**Learning Outcomes**

**CHAPTER 31**

Cardiology

**Cognitive Domain**
1. Spell and define key terms
2. List and describe common cardiovascular disorders
3. Identify and explain common cardiovascular procedures and tests
4. Describe the roles and responsibilities of the medical assistant during cardiovascular examinations and procedures
5. Discuss the information recorded on a basic 12-lead electrocardiogram
6. Explain the purpose of a Holter monitor
7. Identify common pathologies related to each body system
8. Describe implications for treatment related to pathology

**Psychomotor Domain**
1. Perform electrocardiography (Procedure 31-1)
2. Apply a Holter monitor for a 24-hour test (Procedure 31-2)
3. Assist physician with patient care
4. Prepare a patient for procedures and/or treatments
5. Practice standard precautions
6. Document patient care
7. Document patient education
8. Practice within the standard of care for a medical assistant

**Affective Domain**
1. Apply critical thinking skills in performing patient assessment and care
2. Use language/verbal skills that enable patients’ understanding
3. Demonstrate empathy in communicating with patients, family, and staff
4. Use appropriate body language and other nonverbal skills in communicating with patients, family, and staff
5. Demonstrate awareness of the territorial boundaries of the person with whom you are communicating
6. Demonstrate sensitivity appropriate to the message being delivered
7. Demonstrate recognition of the patient’s level of understanding in communications
8. Recognize and protect personal boundaries in communicating with others
9. Demonstrate respect for individual diversity, incorporating awareness of one’s own biases in areas including gender, race, religion, age, and economic status
10. Apply active listening skills
11. Apply local, state, and federal health care legislation and regulation appropriate to the medical assisting practice setting
<table>
<thead>
<tr>
<th>ABHES Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assist the physician with the regimen of diagnostic and treatment modalities as they relate to each body system</td>
</tr>
<tr>
<td>2. Perform electrocardiograms</td>
</tr>
<tr>
<td>3. Comply with federal, state, and local health laws and regulations</td>
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<tr>
<td>4. Communicate on the recipient’s level of comprehension</td>
</tr>
<tr>
<td>5. Serve as a liaison between the physician and others</td>
</tr>
<tr>
<td>6. Show empathy and impartiality when dealing with patients</td>
</tr>
<tr>
<td>7. Document accurately</td>
</tr>
</tbody>
</table>
CHAPTER 31 • Cardiology

MULTIPLE CHOICE

Circle the letter preceding the correct answer.

1. Chronic cases of myocarditis may lead to heart failure with:
   a. endocarditis.
   b. cardiomegaly.
   c. asthma.
   d. bronchitis.
   e. congestive heart failure.

2. To identify the causative agent, proper diagnosis of endocarditis requires a(n):
   a. chest radiograph.
   b. blood culture.
   c. electrocardiogram.
   d. x-ray.
   e. stool sample.

3. Arrhythmia may occur if the sinoatrial node initiates electrical impulses:
   a. too quietly or too loudly.
   b. too roughly or too smoothly.
   c. too fast or too slowly.
   d. always.
   e. 60 to 100 times a minute.

4. When a patient's heart conduction system cannot maintain normal sinus rhythm without assistance, an electrical source can be implanted to assist or replace the sinoatrial node. This device is called a(n):
   a. pacemaker.
   b. artifact.
   c. Holter monitor.
   d. aneurysm.
   e. lead.

5. Which condition may result from rheumatic heart disease?
   a. Valvular disease
   b. Cardiac arrhythmia

6. One symptom of coronary artery disease is:
   a. bleeding around the heart.
   b. chronic head cold.
   c. swollen tongue.
   d. pressure or fullness in the chest.
   e. leg pain.

7. Patients who are considered hypertensive have a resting systolic blood pressure above _____ and a diastolic pressure above _____.
   a. 120 mm Hg; 70 mm Hg
   b. 130 mm Hg; 80 mm Hg
   c. 140 mm Hg; 90 mm Hg
   d. 150 mm Hg; 100 mm Hg
   e. 160 mm Hg; 110 mm Hg

8. Who is predisposed to varicose veins?
   a. People who use their brains more than their bodies
   b. People who run or jog excessively
   c. People who sit or stand for long periods of time without moving
   d. People who are obese over many years
   e. People who play a musical instrument

9. Another term for thrombi is:
   a. heart attack.
   b. blood clots.
   c. fever.
   d. racing heart.
   e. stroke.
10. Patients may refer to anticoagulant medications as:
   a. antipyretics.
   b. thrombolytics.
   c. sugar pills.
   d. thickening agents.
   e. blood thinners.

