the steps of adult one rescuer CPR. (P-1, 2)
4-1.20 Demonstrate the steps of adult two rescuer CPR. (P-1, 2)
4-1.21 Demonstrate child CPR. (P-1, 2)
4-1.22 Demonstrate infant CPR. (P-1, 2)
4-1.23 Demonstrate the four universal steps of AED operation (P-1, 2)
4-1.24 Demonstrate the management of a patient when a shock is advised.
4-1.25 Demonstrate the management of a patient with a pulse after initial shock(s) have been delivered (P-1, 2)

Preparation

Motivation:

Over 600,000 patients die each year from cardiovascular diseases; half of these deaths occur outside the hospital, with sudden death (collapse) being the first sign of cardiac disease in 50% of the cases.

Cardiopulmonary Resuscitation (CPR) and early defibrillation using an Automatic External Defibrillator (AED), which will be covered in this module, is the major determinant of survival in cardiac arrest.

Prerequisites:

Preparatory, Airway, Patient Assessment Modules

Materials

AV Equipment:

Utilize various audio-visual materials relating to emergency medical care. The continuous development of new audio-visual materials relating to EMS requires careful review to determine which best meet the needs of the program. Materials should be edited to ensure that the objectives of the curriculum are met.

EMS Equipment:

CPR manikins, artificial ventilation manikins, AED trainer, suction equipment, airway management equipment, eye protection, exam gloves.

Personnel

Primary Instructor:

One EMT-B instructor knowledgeable in basic life support and use of an AED.

Assistant Instructor:

The instructor-to-student ratio should be 1:6 for psychomotor skills practice. Individuals used as assistants should be knowledgeable in basic life support skills and use of an AED.

Recommended Minimum Time to Complete:

Four hours

Presentation

Declarative (What)

I. Review of the Circulatory System
- A. Function
  1. Deliver oxygen and nutrients to the tissues
  2. Remove waste products from the tissues
- B. Components/Anatomy
  1. Heart
     - a. Atrium
       - (1) Right - receives blood from the veins of the body
       - (2) Left - receives blood from the lungs
     - b. Ventricle
       - (1) Right - pumps blood to the lungs.
       - (2) Left - pumps blood to the body.
     - c. Valves prevent back flow of blood.
  2. Arteries
     - a. Carry blood away from the heart to the rest of the body.
     - b. Major arteries
       - (1) Carotid
         - (a) Major artery of the neck.
         - (b) Pulsations can be palpated on either side of the neck.
       - (2) Femoral
         - (a) The major artery of the thigh.
         - (b) Pulsations can be palpated in the groin area (the crease between the abdomen and thigh).
       - (3) Radial
         - (a) Major artery of the lower arm.
         - (b) Pulsations can be palpated at palm side of the wrist, thumb-side.
       - (4) Brachial
         - (a) An artery of the upper arm.
         - (b) Pulsations can be palpated on the inside of the arm between the elbow and the shoulder.
  3. Capillaries
     - a. Tiny blood vessels that connect arteries to veins
     - b. Found in all parts of the body
     - c. Allow for the exchange of oxygen and carbon dioxide
  4. Veins - vessels that carry blood back to the heart
  5. Blood
     - a. Fluid of the circulatory system
     - b. Carries oxygen and carbon dioxide

C. Physiology
   1. Left ventricle contracts, sending a wave of blood through the arteries.
   2. Pulse can be felt anywhere an artery passes near the skin surface and over a bone.
      a. Carotid
      b. Femoral
      c. Radial
      d. Brachial
   3. A pulse is generated when the left ventricle contracts and sends a wave of blood through the arteries.
   4. A pulse can be felt in the major arteries.
   5. If the heart stops contracting, no blood will flow.
   6. The body cannot survive when the heart stops.
      a. When the patient has lost a pulse, they are in cardiac arrest.
      b. Organ damage begins quickly after the heart stops.
      c. Brain damage begins 4 - 6 minutes after the patient suffers cardiac arrest.
      d. Brain damage becomes irreversible in 8 -10 minutes.
      e. External chest compressions are used to circulate blood any time that the heart is not beating.
      f. External chest compressions are combined with artificial ventilation to oxygenate the blood.
      g. The combination of artificial ventilation and external chest compressions is called cardio-pulmonary resuscitation (CPR)
   7. General reasons for the heart to stop beating
      a. Sudden death and heart disease
      b. Respiratory arrest, especially in infants and children
      c. Medical emergencies (stroke, epilepsy, diabetes, allergic reactions, electrical shock, poisoning, etc.)
      d. Drowning, suffocation, congenital abnormalities
      e. Trauma and bleeding
      f. Regardless of the reason, the CFR's emergency medical care of cardiac arrest is CPR.

