

Clinical Presentation and Management of the Cardiac Patient

14

Learning Outcomes

- 14.1 Describe the structure and location of arteries, including the coronary arteries.
- 14.2 Describe typical cardiac symptoms and unstable angina.
- 14.3 Summarize atypical patient types and presentation.
- 14.4 Compare ST segment elevation and non-ST segment elevation.
- 14.5 Explain heart failure.
- 14.6 Identify assessment and immediate treatment needed for the cardiac patient.
- 14.7 Discuss treatment modalities for the cardiac patient.

Key Terms

acute coronary syndrome (ACS)	left anterior descending artery
angina	left ventricular assist device (LVAD)
angioplasty	Levine's sign
anorexia	marginal artery
ascites	neuropathy
atherosclerotic plaque	non-ST segment elevation MI (NSTEMI)
bolus	pallor
cardiac enzymes (cardiac markers or cardiac biomarkers)	pathologic Q wave
cardiogenic shock	posterior descending artery
circumflex artery	pulmonary edema
collateral blood vessels	rales (crackles)
coronary angiography	restenosis
coronary artery bypass graft (CABG) surgery	stent
diagonal artery	ST segment elevation MI (STEMI)
Electrocardiogram (ECG)	sudden cardiac arrest
enhanced external counter pulsation (EECP)	thrombolytic agent
fibrinolytic agent	unstable angina (pre-infarction angina)
hypercoagulopathy	volume expander
IV fluid challenge	

14.1 Coronary Arteries

The heart, like all of the other organs in the body, needs nutrition and an oxygen supply in order to function. Recall from the chapter *The Cardiovascular System* that this is accomplished by the coronary arteries (Figure 14-1). The first two branches off the aorta are the left and right coronary arteries. The right coronary artery passes along the atrioventricular sulcus (groove) between the right atrium and the right ventricle. It has two major branches. One is the **posterior descending artery** (posterior interventricular artery), which in most people supplies blood to the posterior wall of both ventricles and the interventricular septum. The other is the **marginal artery**, whose branches supply the walls of the right atrium and the right ventricle. One branch of the left coronary artery is the **circumflex artery**. This artery follows the atrioventricular sulcus (groove) between the left atrium and left ventricle. Its branches supply blood to the left atrium and left ventricle. Another branch of the left coronary artery is the **left anterior descending artery** (anterior interventricular artery), which supplies blood to both of the ventricles. A branch of the left anterior descending artery is the **diagonal artery**. This artery supplies blood to the anterior and lateral walls of the lower left ventricle (see Figure 14-1).

The coronary arteries, like all arteries and veins, have three layers (Figure 14-2). The outermost layer of the artery is the tunica adventitia (externa). This layer is composed of tough fibrous connective tissue whose function is to keep the vessel open. The middle layer, the tunica media, is composed of smooth muscle. Its job is to dilate and constrict to maintain normal blood pressure, thus maintaining homeostasis. When certain medications, such as nitroglycerin, are administered to a patient with chest pain, they directly affect this layer of the artery. These medications are discussed later in this chapter.

The third and innermost layer is the tunica intima (interna). This is the layer of the artery that comes in direct contact with the blood. It is a single-cell layer of endothelial cells that is normally very smooth. This delicate layer is prone to disruption when atherosclerotic plaque is ruptured and peels away. When this happens, the blood vessel spasms in response to the injury-reducing blood flow, and chemicals are released into the bloodstream, where they cause the platelets to stick together, and to the site of injury, forming a clot. The vascular spasm coupled with the progressive growth of this clot reduces blood flow at the site of injury. This reduced blood flow results in ischemia distally to the injured site within the heart.

posterior descending artery

One of the primary branches of the right coronary artery providing blood to the interventricular septum and the posterior wall of the heart.

marginal artery

The branch of the right coronary artery that supplies the walls of the right atrium and the right ventricle.

circumflex artery One of the primary branches of the left coronary artery, which winds around, supplying blood to the lateral wall of the left ventricle.

left anterior descending artery

One of the primary branches of the left main coronary artery supplying blood to the anterior wall of the left ventricle.

diagonal artery A branch of the left anterior descending artery that supplies blood to the anterior and lateral wall of the lower left ventricle.

Checkpoint Question (LO 14.1)

1. Name the three layers of an artery and their functions.

Figure 14-1 Blood vessels on the surface of the heart. *A.* Anterior view. *B.* Posterior view.

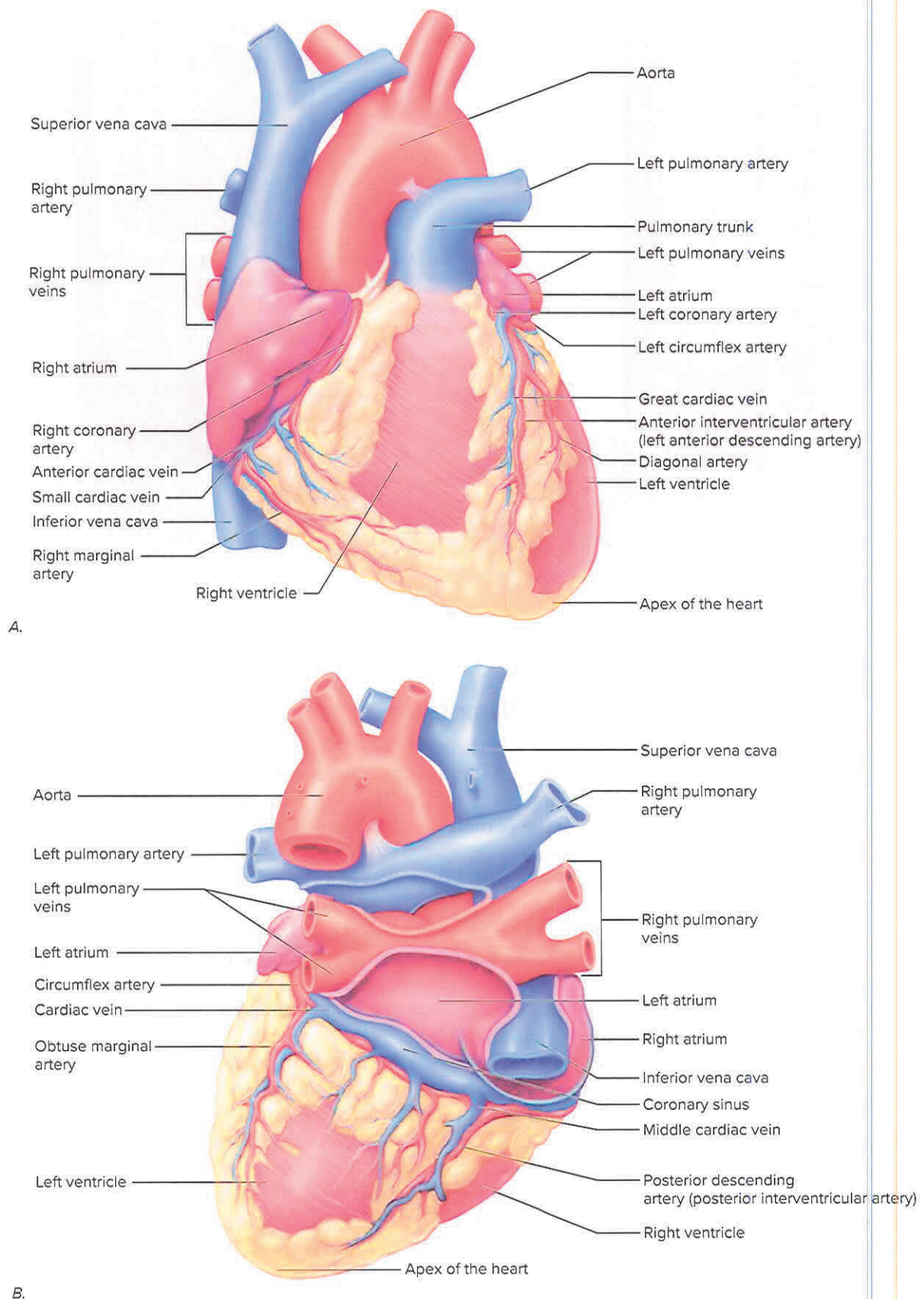
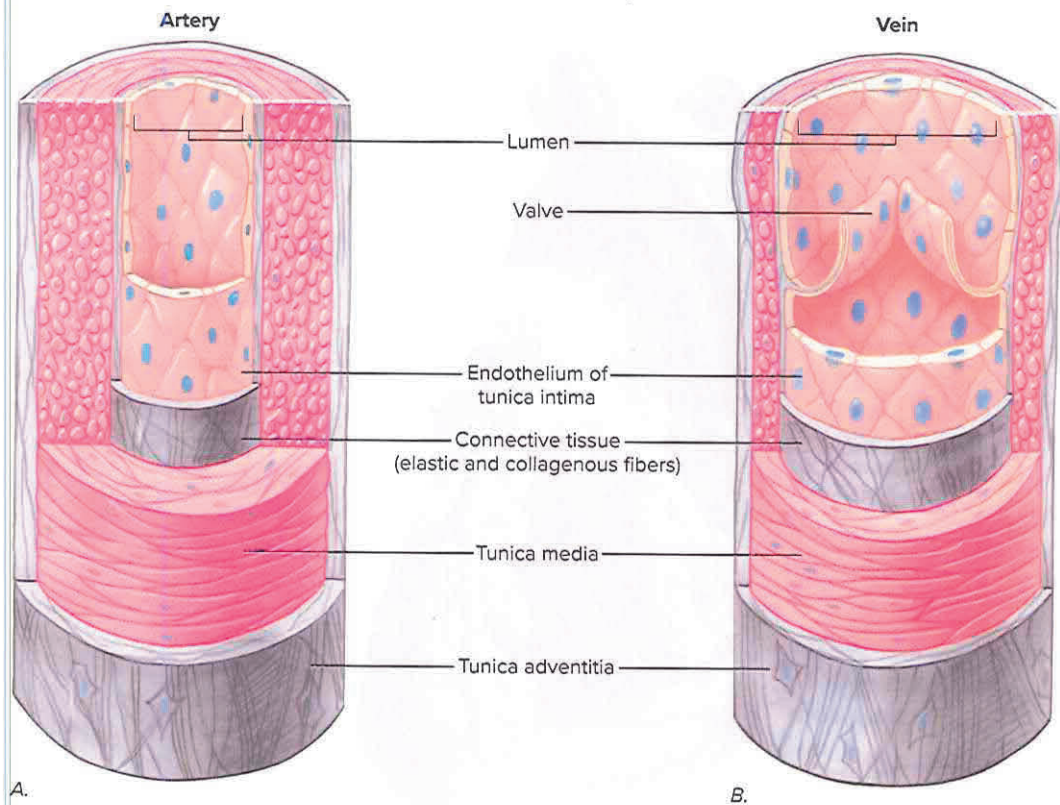