11. A common cause of cerebrovascular accident is:
   a. damage to the blood vessels in the heart.
   b. blockage of the cerebral artery by a thrombus.
   c. weakness or paralysis.
   d. pulmonary embolism.
   e. pleuritic chest pain.

12. Another term for transient ischemic attack is:
   a. peripheral vascular occlusion.
   b. mini-stroke.
   c. heart attack.
   d. brain damage.
   e. slurred speech.

13. Deficiencies in hemoglobin or in the numbers of red blood cells result in:
   a. tachycardia.
   b. thrombus.
   c. stroke.
   d. anemia.
   e. aneurysm.

14. During the physician’s examination, what is used to evaluate the efficiency of the circulatory pathways and peripheral pulses?
   a. Palpation
   b. Blood pressure
   c. Weight
   d. Height
   e. Sign of fever

15. Electrocardiograms are not used to detect:
   a. ischemia.
   b. delays in impulse conduction.
   c. hypertrophy of the cardiac chambers.
   d. arrhythmias.
   e. heart murmurs.

16. How many leads does the standard ECG have?
   a. 2
   b. 10
   c. 12
   d. 18
   e. 20

17. A patient must keep a daily diary of activities when:
   a. wearing a Holter monitor.
   b. preparing for a cardiac examination.
   c. having an ECG.
   d. taking anticoagulants.
   e. completing a cardiac stress test.

18. Many patients with CHF have an enlarged:
   a. chest.
   b. throat.
   c. lung.
   d. heart.
   e. brain.

19. A person who can read and perform ECGs is called a(n):
   a. medical assistant.
   b. phlebotomist.
   c. ultrasonographer.
   d. sound technician.
   e. neurologist.

20. If atherosclerotic plaques are found during a catheterization, which procedure may be performed?
   a. Bypass graft
   b. Angioplasty
   c. Echocardiogram
   d. ECG
   e. Ultrasonograph
**MATCHING**

Place the letter preceding the definition on the line next to the term.

<table>
<thead>
<tr>
<th>Key Terms</th>
<th>Definitions</th>
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<tbody>
<tr>
<td>21. _____ aneurysm</td>
<td>a. a heart rate of less than 60 beats per minute</td>
</tr>
<tr>
<td>22. _____ angina pectoris</td>
<td>b. any disease affecting the myocardium</td>
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<tr>
<td>23. _____ artifact</td>
<td>c. a surgical procedure that increases the blood flow to the heart by bypassing the occluded or blocked vessel with a graft</td>
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<tr>
<td>24. _____ atherosclerosis</td>
<td>d. any activity recorded in an electrocardiogram caused by extraneous activity such as patient movement, loose lead, or electrical interference</td>
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<tr>
<td>25. _____ bradycardia</td>
<td>e. a procedure that improves blood flow through a coronary artery by pressing the plaque against the wall of an artery with a balloon on a catheter, allowing for more blood flow</td>
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<td>26. _____ cardiomegaly</td>
<td>f. an inflammation of the inner lining of the heart</td>
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<tr>
<td>27. _____ cardiomyopathy</td>
<td>g. a death of cardiac muscle due to lack of blood flow to the muscle; also known as heart attack</td>
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<tr>
<td>28. _____ cerebrovascular accident (CVA)</td>
<td>h. a local dilation in a blood vessel wall</td>
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<tr>
<td>29. _____ congestive heart failure</td>
<td>i. a heart rate of more than 100 beats per minute</td>
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<tr>
<td>30. _____ electrocardiography</td>
<td>j. an acute episode of cerebrovascular insufficiency, usually a result of narrowing of an artery by atherosclerotic plaques, emboli, or vasospasm; usually passes quickly, but should be considered a warning for predisposition to cerebrovascular accidents</td>
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<tr>
<td>31. _____ coronary artery bypass graft</td>
<td>k. electrodes or electrical connections attached to the body to record electrical impulses in the body, especially the heart or brain</td>
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<tr>
<td>32. _____ endocarditis</td>
<td>l. paroxysmal chest pain usually caused by a decrease in blood flow to the heart muscle due to coronary occlusion</td>
</tr>
<tr>
<td>33. _____ leads</td>
<td>m. ischemia of the brain due to an occlusion of the blood vessels supplying blood to the brain, resulting in varying degrees of debilitation</td>
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<tr>
<td>34. _____ myocardial infarction (MI)</td>
<td>n. a buildup of fatty plaque on the interior lining of arteries</td>
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<tr>
<td>35. _____ myocarditis</td>
<td>o. the feeling of an increased heart rate or pounding heart that may be felt during an emotional response or a cardiac disorder</td>
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<tr>
<td>36. _____ palpitations</td>
<td>p. a condition in which the heart cannot pump effectively</td>
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<tr>
<td>37. _____ percutaneous transluminal coronary angioplasty (PTCA)</td>
<td>q. an inflammation of the sac that covers the heart</td>
</tr>
<tr>
<td>38. _____ pericarditis</td>
<td>r. a procedure that produces a record of the electrical activity of the heart</td>
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<tr>
<td>39. _____ tachycardia</td>
<td>s. an enlarged heart muscle</td>
</tr>
<tr>
<td>40. _____ transient ischemic attack (TIA)</td>
<td>t. an inflammation of the myocardial layer of the heart</td>
</tr>
</tbody>
</table>
MATCHING