II. Cardiopulmonary Resuscitation
   A. A combination of artificial ventilation and external chest compressions to oxygenate and circulate blood when the patient is in cardiac arrest.
   B. External chest compressions
      1. Depressing the sternum to change the pressure in the chest
      2. This causes enough blood to flow to sustain life for a short period of time.
   C. CPR is only effective for a short period of time
      1. Cannot sustain life indefinitely
      2. Must be started as early as possible
      3. Effectiveness decreases the longer you are doing CPR

4. In many cases the patient needs to be defibrillated to survive
5. CPR increases the amount of time that defibrillation will be effective

D. The chain of survival and the EMS system
   1. Weak links in the chain lower survival rates
   2. Early access
      a. Public education and awareness
         (1) Rapid recognition of a cardiac emergency
         (2) Rapid notification before CPR is started - "phone first"
      b. 911 pre-arrival instructions and dispatcher directed CPR
   3. Early CPR
      a. Lay public
         (1) Family
         (2) Bystanders
      b. CFRs
   4. Early defibrillation using an AED
      a. CFR's Role
   5. Early advanced cardiac life support (ACLS)

E. The steps of one rescuer adult CPR
   Refer to current Nationally Approved Guidelines for CPR

F. The steps of two rescuer Adult CPR
   Refer to current Nationally Approved Guidelines for CPR

II. Infant and Child CPR

A. The steps of infant CPR
   Refer to current Nationally Approved Guidelines for CPR

B. The steps of child CPR
   Refer to current Nationally Approved Guidelines for CPR

IV. Defibrillation Using an AED

A. The Public Access Defibrillation (PAD) section of this course must be taught to the Nationally Approved Guidelines for AED.

B. The PAD curricula from the following organizations, follow the AHA Guidelines and have been approved by the New York State Emergency Medical Services Council for use in this program.
   1. American Heart Association
   2. American Red Cross
   3. National Safety Council
   4. The American Safety & Health Institute
   5. ESI, Inc.
   6. Regional EMS Council of New York City

Application

Procedural (How)

1. Demonstrate assessment, airway management, and emergency medical care of a manikin in a simulated cardiac arrest situation.
2. Demonstrate application and operation of the automated external defibrillator.
3. Demonstrate maintenance checks of the automated external defibrillator.
4. Demonstrate the assessment and documentation of patient response to the automated external defibrillator.

Contextual (When, Where, Why)

The CFR student must prepare to assess and manage patients with cardiac emergencies. The training laboratory must provide simulated cardiac arrest situations for the student to practice demonstrated skills. The student must be able to integrate many single skills into one simulated cardiac arrest scenario in order to perform effective practice after course completion.

Student Activities

Auditory (Hearing)

1. The student should hear of actual cases where cardiac arrest resuscitation efforts were successful and unsuccessful and the reasons for the outcomes.
2. The student should hear computer voice simulations made by automated external defibrillators giving instructions on protocols or shocks.

Visual (Seeing)

1. The student should see an instructor team appropriately resuscitate a simulated cardiac arrest patient.
2. The student should see reenactments of cardiac arrest resuscitation efforts by CFRs .
3. The student should see reenactments of cardiac arrest resuscitation efforts by CFRs using automated external defibrillators.

Kinesthetic (Doing)

1. The student should practice the assessment and emergency medical care of a patient in cardiac arrest.
2. The student should practice assessment, airway management, and emergency medical care and transportation of a manikin in a simulated cardiac arrest situation outside the training laboratory.
2. The student should practice the application and operation of the automated external defibrillator.
3. The student should practice maintenance checks of the automated external defibrillator.

4. The student should practice the assessment and documentation of patient response to the automated external defibrillator.

Instructor Activities

Facilitate discussion and supervise practice.
Reinforce student progress in cognitive, affective, and psychomotor domains.
Redirect students having difficulty with content. (Complete remediation form.)

Evaluation

Practical:

Evaluate the actions of the CFR students during role play, practice, or other skill stations to determine their compliance with the cognitive and affective objectives and their mastery of the psychomotor objectives of this lesson.

Written:

Develop evaluation instruments, e.g., quizzes, oral reviews, and handouts, to determine if the students have met the cognitive and affective objectives of this lesson.

Remediation

Identify students or groups of students who are having difficulty with this subject content. Complete remediation sheet from the instructor's course guide.

Enrichment

What is unique in the local area concerning this topic? Complete enrichment sheets from instructor's course guide and attach with lesson plan.