Figure 14-2 Blood vessels have three layers. *A.* The wall of an artery. *B.* The wall of a vein.



14.2 Cardiac Symptoms

If normal blood flow through the coronary arteries is interrupted or diminished, a patient may experience symptoms of a heart attack. According to the National Institutes of Health's National Library of Medicine (Medline-Plus), the average person waits 3 hours before seeking help for symptoms of a heart attack.

Not all chest pain is cardiac in origin. Patients may experience chest pain due to inflammation of the costal cartilage or lungs, gastric or esophageal irritation, gallbladder disease, or dental problems. The difficulty lies in knowing whether or not the patient's symptoms are related to cardiovascular disease. A patient with jaw pain may be considered as having a "dental problem" yet the patient could be experiencing a heart attack, so it is best to evaluate all pain carefully.

Chest pain or chest discomfort may present suddenly or gradually. It may stay in one location or may radiate or travel to other locations. It may be described as pressure or pain within the chest. The patient experiences chest pain or pressure when the heart muscle does not receive enough oxygen due to partial or complete blockage of a coronary artery. This discomfort or pain is referred to as **angina**. According to the National Heart, Blood, and Lung Institute, experts believe that nearly 10 million people in the United States experience angina. The condition occurs equally among males and females.

angina An oppressive pain or pressure that occurs in the chest when the heart muscle does not receive enough oxygen due to partial or complete blockage of a coronary artery.



Think the Worst

When chest pain is involved, always consider and treat the worst-case scenario first. It is better to consider discomfort or pain as a cardiac problem and be incorrect than to ignore chest pain or discomfort as a cardiac problem and have it turn out to be an untreated myocardial infarction or other serious cardiac condition. To protect the patient, *consider all chest discomfort or pain as being cardiac in origin until proven otherwise.*

Anginal symptoms are the heart's way of complaining that it is not receiving enough oxygen. The blockage of coronary arteries can cause ischemia injury, and even death in the affected areas of the heart muscle. In addition to chest pain or pressure, patients may present with other complaints. The following is a list of complaints that may occur due to blockage of the coronary arteries.

- Shortness of breath
- Sweating
- Chest pain
- Epigastric discomfort (bad indigestion)
- Neck pain
- Cough
- Back pain (between shoulder blades)
- Squeezing sensation
- Dizziness
- Pressure in the chest
- Nausea
- Fullness in the chest
- Tight band around the chest
- Palpitations
- Anxiety
- Sense of impending doom
- Jaw pain
- Arm pain (one or both arms)
- **Levine sign** (holding a clenched fist over the chest)

Levine sign Named after a cardiologist this sign is seen with ischemic heart pain. It is demonstrated in patient's through holding a clenched fist over the chest.

unstable angina (pre-infarction angina) A warning sign that the disease that has been causing angina has worsened. Signs and symptoms are less predictable, last longer, and are more painful than previously experienced.

It is not likely that a patient would present with all the symptoms together, but any of these symptoms could indicate a possible cardiac problem. Frequently, the patient describes the pain as a tightening or squeezing and may even state, "it feels like an elephant is sitting on my chest."

Unstable Angina

Patients with a known cardiac condition or disease may experience angina. However, **unstable angina** is a signal to these patients that the angina that they have experienced in the past has changed or worsened. It is a warning sign that the cardiac disease has advanced and may indicate acute coronary

TABLE 14-1 Signs of Unstable Angina—Chest Pain

Chest Pain	Examples
Change in severity and frequency	Pain is more frequent or severe; pain increases to three or more times a day.
Change in cause	Occurs with less and less exertion; occurs at rest or awakens the patient from sleep.
Change in duration	The symptoms last longer; often greater than 20 minutes.
Change in responsiveness to treatment	Pain is less responsive to nitroglycerin. The patient needs to take more nitroglycerin than previously for the same or less reduction of pain.

syndrome (discussed later in this chapter). Unstable angina is a state between angina and myocardial infarction. Patients with unstable angina will experience symptoms at rest or with minimal exertion. Symptoms will become less predictable and will remain longer. Signs of unstable angina that may be confused with myocardial infarction are described in Table 14-1.

Checkpoint Question (LO 14.2)

1. Briefly explain why all chest pain is initially treated as cardiac in origin.

14.3 Atypical Patient Presentation

Not all patients experience the same symptoms. It is important to know three groups of patients whose complaints and problems are often atypical (different). These include females, patients with diabetes, and elderly individuals.

Females

Heart disease is the leading cause of death for women in the United States. In 2020, one in every five female deaths was due to heart disease. Chest pain is identified by doctors as the most important heart attack symptom in both males and females. However, multiple studies indicate that females have a more atypical presentation of acute coronary syndrome. For example, females are more likely than males to have heart attack symptoms unrelated to chest pain. According to MayoClinic.org females have symptoms such as:

- Neck, jaw, shoulder, upper back, or upper belly (abdomen) discomfort
- Shortness of breath
- Pain in one or both arms
- Nausea or vomiting
- Sweating

TABLE 14-2 Female Heart Attack Symptoms

Common Symptoms	Likelihood of Symptoms Compared to Males
Back pain between the shoulder blades	Twice as likely
Neck pain	83% more likely
Jaw pain	75% more likely
Nauseas or vomiting	64% more likely
Fatigue	36% more likely

- Light-headedness or dizziness
- Unusual fatigue
- Heartburn (indigestion)

This makes it very important for us as healthcare providers to be aware of other, subtler complaints that this large patient population may have. Table 14-2 lists the likelihood of common cardiac symptoms of females as compared to males.

Diabetes

Chronic diabetes or poorly managed diabetes with high blood glucose levels can damage nerves called neuropathy and blood vessels. The elevated glucose level leads to an accumulation of fatty deposits called **atherosclerotic plaque**. The blood vessels can accommodate the presence of up to as much as 40% of this plaque. The vessels will expand and reshape or remodel themselves in an effort to maintain normal blood flow. Eventually, however, the vessel can no longer expand. As plaque continues to accumulate, it further reduces blood flow to the heart muscle. This often leads to complications such as heart disease and stroke. Because of the damage to the blood vessels, a patient with diabetes is twice as likely to experience a heart attack or stroke. Heart attacks in people with diabetes are more serious and more likely to result in death.

The cardiac symptoms experienced by patients with diabetes are similar to the classic symptoms; however, the symptoms experienced by a patient with diabetes may be transient. The most common symptoms include

- Chest pain or discomfort
- Pain or discomfort in arms, back, jaw, neck, or stomach
- Shortness of breath
- Sweating
- Nausea
- Light-headedness

The problem for patients with diabetes is that their symptoms may be mild or absent due to a condition in which the heart rate stays at the same level during exercise, inactivity, stress, or sleep. Additionally, **neuropathy** (nerve damage) caused by diabetes may result in lack of, or impaired perception of, pain during a heart attack creating a “silent MI.”

atherosclerotic plaque

Fatty deposits accumulated due to elevated glucose levels.

neuropathy Nerve damage that causes vascular and autonomic nervous system problems, with loss of ability to maintain blood pressure and loss or impaired sensation. Common cause is chronic diabetes mellitus.

Females have the additional benefit of protective hormones produced during their childbearing years that help reduce the risk of cardiac problems. However, females with diabetes have an increased risk of heart disease because diabetes cancels out the benefits of these protective hormones.

Elderly Patients

Various studies indicate that approximately 50% of elderly patients with an acute coronary syndrome reported atypical symptoms, including shortness of breath, nausea, profuse sweating, pain in the arms, and fainting. These symptoms are more likely to occur in patients with personal or family history of heart disease. Although classic symptoms of heart disease may be experienced by any patient regardless of age, gender, or medical history, elderly patients are likely to experience milder symptoms. As a result, they are more likely to delay medical treatment. The most common symptoms in elderly patients include

- Shortness of breath
- Nausea
- Profuse sweating
- Pain in the arms
- Syncope
- Weakness or fatigue

Checkpoint Questions (LO 14.3)

1. Which of the following patient groups present atypically? Select a or b.

- a. Children, African Americans, and males
- b. Patients with diabetes, females, and elderly individuals

2. Why are these groups considered atypical?

acute coronary syndrome

(ACS) This is a broad term that refers to unstable angina, ST segment elevation MI (STEMI), and non-ST segment elevation MI (NSTEMI). ACS is usually associated with intra-coronary plaque changes or thrombosis, where blood flow is suddenly stopped.