Place the letter preceding the description on the line preceding the cardiac condition.

Conditions

41. _____ congestive heart failure
   a. occurs when some of the electrical signals originate in the ventricles rather than in the SA node
42. _____ myocardial infarction
   b. a shock administered to restore normal cardiac electrical activity
43. _____ ventricular tachycardia
   c. symptoms may be similar to those felt during angina pectoris
44. _____ ventricular fibrillation
   d. may occur if the SA node initiates electrical impulses too fast or too slowly
45. _____ arrhythmia
   e. failure of the left ventricle leads to pulmonary congestion

MATCHING

Place the letter preceding the description on the line preceding the cardiac procedure.

Procedures

46. _____ electrocardiogram
   a. provides valuable information about the anatomical location and gross structures of the heart, great vessels, and lungs
47. _____ chest radiography
   b. uses sounds waves generated by a small device called a transducer
48. _____ cardiac stress test
   c. a graphic record of the electrical current as it progresses through the heart
49. _____ echocardiography
   d. common invasive procedure used to help diagnose or treat conditions affecting coronary arterial circulation
50. _____ cardiac catheterization
   e. measures the response of the cardiac muscle to increased demands for oxygen
Cardiac inflammation, or carditis, is a disorder of the heart that is usually the result of infection. In the chart below are descriptions of the three types of carditis. Read the descriptions and fill in the missing boxes with the correct type of carditis.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Causes</th>
<th>Signs and Symptoms</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>a. _____________</td>
<td>a pathogen, neoplasm, or autoimmune disorder, such as lupus erythematosus or rheumatoid arthritis</td>
<td>sharp pain in the same locations as myocardial infarction</td>
<td>relieving the symptoms and, if possible, correcting the underlying cause, including administering an antibiotic for bacterial infection</td>
</tr>
<tr>
<td>b. _____________</td>
<td>radiation, chemicals, and bacterial, viral, or parasitic infection</td>
<td>early signs: fever, fatigue, and mild chest pain chronic: cardiomegaly, arrhythmias, valvulitis</td>
<td>supportive care and medication as ordered by the physician to kill the responsible pathogen</td>
</tr>
<tr>
<td>c. _____________</td>
<td>infection or inflammation of the inner lining of the heart, the endocardium</td>
<td>reflux, or backflow, of the valves or blood</td>
<td>directed at eliminating the infecting organism</td>
</tr>
</tbody>
</table>

Identify and circle the letter preceding the best answer.

52. Valvular disease is:
   a. inflammatory lesions of the connective tissues, particularly in the heart joints, and subcutaneous tissues.
   b. an acquired or congenital abnormality of any of the four cardiac valves.
   c. a collection of fatty plaques made of calcium and cholesterol inside the walls of blood vessels.
   d. a disordered blood flow within the valvular walls of the heart.

