

## OEC Chapter 15 Cardiovascular Emergencies

**Overview:** Cardiovascular disease is the leading cause of death in the United States, so this chapter is very important. This chapter covers anatomy and physiology of the cardiovascular system including the heart, blood vessels, and blood. The chapter then covers the major cardiovascular emergencies encountered on the hill and the patient assessment for these emergencies.

### **Major Points:**

#### **I. Anatomy and Physiology**

- Figures 15-1, 15-3, and 15-4 are critical to understanding anatomy of cardiovascular system

##### **A. Heart**

- 4 chambers, know difference between atrium and ventricles
- Understand that the right side accepts deoxygenated blood from the body and pumps it to lungs to remove CO<sub>2</sub>, while oxygenated blood moves from lungs to left heart which then pumps the blood to the body

##### **B. Blood Vessels**

- Arteries and Arterioles carry oxygenated blood away from the heart while veins and venules bring blood to the heart.
- Capillaries connect the arteries to the veins
- Know major veins and arteries (ie aorta, vena cava)

##### **C. Blood**

- Four main components of blood: red blood cells, white blood cells, platelets, and plasma
- Know function of each component

#### **II. Cardiovascular Emergencies**

- **Atherosclerosis:** Hardening of the arteries, plaques of lipids, cholesterol, calcium, and proteins form along the inner lining of arteries, decreases blood flow to tissue. Can cause AMI if ruptured and block critical coronary arteries .
- **Hypertension:** High blood pressure meaning systolic blood pressure greater than 130 or diastolic bp above 80. Often due to small arteries and narrow arterioles. Damages small arteries, and can lead to stroke or kidney failure.
  - Headache, poor vision, nausea, seizures, vomiting, facial flushing, bounding pulse, chest pain, shortness of breath, confusion
- **Congestive Heart Failure (CHF):** Heart can't pump blood to tissue, blood backs up into the major blood vessels that lead to the heart and other organs
  - Right sided CHF results in backup of blood into the venous system, leakage into legs
    - edema in lower extremities, swollen ankles, "pitting edema"
  - Left-sided CHF results in blood backup in the lungs (pulmonary edema)
    - shortness of breath, bubbling sounds, grasping breaths
- **Pulmonary Edema:** Accumulation of fluid in the lungs due to inability of left ventricle to pump blood effectively to body, preventing proper exchange of O<sub>2</sub> and carbon dioxide.
  - chest pain, shortness of breath, rapid breathing, tachycardia, sharp pain, cyanotic, deep vein thrombosis only in 1 leg, severe tenderness/swelling in calf

- **Angina Pectoris:** Chest pain caused by ischemia due to narrowing of coronary arteries. Often caused by vasoconstriction (spasms) of a coronary artery.
- **Acute Myocardial Infarction (AMI):** blockage in 1 or more coronary arteries results in ischemic death of heart muscle. Tissue dies when oxygen is low, so the heart cannot pump blood which can lead to cardiac arrhythmias, CHF, cardiogenic shock, or death. Study figure 15-7.
  - heavy/crushing chest pain, heartburn, radiating to jaw arm or back, anxiety, dizziness, nausea, diaphoresis feelings of impending doom
- **Cardiac Arrhythmias:** Slow bpm to below 60 (bradycardia) or above 100 (tachycardia), irregular rhythm, or stopped heart beat.
- **Cardiogenic Shock:** Diminished pumping of blood leading to fall in BP (more in Ch 10)
  - pale skin, diaphoresis, anxiety, tachycardia or bradycardia, hypotensive
- **Sudden Cardiac Arrest (SCA):** Abrupt stop of effective pumping of blood from heart into arteries, brain, or other vital organs. Caused by an arrhythmia including ventricular fibrillation, ventricular tachycardia, or asystole
- **Pericarditis and Pericardial Tamponade:** Inflammation of the pericardial sac around the heart, causes pericardium to rub against heart. Can be caused by myocardial infarction, bacterial/viral infections, or trauma. Pericarditis is slowly developed while pericardial tamponade is often from trauma.
  - Short of breath, anxious, pale, cool, diaphoretic skin, Chest pain, tachycardia, hypotension, distended neck veins, pulse pressure narrows
- **Aortic Aneurysm/Aortic Dissection:** localized dilation of blood vessel in aorta that is congenital or from degenerative weakening of vessel wall over time. Aortic dissection is a condition in which the lining of the aorta's inner wall tears away from the outer wall, weakening it and making it susceptible to rupture.
  - Severe chest pain, back pain (stabbing, ripping) hypertensive, decreased pulse in groin
- **Heart Valve Disorder:** Valves help ensure unidirectional flow of blood through and out of the heart, valves can function improperly creating leaks, pooling, or clots within the heart.

### III. Patient assessment and Management

- Scene safety, ABCDs, if unresponsive, apenic, and pulseless start CPR call for AED, ALS, and IMMEDIATE transport!
- 5 links in adult out-of-hospital chain of survival are as follow (study figure 15-9)
- Pay attention to medical history, especially medications, use of VAD, and use of street drugs
- Assess vitals, monitor symptoms, check pulse, capillary refill, LOR, BP, provide high flow O2
- Can administer aspirin if suspected AMI symptoms, or can assist with nitroglycerin if prescribed

**Must Study:** signs/symptoms of cardiovascular emergencies, patient assessment and management

**Key Terms:** *Acute Myocardial Infarction (AMI), Angina Pectoris, Aorta, Aortic Aneurysm, Arrhythmia, Asystole, Atherosclerosis, Automated external defibrillator (AED), Automatic implantable cardioverter defibrillator(AICD), Cardiopulmonary resuscitation (CPR), Congestive heart failure (CHF), Coronary arteries, Coronary artery disease, defibrillation, hypertension, hypotension, Ischemia, Myocardium, Pericarditis, Pulmonary Edema, Sudden Cardiac arrest (SCA), Ventricular assist device (VAD), Ventricular-fibrillation (VF), Ventricular tachycardia (VT)*