14.4 Acute Coronary Syndrome

Once the 12-lead ECG is obtained or the cardiac monitor is attached to the patient with complaints, it may provide evidence of **acute coronary syndrome (ACS)**. According to the American Heart Association (AHA), ACS covers the spectrum of clinical conditions, ranging from unstable angina to

ST segment elevation MI (STEMI) Classic MI with expected ST segment deviation and development of pathologic Q wave.

non-ST segment elevation MI (NSTEMI) A type of heart attack in which the classic signs are not present. Caused by incomplete occlusion of a coronary artery.

pathologic Q wave

A Q wave that measures 0.04 second or wider in duration and/or is one-third or more the height of the R wave in that lead.

sudden cardiac arrest

A condition in which the heart stops beating suddenly, often without warning, due to a failure of its electrical system.

ST segment elevation MI (STEMI) or non-ST segment elevation MI (NSTEMI). Compared to stable angina, the discomfort associated with ACS will last more than just a few minutes.

ST Segment Elevation MI (STEMI)

According to the American College of Cardiology and the American Heart Association (ACC/AHA), between 75% and 80% of patients with MI present with STEMI. STEMI refers to the classic MI, which occurs as a result of a complete occlusion of a coronary artery. Ischemia delays repolarization, and this has a direct effect on the ST segment. The changes to the ECG tracing include:

- ST segment depression or elevation
- T wave inversion
- Development of a **pathologic Q wave**

These changes are often present in a patient experiencing an MI in the classic sense. However, not every patient has the classic presentation (Figure 14-3).

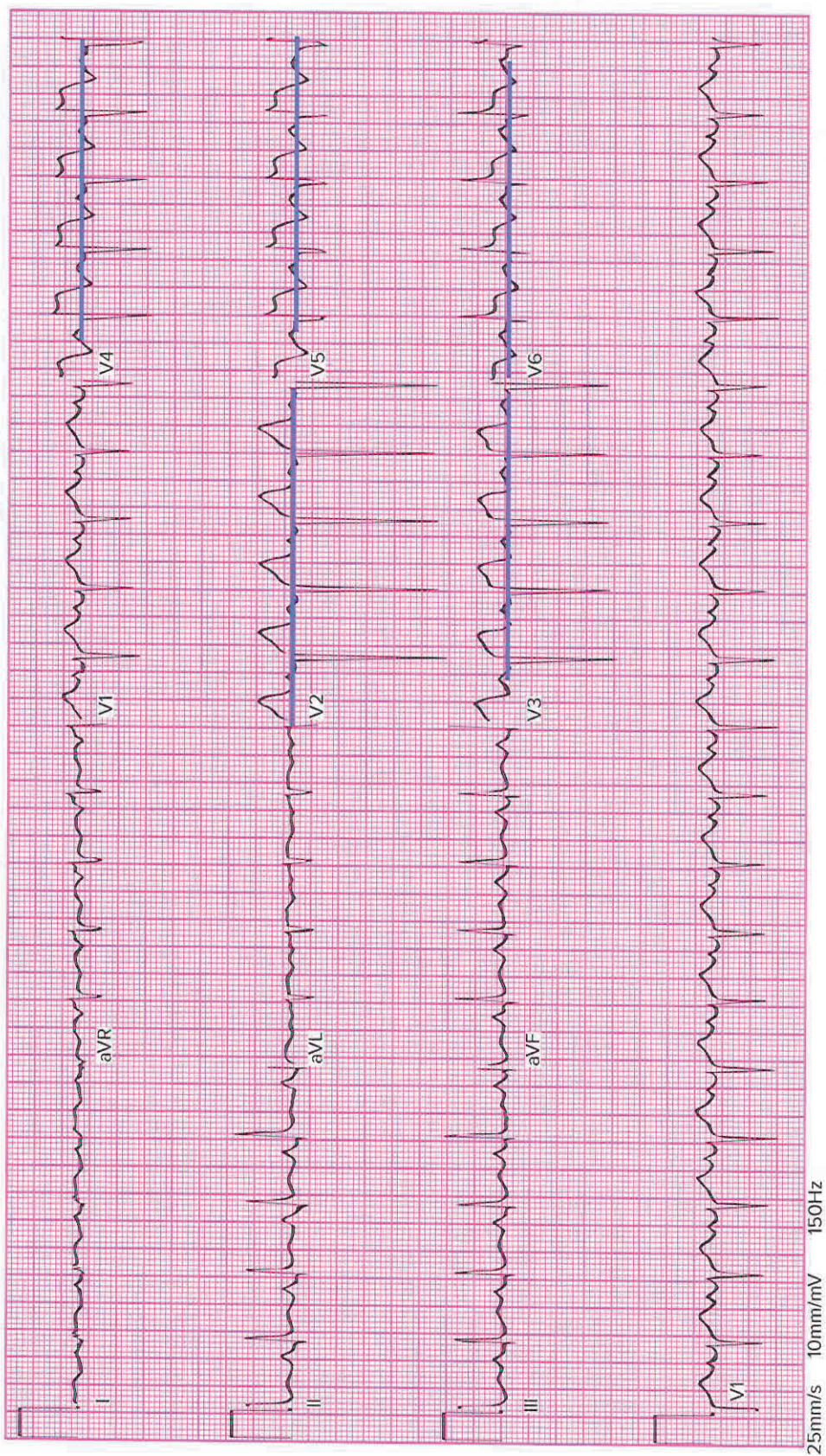
Non-ST Segment Elevation (NSTEMI)

The American College of Cardiology (ACC) and the AHA also suggest that between 20% and 25% of MI patients display non-ST segment elevation (NSTEMI). This clinical situation presents a challenge to the healthcare team because the “classic” signs and symptoms may not be present. The healthcare team must be aware that patients without the classic signs and symptoms may present in the emergency department or clinic. NSTEMI often occurs because of an incomplete occlusion of a coronary artery. The patient is often asymptomatic but will frequently have vague symptoms of this “silent” MI. The term *silent* refers to patients who do not present with the classic MI symptoms. When the 12-lead ECG is examined, it will not display the classic MI morphologic changes. The doctor will order special blood tests to look for the presence of enzymes in the blood as a result of tissue death (infarction).

You might think that the patient is not at risk for sudden death because of the “incomplete” occlusion, but you would be wrong. Sudden death is just as real and actually happens more often than with classic STEMI patients. The symptoms of NSTEMI are not as clearly cardiac as the dramatic “Hollywood” MI complaints. Thus, many of these patients die at home or on the job.

When discussing STEMI and NSTEMI events, it is important to realize that although these patients present quite differently, they are each at risk for **sudden cardiac arrest**. According to the American Heart Association, sudden cardiac arrest occurs when the heart suddenly stops beating, frequently without warning, due to a failure of its electrical system. Many people confuse the terms *sudden cardiac arrest* and *heart attack*, but the two are not the same. A heart attack, or myocardial infarction, occurs when a portion of the heart does not receive enough oxygen due to the occlusion of a coronary artery, whereas sudden cardiac arrest is an electrical event that affects the entire heart. Sudden cardiac arrest is a separate event that can occur during recovery from a heart attack and can cause death if CPR is not initiated promptly.

Figure 14-3 Anterolateral AMI (acute myocardial infarction). The isoelectric line has been identified with dark blue lines. Notice the ST segment elevation in V2 to V6 (V3 and V4 Anterior and V5 and V6 Lateral). Note: ST elevation in V2 provides evidence of a growing (extension) MI.



**Checkpoint
Question
(LO 14.4)**

1. List two changes in the cardiac complex that may indicate ischemia.
 - a. _____
 - b. _____

14.5 Heart Failure

Heart failure occurs when the heart muscle has sustained enough injury that it is unable to perform as an effective pump. This occurs when a lack of blood supply causes the tissue of the heart to die, making it unable to contract. Heart failure differs depending on which side of the heart is affected. As discussed in the chapter *The Cardiovascular System*, the left side of the heart receives the blood from the lungs and pumps the blood to the body. The right side of the heart receives the blood from the body and pumps the blood to the lungs. Because each side functions differently, the effects and treatment of failure are different based on the location of the heart muscle damage (Figure 14-4).

The most common cause of pump failure is myocardial infarction. It is important always to remember that the heart is a pump. When the heart is damaged and doesn't work the way it should, the tissues of the body do not receive enough oxygen-carrying blood, and sometimes do not receive any oxygen at all. This is often referred to as **cardiogenic shock**. Cardiogenic shock results in different effects on the systems of the body. For example, when the kidneys are not perfused well enough, urinary output is decreased. The elimination of waste from the body is very important to heart function. When the liver is not perfused well enough, special proteins important to blood clotting are reduced, increasing the patient's risk of bleeding in the event the patient is injured.

cardiogenic shock Inadequate flow of arterial blood, typically as a result of left heart failure.

pulmonary edema Abnormal collection of fluid within the pleural space (lungs) due to congestive heart failure (left ventricle).

rales (crackles) Noisy breath sounds during inhalation caused by retained airway secretions. When caused by pulmonary edema, rales are heard as very short, soft, bubbling lung sounds.

anorexia Decreased or loss of appetite.