53. Atherosclerosis can sometimes result in:
   a. rheumatic heart disease.
   b. valvular disease.
   c. coronary artery disease.
   d. congestive heart failure.

54. Cerebrovascular accident (CVA) is sometimes called:
   a. heart attack.
   b. paralysis.
   c. blood clot.
   d. stroke.

55. Which of the following is a question you should ask the patient before a cardiovascular examination?
   a. Are you currently pregnant?
   b. How long have you had the pain/discomfort?
   c. How often do you exercise?
   d. What do you like to do in your free time?
56. A Holter monitor is used for:
   a. the diagnosis of intermittent cardiac arrhythmias and dysfunctions.
   b. obtaining a good-quality ECG without avoidable artifacts.
   c. obtaining basic information about the anatomical location and gross structures of the heart, great vessels, and lungs.
   d. measuring the response of the cardiac muscle to increased demands for oxygen.

57. Read the risk factors for developing thrombi below and indicate whether the risk factor is primary (P), or inherited, versus secondary (S), or acquired.
   a. _____ hemolytic anemia
   b. _____ long term immobility
   c. _____ chronic pulmonary disease
   d. _____ thrombophlebitis
   e. _____ sickle cell disease
   f. _____ varicosities
   g. _____ defibrillation after cardiac arrest

58. Identify whether each description describes lead I, lead II, or lead III:
   a. _____ measures the difference in electrical potential between the right arm (RA) and the left leg (LL).
   b. _____ measures the difference in electrical potential between the right arm (RA) and the left arm (LA).
   c. _____ measures the difference in electrical potential between the left arm (LA) and the left leg (LL).

59. List five symptoms of the various heart disorders.

   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

60. List the four causes of congestive heart failure.

   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
61. Explain how a pacemaker helps the heart maintain normal sinus rhythm.

62. List six potential causes of anemia.

63. Explain angiography, one of the procedures used to diagnose atherosclerosis.

64. Explain why a physician often requires several blood pressure readings before making the diagnosis of hypertension.

65. List the six elements that are taken into consideration during the ECG.
66. Explain the role of the medical assistant during an ECG.

COG TRUE OR FALSE?

Indicate whether the statements are true or false by placing the letter T (true) or F (false) on the line preceding the statement.

67. _____ Congestive heart failure (CHF) is a condition in which the heart cannot pump effectively.

68. _____ Ventricular fibrillation is a medical emergency that occurs when the heart is contracting rather than quivering in an organized fashion.

69. _____ Diagnosis of atherosclerosis is often made by electrocardiography.

70. _____ Patients who have cerebrovascular accidents usually have varying degrees of weakness or paralysis of one side of the body.

COG AFF CASE STUDIES FOR CRITICAL THINKING

1. You are interviewing a patient prior to a physical examination of the cardiovascular system. This is his first time in a medical office after many years’ absence, and he is considerably anxious. What do you say to him to calm him down? How would you explain the procedure?
2. A patient comes into the office complaining of chest pain, nausea, and vomiting. Will he likely be admitted to the hospital right away? Why or why not?

3. A patient is given an artificial pacemaker. She would like to know how the device works and what changes she can expect from it. What do you tell her?

4. Why is it important that a patient continue taking her prescribed antihypertensive medication, even if her blood pressure has reached a manageable level?

5. Many cardiac conditions are preventable with proper diet and exercise. It’s important to stress prevention over cure, because in most instances, there is no quick “cure.” How will you send this message to patients? What kinds of tools will you use?
PROCEDURE 31-1 Perform a 12-Lead Electrocardiogram

Name: __________________________ Date: _______ Time: _______ Grade: _______

EQUIPMENT/SUPPLIES: Physician order, ECG machine with cable and lead wires, ECG paper, disposable electrodes that contain coupling gel, patient gown and drape, skin preparation materials including a razor and antiseptic wipes

STANDARDS: Given the needed equipment and a place to work the student will perform this skill with _________% accuracy in a total of _________ minutes. (Your instructor will tell you what the percentage and time limits will be before you begin.)

