Cardiovascular Emergencies
Anatomy and Physiology

• Major Components of the Cardiovascular System:
  • The Heart
  • Blood Vessels
  • Blood
The Heart

The Heart

Superior Vena Cava
Pulmonary Artery
Pulmonary Veins
Pulmonary Artery
Pulmonary Veins
Right Atrium
Tricuspid valve
Inferior Vena Cava

Left Atrium
Mitral valve
Aortic valve

Right Ventricle
Left Ventricle

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Blood
Cardiovascular Emergencies

- Atherosclerosis
- Hypertension
- Congestive Heart Failure
- Pulmonary Edema
- Angina Pectoris
- Myocardial Infarction
- Cardiac Arrhythmias
- Cardiogenic Shock
- Sudden Cardiac Arrest
- Thromboembolism
- Pericarditis and Pericardial Tamponade
- Aortic Aneurysm/ Aortic Dissection
- Heart Value Disorders
- Concurrent Cardiovascular Diseases
Atherosclerosis

(a) Damaged endothelium
- Endothelium
- Tunica intima
- Tunica media
- Adventitia

(b) Fatty streak forms

(c) Fibrous plaque forms

(d) Clot forms
Hypertension

• Abnormally elevated blood pressure
• Increased pressure causes damage small arteries in many of the body’s organs
• Untreated can lead to stroke and kidney failure
Congestive Heart Failure

- Heart cannot adequately pump blood to body tissues
- Can occur in the right side, left side, or both sides of the heart
- Right-sided heart failure- backup of blood in the systemic circulation
- Left-sided heart failure- backup of blood in the lungs
Pulmonary Edema

- accumulation of fluid in the lungs
- caused by severe left-sided congestive heart failure due to acute MI, direct trauma to the lung tissue, medical conditions and certain drugs
- As things get worse the patient may develop cardiogenic shock or hypoxia
Angina Pectoris

- Chest pain/ discomfort caused by ischemia or the heart muscle (myocardium)
- Happens when the oxygen demands of the heart muscle exceed the available supply
- common with patients who have coronary heart disease
- another cause is vasoconstriction or spasm of the coronary arteries
Myocardial Infarction (MI)

- is a blockage in one or more of the coronary arteries that results in ischemia and death of heart muscle
- most common type of blockage is a blood clot (90%)
Cardiac Arrhythmias

- irregular heart beat or heart rhythm
- primary cause of a life-threatening arrhythmia is ischemia of the heart muscle
- Ventricular fibrillation and pulseless ventricular tachycardia are two life-threatening arrhythmias
Sudden Cardiac Arrest

- abrupt cessation of effective pumping of blood from the heart into vital organs and arteries
- condition occurs without warning
- No Pulse will be present
- Lethal Arrhythmias:
  - ventricular fibrillation
  - pulseless ventricular tachycardia
  - asystole
Thromboembolism

- thrombus → thrombosis
- embolus → embolism
- thrombus can be a blood clot, fat, or other material in the venous system
- Can go undetected for months/years until it causes a disruption in blood flow
- Deep venous thrombosis (DVT) is the most widely known kind of thrombosis
- most lethal form of embolism is pulmonary embolism (PE)
Pericarditis and Pericardial Tamponade

- **Pericarditis**: inflammation of the pericardial sac
  - causes: MI, bacterial and viral infections, and trauma
- **Pericardial Tamponade**: excess fluid builds up in the pericardial sac and restricts the heart’s ability to pump effectively
  - life threatening and requires emergency care
Aortic Aneurysm/ Aortic Dissection
Assessment

• Conduct primary assessment, satisfying ABCD’s as necessary
• Obtain a SAMPLE history (note if they take meds like aspirin or nitroglycerin as this may indicate a history of heart issues)
• Determine OPQRST (patients suffering from cardiac arrest often complain of “heavy,” “crushing,” or “tight” pain on the chest
• Look for AMS
• Check for signs of inadequate perfusion (assess skin for color, temp, sweating or diaphoresis
• Monitor vital signs every 3-5 minutes
Recognizing signs and symptoms

- **Hypertension**: headache, vision disturbances, seizures, nausea/vomiting, facial flushing, bounding pulse
- **Angina and Myocardial Infarction**: Usually but not always “crushing” chest pain -- sometimes masquerades as heartburn. Pain may radiate to jaw, arm, back
- **Cardiogenic Shock**: patients appear deathly ill and exhibit signs of shock: pale skin, diaphoresis, anxiety, and respiratory distress. Patient often tachycardic and hypotensive
# Distinguishing Angina Pectoris from Myocardial Infarction

<table>
<thead>
<tr>
<th></th>
<th>Angina Pectoris</th>
<th>Myocardial Infarction</th>
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<tbody>
<tr>
<td>Location of Discomfort</td>
<td>Substernal or across chest</td>
<td>Same</td>
</tr>
<tr>
<td>Radiation of Discomfort</td>
<td>Neck, jaw, arms, back, shoulders</td>
<td>Same</td>
</tr>
<tr>
<td>Nature of Discomfort</td>
<td>Dull or heavy discomfort with a pressure or squeezing sensation</td>
<td>Same, but maybe more intense</td>
</tr>
<tr>
<td>Duration</td>
<td>Usually 2 to 15 minutes, subsides after activity stops</td>
<td>Lasts longer than 10 minutes</td>
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<tr>
<td>Other symptoms</td>
<td>Usually none</td>
<td>Perspiration, pale gray color, nausea, weakness, dizziness, lightheadedness</td>
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<tr>
<td>Precipitating Factors</td>
<td>Extremes in weather, exertion, stress, meals</td>
<td>Often none</td>
</tr>
<tr>
<td>Factors Giving Relief</td>
<td>Stopping physical activity, reducing stress, nitroglycerin</td>
<td>Nitroglycerin may give incomplete or no relief</td>
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Recognizing signs and symptoms con’t

**Congestive Heart Failure:**
- Right congestive heart failure: edema in lower extremities.
- Left congestive heart failure: blood backs up in lungs → shortness of breath. Mild to profound dyspnea with audible “bubbling” or gasping sounds

**Pericardial Tamponade:** Deathly appearance: pale skin, diaphoresis, anxiety, and respiratory distress. Look for distended neck veins
Recognizing signs and symptoms con’t

Aortic Aneurysm:

- abnormal dilation, bulging, or ballooning of the aorta → S/S: Severe chest or back pain described as “tearing, ripping, or stabbing.”
- Some abdominal pain that radiates to back. May present with dizziness. Technicians may be able to feel pulsatile mass in abdomen.

Thromboembolism:

- S/S: sudden onset of chest pain, shortness of breath, tachycardia
- Look for deep vein thrombosis (DVT)
Management

• Transport and advanced life support (ALS) requested ASAP
• If patient not breathing or pulse is absent, begin basic life support (BLS) immediately

Follow these steps:
1. immediate recognition
2. Early CPR that emphasizes chest compressions
3. rapid defibrillation if indicated
4. early and effective ALS
5. Integrated post-cardiac arrest care
CVD Patient NOT in Cardiac Arrest

- Call for immediate assistance, oxygen, AED, and ALS.
  - Keep patient calm, put in position of comfort.
  - If hypotensive, keep supine and warm, and elevate legs
  - If CHF, sit patient up and put legs in dependent position
Other Considerations

- Implantable devices may be in place
- High flow oxygen therapy is crucial
- Nitroglycerin -- assist patient if they have their prescription with them and conditions/protocols allow
- Aspirin -- assist patient if they have aspirin and protocols allow for it.