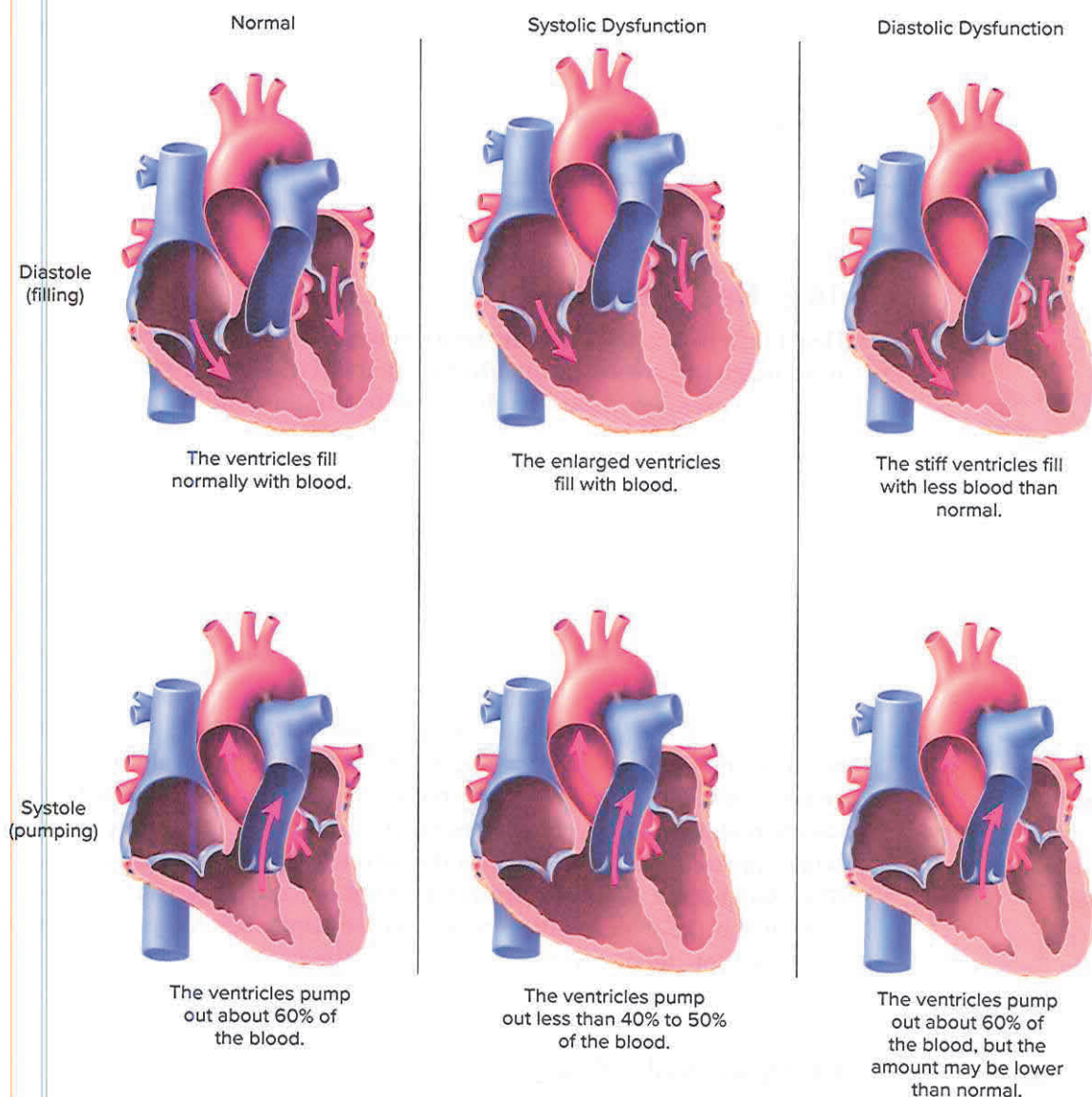
pallor Pale skin.

Left Ventricular Failure

The left ventricle plays perhaps the most important role of the heart in its job of providing oxygenated blood for systemic circulation. When the left pump (ventricle) fails, blood will stall and back up in the lungs, often causing **pulmonary edema**. Respiratory assessment will often reveal noisy, "wet"-sounding lungs, referred to as **rales (crackles)**. Additional signs and symptoms of left heart failure include:

- Shortness of breath or trouble breathing
- Fatigue (tiredness)
- Tachycardia
- Confusion
- Shortness of breath
- **Anorexia**
- Decreased or absent urine production
- **Pallor**

Figure 14-4 Effects of heart damage on function.



Left heart failure always leads to right heart failure. Common causes of left ventricular failure include, but are not limited to

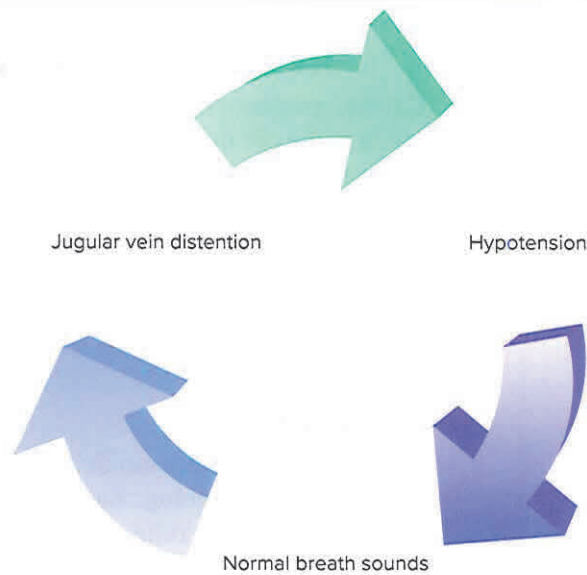
- ST segment elevation myocardial infarction (STEMI)
- Hypertension
- Cardiac dysrhythmias, such as atrial fibrillation

Right Ventricular Failure

Right ventricular failure has a different effect on the body. When the right ventricle fails, less blood is being pumped into the lungs. This in turn reduces the amount of blood reaching the left ventricle. The left heart can only pump out what it receives, and this reduction in cardiac output then affects blood pressure. Hypotension is one of the leading signs of right ventricular failure.

Blood is not backing up in the lungs, so respiratory assessment will demonstrate clear, “normal” breath sounds; however, it *is* backing up on the

Figure 14-5 Clinical triad. These three symptoms are indicative of right-side heart failure and are considered ominous when they present together.



venous side due to the failing right ventricle. This will frequently cause the patient's jugular veins to distend or "bulge." These three clinical signs are often referred to as the clinical triad (Figure 14-5). They don't always present together, but all three together represent an ominous sign.

Signs and symptoms of right heart failure include:

- Hypotension
- Jugular vein distention
- Clear lung sounds
- Swelling in the ankles, feet, and legs, (pitting edema)
- **Ascites**

Common causes of right ventricular failure include, but are not limited to:

- Left-sided heart failure (most common)
- Coronary artery disease
- Chronic lung disease
- Extensive right ventricular infarction

ascites Abnormal collection of serous fluid within the abdomen (peritoneal cavity). This may occur secondary to congestive heart failure.

Checkpoint Questions (LO 14.5)

1. Explain what can occur from left ventricular heart failure.

2. What are the significance and symptoms of the clinical triad?

14.6 Cardiac Patient Assessment and Immediate Treatment

Cardiac patients may present with a number of different physical complaints and a different duration of symptoms. It is important to approach all cardiac patients the same way. Two mnemonics (memory devices) can be used when assessing the patient: O-P-Q-R-S-T and S-A-M-P-L-E. The O-P-Q-R-S-T mnemonic device is used to evaluate pain, and the S-A-M-P-L-E mnemonic device gathers more information. No matter what method of questioning or evaluation is used, the information must be efficiently gathered, recorded, and/or reported to the physician or treating practitioner.

O-P-Q-R-S-T

The O-P-Q-R-S-T mnemonic will help you evaluate the pain or discomfort a patient is experiencing. Each letter of this memory device corresponds with a specific question related to the patient's pain level. This creates the logical flow for patient questioning and information gathering that is necessary for the most prompt medical care (Figure 14-6).

O—Onset: What were you doing when it started? Did it occur suddenly or gradually?

P—Provoke: What provokes (causes) the pain or makes it better or worse?

Q—Quality: Can you describe what the pain feels like? Is it sharp, dull, aching, and so on?

R—Radiation: Does the pain stay in one location or travel in a particular direction? Can you touch a spot that hurts the most?

S—Severity: Rate your pain on a scale of 0 to 10, with 0 = no pain and 10 = most pain ever experienced. What number was it when it started? What number is it now? If the patient cannot understand this scale or does not speak English, use a visual pain scale like the one shown in Figure 14-7.

T—Time: How long has it been going on?

S-A-M-P-L-E

S-A-M-P-L-E is another mnemonic tool used when evaluating patients. O-P-Q-R-S-T is specific to the pain or discomfort level, while the S-A-M-P-L-E memory tool includes additional information gathering (Figure 14-8).

Figure 14-6 Patient pain assessment using a mnemonic (memory device): O-P-Q-R-S-T.

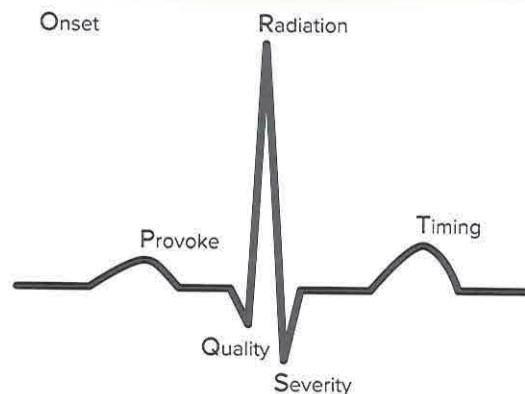


Figure 14-7 When evaluating the severity of pain that a patient is experiencing, a pain scale can be used. This is especially helpful for patients with language, educational, or other understanding barriers.

TCP Health Center

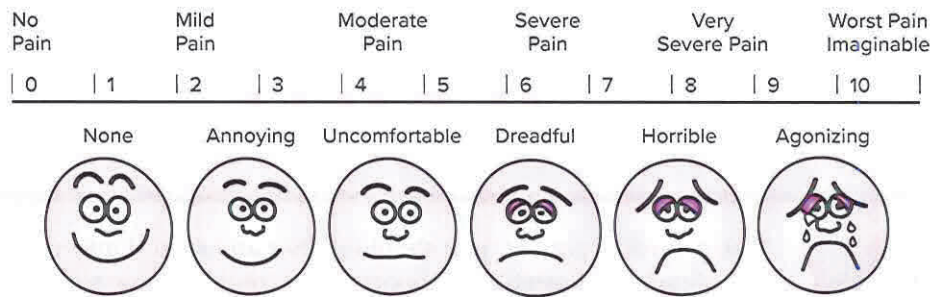


Figure 14-8 Patient assessment using a mnemonic (memory device): S-A-M-P-L-E.

S: Signs and Symptoms

A: Allergies

M: Medications

P: Previous History

L: Last Intake

E: Events

S—Signs and symptoms: Signs are things you can actually see, feel, or measure, such as pallor (pale skin), cyanosis (blue tint) to skin or other body parts such as lips or nail beds, or vital signs. Symptoms are patient complaints such as pain, tingling, or pressure. Note that the O-P-Q-R-S-T actually gathers information about pain, which is one of the most important symptoms to be evaluated, so O-P-Q-R-S-T is actually part of the first step in the S-A-M-P-L-E mnemonic.

A—Allergies: Record any known allergies and, for inpatients (patients admitted to a hospital), place a wristband identifying the allergy on an arm. If there are no allergies, be sure to document this so it is known that the question has been asked.

M—Medications: Record all prescription, over-the-counter, and herbal medications.

P—Previous pertinent history: Record any pertinent information related to the patient's cardiac health or previous cardiac events.

L—Last intake: This would include food or liquids, when they were eaten, and how much.

E—Events: Record anything that led up to the problem, including what they were doing when they first experienced the symptoms.

Safety & Infection Control



With a cardiac patient, you should gather and record information as quickly and clearly as possible to report to the physician or treating practitioner. It is not your responsibility to diagnose the patient. Remember that time is muscle—the patient's heart muscle!

Immediate Care

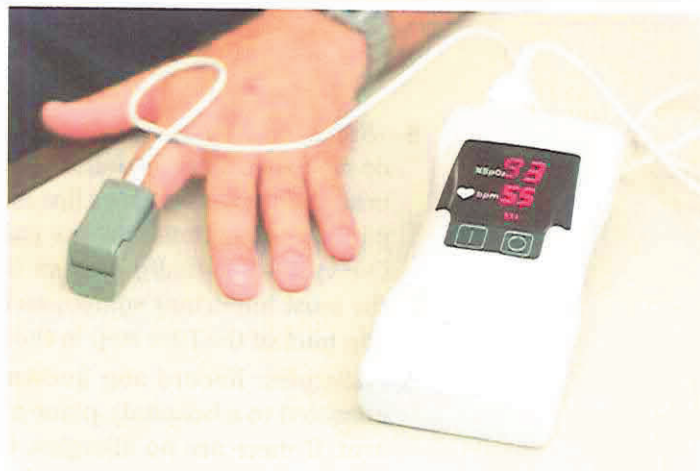
When providing care to patients complaining of chest pain, medical care must be delivered immediately and effectively. Communication within the team creates success. This is a very busy time, so precise and complete communication is essential. Each member of the healthcare team typically will be assigned to perform very specific tasks.

Using the American College of Cardiology/American Heart Association (ACA/AHA) guidelines, the following is a list of tasks to be performed within 10 minutes of the patient's arrival:

1. Assess pain level: quality, duration, location, and radiation. Use the O-P-Q-R-S-T technique.
2. Check vital signs, including pulse oximetry (Figure 14-9), which measures the oxygen saturation (SpO_2) of the blood.
 - Pulse reporting is more than just the number. It is important to note regularity and strength of the pulse and to report your observations to the physician.

Figure 14-9 A pulse oximeter is a small device that uses red and infrared light passing from one side of the finger to the other to measure the SpO_2 .

choja/Getty Images



cardiac enzymes (cardiac markers or cardiac biomarkers) Chemicals found in the bloodstream that are indicators of myocardial cell death (infarction). Common examples include troponin, CK-MB, and myoglobin.

IV fluid challenge Administration of IV fluid (i.e., 0.9% NaCl) to offset the effect of administered medication or to treat for hypovolemia. Often referred to as a fluid resuscitation.

bolus A concentrated amount of medication or fluid based upon body weight to be administered over a prescribed short period of time.

volume expander IV solution administered to fill fluid volume or replace the space that blood normally takes up. The context referred to in this book is referring to inert fluids, specifically 0.9% NaCl. It is given to increase blood volume in the hypotensive or potentially hypotensive patient in an effort to maintain homeostasis.

- Is the pulse thready (weak), full (normal), or bounding?
 - Are the respirations regular or in a pattern? Does it appear as though the patient is struggling to breathe? Is the patient breathing through their mouth, or is tissue around the neck or upper chest pulling back with each respiration (tracheal tugging)?
3. Start oxygen at 4 liters/min by nasal cannula if required by current standards. Oxygen is a drug and cannot be administered without an order and may not be administered if the O₂ saturation is over 90%.
 4. Obtain 12-lead ECG immediately and with each set of vital signs.
 5. Notify physician or treating practitioner of patient with chest pain.
 6. Physician or treating practitioner interprets ECG.

Once the initial tasks have been performed, the physician or treating practitioner will direct further care based on clinical impression or index of suspicion. Further treatment may include the following orders:

1. Determine cardiac rhythm on monitor.
2. Start an intravenous line or saline lock. This must be done before medications such as nitroglycerin or morphine are administered.
3. Obtain a blood specimen. It is common for the blood to be drawn by the person starting the IV. This is done to save time and to avoid the need for an additional needle stick.
4. Order laboratory tests, including CBC, electrolytes, PT/PTT or PT/INR, lipid panel, and **cardiac enzymes (cardiac markers or cardiac biomarkers)** such as troponin and CK-MB. Blood tests can help the doctor determine if there is evidence of heart tissue death (infarction or necrosis). When cardiac myocytes (muscle cells) die, intracellular chemicals are released into the bloodstream. Increased levels of these chemicals are indicators or markers for MI. This is very useful in cases when a patient is having or recently has had an MI and the usual changes are not seen on an ECG.
5. Aspirin is typically administered; the doctor will order either a 325-mg tablet or two to four 81-mg chewable low dose aspirin tablets if no aspirin has been taken in the past 3 hours. Regardless of the type of tablet, the aspirin should be chewed to facilitate absorption.
6. Nitroglycerin (0.3 or 0.4 mg under the tongue [SL]) is administered as long as systolic blood pressure (BP) is greater than 100 mmHg. A tablet or spray is used.
 - A systolic BP of less than 100 mmHg is an indicator of hypotension. It is especially important that hypotensive MI patients have an intravenous line or saline lock in place before nitroglycerin or morphine is administered. The hypotensive MI patient will still need these medications, but the doctor will order an **IV fluid challenge** or **bolus** of between 250 and 500 milliliters (mL) of fluid administered as a **volume expander**. This is done in an effort to raise the patient's systolic blood pressure to a safe level in anticipation of the pressure drop that occurs with the administration of drugs such as nitroglycerin. If this is not done, the patient's blood pressure may drop to the point of hypoperfusion (low blood circulation), further complicating ischemia, injury, and infarction. The hypotensive MI patient will require frequent reassessment as these drugs are often administered several times in an

effort to reestablish blood flow within the heart and to achieve proper pain management.

7. Repeat nitroglycerin administration for two more doses, 5 minutes apart, if chest pain persists and as long as systolic pressure remains over 100 mmHg.
8. Monitor vital signs every 15 minutes.
9. Start morphine IV as ordered, if chest pain is not relieved by nitroglycerin and systolic pressure is above 100 mmHg.
10. Beta-blocker medications are given per the protocol of the facility. (See the Appendix A, *Cardiovascular Medications*, for more information about beta blockers and other cardiovascular medications.)
11. Other tasks may include contacting radiology for a portable upright chest X-ray and cardiopulmonary or laboratory for a blood gas analysis.

Law & Ethics



If there is a possibility that the patient will be undergoing an invasive procedure such as a cardiac catheterization or operation, an operative permit or consent must be signed before any narcotic is administered. Informed consent is violated if the patient is chemically impaired from a narcotic when signing this document.

Additional Cardiac Tests

Additional tests are used to evaluate the heart and its function. These include the following:

coronary angiography

An X-ray visualization of the coronary vessels after a radiopaque dye is injected into the patient.

electrocardiogram (ECG)

A tracing of the heart's electrical activity recorded by an electrocardiograph.

Coronary angiography. This is usually done in the cath (short for cardiac catheterization) lab. A radiopaque dye is injected into the patient to assist with visualizing the heart structures and especially the coronary arteries (Figure 14-10).

Electrocardiogram (ECG). Serial or repeated ECGs are performed at regular intervals over several hours to observe for subtle changes in the cardiac complexes.

Checkpoint Questions (LO 14.6)

1. List the tasks that should be performed within the first 10 minutes of a cardiac patient's arrival at the healthcare facility.

2. How can mnemonics such as O-P-Q-R-S-T and S-A-M-P-L-E help you assess a cardiac patient efficiently?

Figure 14-10 During a coronary angiography, radiopaque dye is injected into the patient to assist with visualizing the heart structures, and especially the coronary arteries.

BSIP SA/Alamy Stock Photo



14.7 Treatment Modalities for the Cardiac Patient

Life-threatening irregular heartbeats, or dysrhythmias, are the leading cause of death in the first few hours after a heart attack. Dysrhythmias may be treated with medications or electrical cardioversion (defibrillation). In many instances, it is necessary to perform other procedures as well. The following are common examples of interventional procedures. Not every patient is a good candidate for each procedure. Some patients are not strong enough, the occluded coronary vessel may not be accessible enough, or there may not be a nearby facility with the capabilities to perform the intervention.

Thrombolytic or Fibrinolytic Therapy (Clot Busters)

Thrombolytic or fibrinolytic therapy has been an important addition to the world of emergency cardiovascular care. Known as clot busters, these medications are used to prevent or break down clots that cause blocked coronary vessels. In order to understand this type of therapy, you must first understand how clots are formed. The three main components of a blood clot are platelets, thrombin, and fibrin. During thrombus formation, activated platelets convert circulating prothrombin to the active clotting factor thrombin. Fibrinogen is converted to fibrin by the newly activated thrombin. Fibrin then forms a matrix to which the platelets can adhere.

Thrombolytic agents work by converting plasminogen to the natural fibrinolytic agent plasmin. Plasmin lyses (destroys) clots by breaking down the fibrin contained in a clot. **Fibrinolytic agents** work by breaking

thrombolytic agent

Medications administered intravenously that possess the ability to lyse or dissolve a clot.

fibrinolytic agent

Medications administered to break down the fibrin in a blood clot, essentially dissolving it.

down the fibrin in the clot, causing lysis (destruction) of the clot. The small remaining fragments of this clot are metabolized by the liver and kidneys and eliminated from the body.

These agents are especially beneficial in regions of the country where a cath lab or cardiovascular operating room is not immediately available. The sooner the symptomatic cardiac patient receives this drug, the better the chances of survival. It is often referred to as door-to-drug or door-to-needle time. Thrombolytics or fibrinolytics can be given in the prehospital setting to further reduce the time to treatment. The goal is a door-to-drug or door-to-needle time of less than 30 minutes. Every effort must be made to expedite the intervention.

Thrombolytic or fibrinolytic therapy is *not* appropriate in cases of:

- Brain bleeding (intracranial hemorrhage)
- Stroke within the past 3 months (or possibly longer)
- Head trauma within the past 3 months
- Bleeding disorders
- Bleeding ulcers
- Pregnancy
- Uncontrolled high blood pressure
- Recent trauma or surgery

Thrombolytics are given intravenously. They will dissolve formed clots anywhere in the body, so it is important to realize the systemic (entire body) impact. The patient is at risk for hemorrhage from other locations of recent injury or even at the IV puncture site itself.

Angioplasty and Stents

angioplasty A minimally invasive procedure performed to open narrowed or blocked blood vessels.

Angioplasty is a minimally invasive procedure performed to open narrowed or blocked blood vessels. When angioplasty is performed specifically on coronary vessels, it is referred to as *percutaneous coronary intervention (PCI)* or *percutaneous transluminal coronary angioplasty (PTCA)*. It must be performed within 90 minutes of the patient's arrival at the hospital and no more than 12 hours after a heart attack.

In this procedure, dye is injected for fluoroscopic examination of the arteries to determine the specific location of a narrowed or occluded artery. Once the location has been determined, a catheter with a balloon is inserted, and the balloon is placed at the location of the obstruction and inflated. The balloon outwardly compresses the plaque to reestablish blood flow to the region of tissue distal to the occlusion.

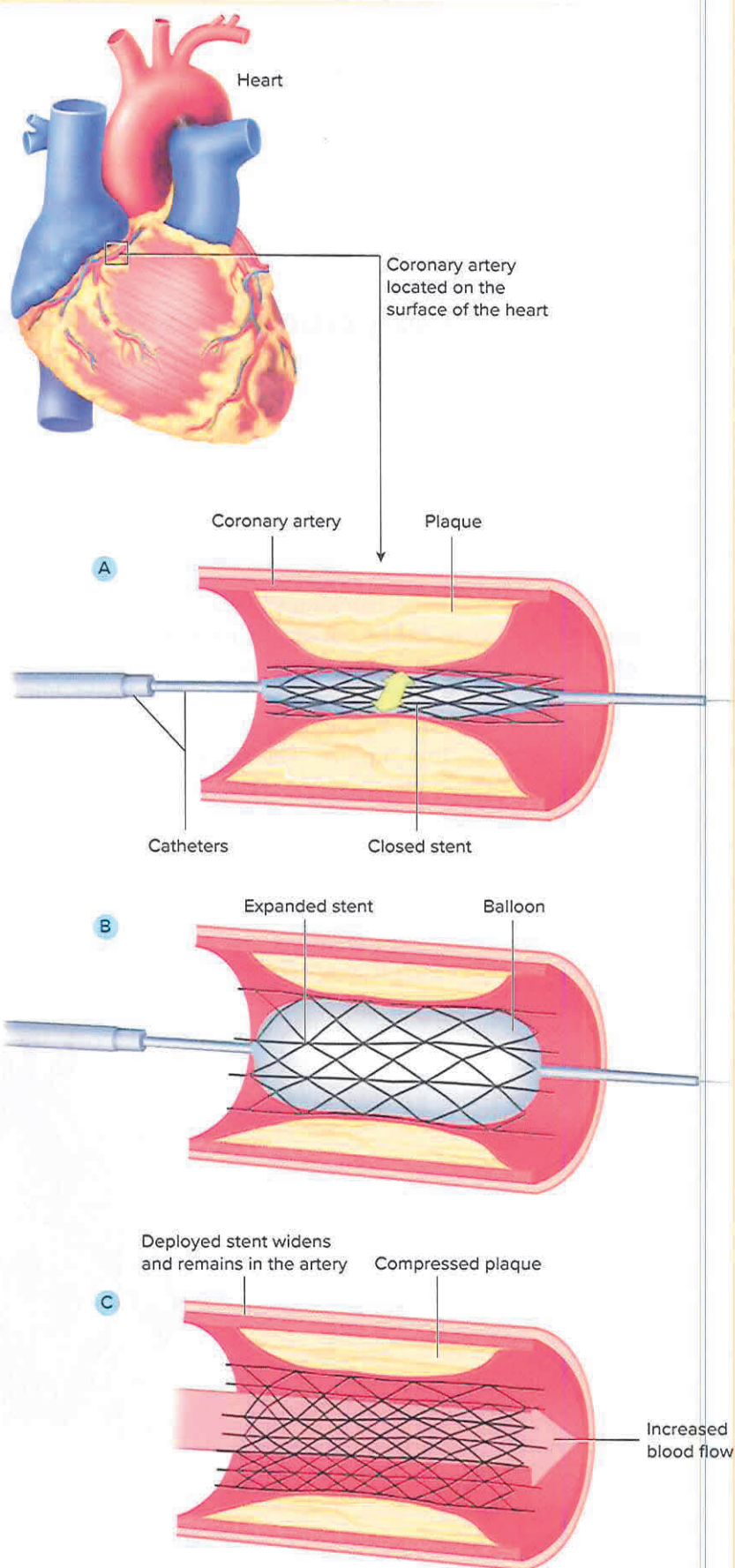
Angioplasty alone has a chance of **restenosis**, or returning to the blocked state. For severe blockages, restenosis may occur in up to 60% of cases within 6 months after the angioplasty is performed. Therefore, a coronary artery **stent** is typically inserted at the time the angioplasty is performed (Figure 14-11). The stent is a matrix of crisscrossed metal that forms a small tube. The stent helps hold the artery open after the angioplasty.

Early, bare-metal stents were only partially effective, and the incidence of restenosis was still high. Drug-eluting stents (DESs) have an interior coating made of a polymer that slowly releases a medication that helps reduce the chance of restenosis, and they are very effective.

restenosis The return of a blood vessel to a blocked state.

stent A matrix of crisscrossed metal that forms a small tube to help keep an artery open after angioplasty.

Figure 14-11 Coronary angioplasty with stent.



Studies have shown that some of the earlier DESs may increase the risk of stent thrombosis, in which the stent itself causes a thrombus to form. Although rare, it almost always causes a myocardial infarction and is often fatal. For this reason, although DES technology has improved greatly, many practitioners now place patients on long-term dual antiplatelet therapy (DAPT). This therapy consists of taking both aspirin and a platelet receptor blocker, that inhibits the platelets, reducing the chance of thrombus formation. Plavix (clopidogrel) or Effient (prasugrel) are two common platelet receptor blocker medications given after stent placement to prevent thrombus formation.

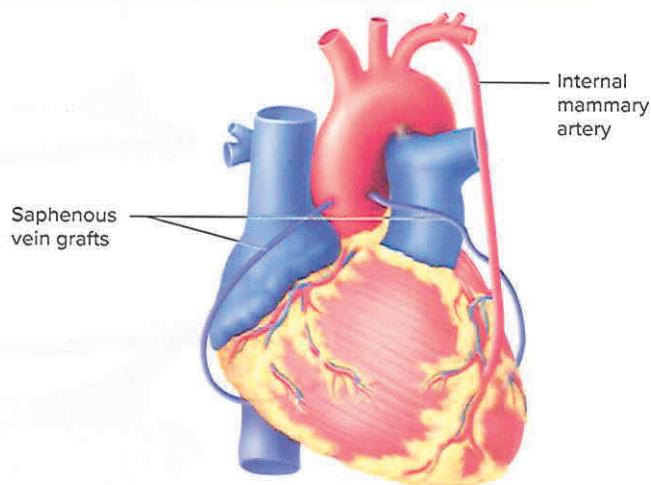
Coronary Artery Bypass Graft (CABG) Surgery

Coronary angiography is performed for diagnostic purposes. When this test is performed, sometimes it reveals extensive coronary artery disease or disease in the left main coronary artery. Disease of the left main coronary artery is a very dangerous circumstance requiring immediate intervention. Occlusion of the proximal left main coronary artery leads to cardiogenic shock and sudden death and is often referred to as the “widow maker.” Occlusion of this vessel will lead to death of the septum and the anterior and lateral walls of the left ventricle, with subsequent left pump failure and death.

The blockages in the coronary arteries are “bypassed” during a procedure called **coronary artery bypass graft (CABG) surgery**. This surgical procedure is performed while the patient is under anesthesia and placed on a heart–lung machine. The heart–lung machine continues to circulate the patient’s blood and oxygen while the heart is “stopped or bypassed” during this surgery. The surgeon will select a vessel to use for grafting such as the saphenous vein (SV), internal mammary artery (IMA), internal thoracic artery (ITA), radial artery (RA), right gastroepiploic artery (RGEA), and occasionally ulnar artery (UA), splenic artery, and inferior epigastric artery. The donor vessel is connected to the ascending aorta and attached (anastomosed) to just past (distal) the coronary artery blockage, to reestablish blood flow. Whichever vessel is used, the intent is to reestablish blood flow to regions of the heart that are ischemic due to blood vessel disease (Figure 14-12).

coronary artery bypass graft (CABG) surgery Surgical intervention performed by taking a grafted or transplanted blood vessel and attaching it to the heart at a point beyond an occluded coronary artery to reestablish blood flow.

Figure 14-12 Example placement of vessels for coronary artery bypass graft (CABG) surgery.



left ventricular assist device (LVAD) A mechanical, battery-powered device that is surgically implanted in a patient's chest to help the left ventricle pump blood throughout the body.

hypercoagulopathy An increased ability of the blood to form clots.

Left Ventricular Assist Devices

A **left ventricular assist device (LVAD)** is a mechanical, battery-powered device that is surgically implanted in a patient's chest. Its purpose is to help the left ventricle pump blood throughout the body. The blood in the patient's left ventricle is drawn through a tube into the implanted LVAD and is then pumped directly into the aorta, allowing the blood to be distributed normally throughout the body.

LVAD is an option for patients with severe (end-stage) heart failure. It is used for people who are waiting for a heart transplant, as well as for people who are not strong enough to endure a heart transplant. Newer LVADS can also be used for long-term treatment, with some patients never receiving transplant. LVAD's are portable, so the patient does not have to remain in the hospital while waiting for a suitable heart for transplantation.

Anticoagulants

Coumadin clinics provide an essential service to patients taking the oral anticoagulant Coumadin (warfarin). Patients are prescribed this drug due to either a heart rhythm disturbance such as atrial fibrillation or a problem with **hypercoagulopathy**. In either case, the drug is used to reduce the clot formation in the blood.

The Coumadin works by decreasing the activity of vitamin K, so while taking Coumadin the patient needs to keep their vitamin K blood level consistent. A sudden increase in vitamin K will decrease the effect of Coumadin. Once this therapy is initiated, the patient is placed on a specific diet that restricts foods that will affect the clotting of the blood. Patients must limit the intake of foods that are high or moderately high in vitamin K, such as spinach, kale, broccoli, turnips, romaine lettuce, and collard greens.

Patients must take the Coumadin at the same time each day and have their bleeding times checked on a regular basis at a Coumadin clinic. This helps ensure that the dose of Coumadin remains within the therapeutic range. These patients are carefully monitored to prevent excessive bleeding or the formation of an embolus.

Newer oral anticoagulants known as non-vitamin K antagonist oral anticoagulants (NOAC) may be used as treatments. These oral anticoagulants (of which there are several) work by directly inhibiting specific factors in the blood clotting cascade. While the effects of Coumadin (warfarin) can be monitored by weekly blood tests the effects of NOAC's are not. Thus, the patient must be very deliberate about when they take their medication and cannot miss a dose.

These other oral anticoagulants are generally prescribed for patients who need anticoagulation, however, do not have any heart valve abnormalities. The drugs include dabigatran (Pradaxa) (twice daily), rivaroxaban (Xarelto) (1 or 2 daily), apixaban (Eliquis) (twice daily), and edoxaban (Savaysa) (1 daily). Any patient, taking these types of anticoagulants or warfarin, are at high risk for bleeding which may not stop, and will bruise very easily.

Figure 14-13 Enhanced external counter pulsation (EECP) therapy. Vasomedical™ Lumenair System.

EECP is a registered® trademark of the Vasomedical, Inc. Westbury, NY.



enhanced external counter pulsation (EECP)

Treatment for chronic angina patients who do not have other options due to health status. This procedure is performed 5 days a week for several weeks, with the intent of developing collateral blood vessels—essentially creating a “natural” bypass around narrowed or blocked arteries.

collateral blood vessels

Small blood vessels that develop forming a natural bypass to a region of tissue.

Enhanced External Counter Pulsation (EECP) Therapy

External counter pulsation therapy may be performed on patients with recurrent angina or, more recently, on heart failure patients who are typically not strong enough to withstand major surgery such as heart catheterization or CABG. **Enhanced external counter pulsation (EECP)** is a safe, noninvasive, well-tolerated, and clinically effective outpatient physical therapy treatment. During the treatment, the patient lies on a comfortable treatment table with large blood pressure-like cuffs wrapped around their legs and buttocks (Figure 14-13). The cuffs are designed to systematically inflate and deflate in coordination with the contraction and relaxation phases of the heart. The idea behind it is to increase the intravascular pressure in an effort to promote the growth of new **collateral blood vessels** and in essence create a “natural” bypass to bridge areas of the heart where occlusions or narrowing of blood vessels have occurred. Each EECP treatment generally lasts 1 hour per day and is performed 5 days per week for a total of 7 weeks.

Checkpoint Questions (LO 14.7)

1. Compare the two types of clot busters.

2. Why are stents usually inserted during coronary angioplasty?

Chapter Summary

Learning Outcomes	Summary	Pages
14.1 Identify the major coronary arteries, and describe the structure of arteries.	The right coronary artery main branches include the posterior descending artery and marginal artery. The left coronary artery main branches are the circumflex and the left anterior descending artery. The coronary artery walls include three layers of tissue: tunica adventitia, tunica media, and tunica intima.	332–334
14.2 Describe typical cardiac symptoms and unstable angina.	Not all chest pain is cardiac in origin; however, all chest discomfort or pain is considered cardiac until proven otherwise. Chest pain may present gradually or quickly, stay in one location, or radiate to other locations. Anginal symptoms are the heart's way of telling us it is not receiving enough oxygen. Unstable angina is a signal to a patient that their angina has changed or gotten worse. Signs of unstable angina may be confused with an MI.	334–336
14.3 Summarize atypical patient types and presentation.	Not every patient with MI presents with the same complaints. Females, patients with diabetes, and elderly people are three groups who present atypically.	336–338
14.4 Compare ST segment elevation and non-ST segment elevation.	<i>Acute coronary syndrome</i> is a broad term that refers to patients presenting with unstable angina, ST segment elevation MI (STEMI), or non-ST segment elevation MI (NSTEMI). STEMI refers to the classic MI, which occurs 75% to 80% of the time. NSTEMI patients don't present with the classic signs and symptoms and represent 20% to 25% of cases. NSTEMI patients may be asymptomatic, so the healthcare team must be alert to this type of patient.	338–341

(Continued)

Learning Outcomes	Summary	Pages
14.5 Explain heart failure.	Heart failure occurs when the heart muscle has sustained enough injury that it is unable to function as an effective pump. The most common cause of heart failure is MI. Left and right ventricular failure have different effects on the body.	341–343
14.6 Identify assessment and immediate treatment for the cardiac patient.	O-P-Q-R-S-T and S-A-M-P-L-E are common mnemonics, or memory tools, used to ensure a consistent approach to information gathering when interviewing cardiac patients. When providing care to the cardiac patient, it is necessary that medical care be delivered immediately and effectively. Communication within the team creates success.	344–349
14.7 Discuss treatment modalities for the cardiac patient.	Additional tests are often used to evaluate the heart and its function. Interventional procedures may be performed for patients in certain circumstances and may include fibrinolytic therapy, angioplasty with stenting of vessels, and CABG surgery. Other types of treatment are prescribed for cardiac patients, such as LVAD, anticoagulant therapy, and EECF, depending on the specific diagnosis or patient's health state. When working with a cardiac patient, if there is a chance the patient will be having an invasive procedure, ensure that the consent is signed before the patient receives narcotics.	349–355

Chapter Review

True / False

Read each statement and determine if it is true or false. Circle the T or F. For false (F) statements, correct them on the lines provided.

T F 1. All chest pain is cardiac in origin. (LO 14.2)

T F 2. Angina is the heart's way of complaining it needs more oxygen. (LO 14.2)

T F 3. All acute myocardial infarctions present with ST segment elevation. (LO 14.4)

T F 4. The "A" in S-A-M-P-L-E refers to ascites. (LO 14.6)

T F 5. Patients must sign a consent for procedures before receiving narcotics. (LO 14.5)

T F 6. Fibrinolytic agents may be used on any patient. (LO 14.7)

T F 7. Beta blockers decrease heart rate and blood pressure. (LO 14.6)

T F 8. The circumflex artery supplies blood to the right atrium and ventricle. (LO 14.1)

Multiple Choice

Circle the correct answer.

9. What is the name of the innermost layer of an artery? (LO 14.1)

- a. Tunica adventitia
- b. Tunica media
- c. Tunica os
- d. Tunica intima

10. Which major coronary artery and vessel supplies blood to both ventricles? (LO 14.1)

- a. Circumflex artery
- b. Left anterior descending artery
- c. Right descending artery
- d. Right main and marginal arteries

11. Which of the following complaints may be cardiac in origin? (LO 14.2)
 - a. Jaw pain
 - b. Nausea
 - c. Indigestion
 - d. All of the answers are correct.
12. Symptoms of unstable angina include which of the following? (LO 14.2)
 - a. Chest pain that lasts longer than 20 minutes
 - b. More frequent or severe chest pain
 - c. Chest pain that occurs with less exertion
 - d. All of the answers are correct.
13. Which three groups of patients often present with atypical symptoms of MI? (LO 14.3)
 - a. Females, infants, and children
 - b. Females, elderly patients, and patients with diabetes
 - c. Males, females, and children with diabetes
 - d. All of the answers are correct.
14. Due to damage to blood vessels, patients with diabetes are _____ as likely as a nondiabetic individual to experience a stroke or heart attack. (LO 14.3)
 - a. 10 times
 - b. 5 times
 - c. twice
 - d. not
15. Which of the following are included when referring to acute coronary syndrome? (LO 14.3)
 - a. STEMI, NSTEMI, and unstable angina
 - b. STEMI, NSTEMI, and stable angina
 - c. STEMI, NSTEMI, and diabetes
 - d. STEMI, NSTEMI, and CVA
16. What percentage of patients may present with STEMI? (LO 14.4)
 - a. 20%–25%
 - b. 40%–45%
 - c. 75%–80%
 - d. 100%
17. What percentage of patients may present with NSTEMI? (LO 14.4)
 - a. 20%–25%
 - b. 40%–45%
 - c. 75%–80%
 - d. 100%
18. Heart failure is simply defined as _____. (LO 14.5)
 - a. pulmonary edema
 - b. hyperlipidemia
 - c. pulmonary failure
 - d. pump failure
19. Which type of heart failure causes fluid to back up in the lungs, causing pulmonary edema? (LO 14.5)
 - a. Right atrial
 - b. Right ventricular
 - c. Left atrial
 - d. Left ventricular

20. Mnemonic devices are commonly used in medicine to _____. (LO 14.6)
 - a. create a complex tool for specialists only
 - b. decrease communication and efficiency of patient care
 - c. increase the amount of time before the patient receives care
 - d. increase efficiency and present a more logical flow to patient care
21. Which of the following items must be assessed during a patient evaluation? (LO 14.6)
 - a. Signs and symptoms
 - b. Signs of distress
 - c. Pain scale
 - d. All of the answers are correct.
22. Which of the following would *not* be done during patient assessment and initial treatment of a cardiac patient? (LO 14.6)
 - a. Obtain a 12-lead ECG.
 - b. Start oxygen.
 - c. Obtain the vital signs.
 - d. Obtain a urine specimen.
23. Nitroglycerin causes blood vessels to _____ and blood pressure to _____. (LO 14.6)
 - a. constrict, increase
 - b. relax, increase
 - c. constrict, decrease
 - d. relax, decrease
24. Which procedure allows visualization of the coronary arteries and placement of a stent? (LO 14.7)
 - a. Coronary artery bypass
 - b. Echocardiography
 - c. Cardiac catheterization
 - d. Enhanced external counter pulsation
25. Coumadin is used to _____. (LO 14.7)
 - a. increase heart rate
 - b. increase clot formation in blood
 - c. decrease heart rate
 - d. decrease clot formation in blood

Fill in the Blank

26. List at least five things that must be done when caring for a cardiac patient within the first 10 minutes of their arrival. (LO 14.6)

_____	_____
_____	_____
_____	_____

27. List five blood tests that the doctor might order when caring for a chest pain patient. (LO 14.6)

_____	_____
_____	_____
_____	_____

28. Occlusion of the proximal left coronary artery is often referred to as the _____. (LO 14.7)
29. Name two vessels that are used in CABG surgery. (LO 14.7)
- _____

Critical Thinking Application *What Should You Do?*

30. The patient is a 57-year-old female with a history of hypertension and chronic stable angina. She arrives in the ED complaining of indigestion-type pain that occurs more frequently than her chest pain and takes over 20 minutes to go away. She appears mildly short of breath, with vital signs of BP 155/98, pulse rate 100, and respiratory rate 24/min. (LO 14.2)
- What should be considered as the most likely cause of this patient's pain? Why?
 - What is the difference between stable and unstable angina?
 - Why might this new pain most likely be considered unstable angina?
- _____
31. The 50-year-old male patient with diabetes undergoes coronary angiography that shows a 90% blockage of the LAD. He has a DES placed and will be taking medication postprocedure to prevent restenosis. (LO 14.7)
- To what part of the heart does the LAD artery supply blood? Why do you think it is sometimes called the widow maker?
 - What medication(s) would this patient most likely be given after the DES placement procedure?
 - What would be the best explanation to a patient who asks why he needs to take medication even after having a stent placed?
- _____
32. A 68-year-old male is complaining of substernal chest pressure. The pressure is radiating to his left shoulder. This patient has no history of heart disease, diabetes, hypertension, or stroke. His father died from a heart attack at the age of 62. This patient is moderately anxious. He is not obese, and his vital signs are within normal limits except for a blood pressure (BP) of 90/48. (LO 14.2, 14.6)
- Is this patient at risk?
 - Why would this patient be anxious?
 - What are the tasks that must be performed within the first 10 minutes of arrival?
 - Why are these tasks performed within the first 10 minutes?
 - What do you think this patient is experiencing?
- _____



connect

Now that you have completed the material in the textbook, go to Connect and complete any chapter activities you have not yet done.

Competency Checklist

Use the following Procedure Checklist 14-1 to practice and perform the skills presented in this chapter (LO 14.6).

COMPETENCY CHECKLIST 14-1

Immediate Care for a Cardiac Patient

Procedure Steps (<i>Rationale</i>)	Practice		Practice		Test		Mastered	
	Yes	No	Yes	No	Yes	No	Date	Initials
Preprocedure								
1. Use the O-P-Q-R-S-T and/or the S-A-M-P-L-E technique to assess pain level.								
2. Check vital signs, including pulse oximetry. Report additional observations for pulse and respirations.								
Procedure								
1. Start oxygen liters/min by nasal cannula (if required by protocol).								
2. Obtain 12-lead ECG immediately and with each set of vital signs.								
3. Notify physician or treating practitioner of patient with chest pain.								
4. Physician or treating practitioner interprets ECG.								
5. Wait for directions from treating practitioner and provide further treatment using these guidelines.								
6. Determine cardiac rhythm on monitor.								
7. An intravenous line or saline lock is started for administration of medications.								
8. A blood specimen is obtained.								
9. Laboratory tests are ordered per protocol including CBC, electrolytes, PT/PTT or PT/INR, lipid panel, and cardiac enzymes.								
10. Aspirin is administered per protocol.								
11. Nitroglycerin is administered per protocol.								
12. Assist with treatment of a hypotensive patient including an IV fluid challenge or bolus if ordered.								
13. Nitroglycerin administration repeated for two more doses, 5 minutes apart.								

Procedure Steps (<i>Rationale</i>)	Practice		Practice		Test		Mastered	
	Yes	No	Yes	No	Yes	No	Date	Initials
Postprocedure (<i>continued</i>)								
14. Monitor vital signs every 15 minutes and after each dose of medication.								
15. IV morphine is started as ordered, if chest pain is not relieved by nitroglycerin and systolic pressure is above 100 mmHg.								
16. Beta-blocker medications are given per the protocol of the facility.								
Postprocedure								
1. Perform any other tasks as needed, such as contacting radiology for a portable upright chest X-ray and cardiopulmonary or laboratory for a blood gas analysis.								
Comments:								
<i>Signed</i>								
Evaluator:								
Student:								