KEY: 4 = Satisfactory 0 = Unsatisfactory NA = This step is not counted

<table>
<thead>
<tr>
<th>PROCEDURE STEPS</th>
<th>SELF</th>
<th>PARTNER</th>
<th>INSTRUCTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wash your hands.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. Assemble the equipment.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. Greet and identify the patient. Explain the procedure.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Turn the ECG machine on and enter appropriate data into it. Include the patient’s name and/or identification number, age, sex, height, weight, blood pressure, and medications.</td>
<td>☐</td>
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<tr>
<td>5. Instruct the patient to disrobe above the waist.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>a. Provide a gown for privacy.</td>
<td>☐</td>
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<tr>
<td>b. Female patients should also be instructed to remove any nylons or tights.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>a. Provide pillows as needed for comfort.</td>
<td>☐</td>
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<tr>
<td>b. Drape the patient for warmth and privacy.</td>
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<tr>
<td>7. Prepare the skin as needed.</td>
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<tr>
<td>a. Wipe away skin oil and lotions with the antiseptic wipes.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>b. Shave hair that will interfere with good contact between skin and electrodes.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>8. Apply the electrodes:</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>a. Arms and legs: snugly against the fleshy, muscular parts of upper arms and lower legs according to the manufacturer’s directions.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>9. Connect the lead wires securely according to the color codes.</td>
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<td>☐</td>
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<tr>
<td>a. Untangle the wires before applying them to prevent electrical artifacts.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>b. Each lead must lie unencumbered along the contours of the patient’s body to decrease the incidence of artifacts.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>c. Double-check the placement.</td>
<td>☐</td>
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</table>
### PART III • The Clinical Medical Assistant

| 10. | Determine the sensitivity and paper speed settings on the ECG machine. | ☐ | ☐ | ☐ |
| 11. | Depress the automatic button on the ECG machine to obtain the 12-lead ECG. | ☐ | ☐ | ☐ |
| 12. | When the tracing is printed, check the ECG for artifacts and standardization mark. | ☐ | ☐ | ☐ |
| 13. | If the tracing is adequate, turn off the machine.  
   a. Remove the electrodes from the patient’s skin.  
   b. Assist the patient to a sitting position and help him or her with dressing if needed. | ☐ | ☐ | ☐ |
| 14. | **AFF** Explain how to respond to a patient who has dementia. | ☐ | ☐ | ☐ |
| 15. | For a single-channel machine, roll the ECG strip.  
   a. Do not secure the roll with clips.  
   b. This ECG will need to be mounted on an 8 × 11-inch paper or form. | ☐ | ☐ | ☐ |
| 16. | Record the procedure in the patient’s medical record. | ☐ | ☐ | ☐ |
| 17. | Place the ECG tracing and the patient’s medical record on the physician’s desk or give it directly to the physician as instructed. | ☐ | ☐ | ☐ |

### CALCULATION

Total Possible Points: _____

Total Points Earned: _______ Multiplied by 100 = _______ Divided by Total Possible Points = _______ %

**PASS**  **FAIL**  **COMMENTS:**

☐  ☐

Student’s signature __________________________ Date _______

Partner’s signature __________________________ Date _______

Instructor’s signature _________________________ Date _______
PROCEDURE 31-2  Apply a Holter Monitor for a 24-Hour Test

Name: ___________________________  Date: ________  Time: ________  Grade: ________

EQUIPMENT/SUPPLIES:  Physician’s order, Holter monitor with appropriate lead wires, fresh batteries, carrying case with strap, disposable electrodes that contain coupling gel, adhesive tape, patient gown and drape, skin preparation materials including a razor and antiseptic wipes, patient diary

STANDARDS:  Given the needed equipment and a place to work the student will perform this skill with _________% accuracy in a total of _________ minutes.  (Your instructor will tell you what the percentage and time limits will be before you begin.)

KEY:  4 = Satisfactory  0 = Unsatisfactory  NA = This step is not counted

PROCEDURE STEPS  SELF  PARTNER  INSTRUCTOR

1.  Wash your hands.  ☐  ☐  ☐
2.  Assemble the equipment.  ☐  ☐  ☐
3.  Greet and identify the patient.  ☐  ☐  ☐
4.  Explain the procedure and importance of carrying out all normal activities.  ☐  ☐  ☐
5.  Explain the reason for the incident diary, emphasizing the need for the patient to carry it at all times during the test.  ☐  ☐  ☐
6.  Ask the patient to remove all clothing from the waist up; gown and drape appropriately for privacy.  ☐  ☐  ☐
7.  Prepare the patient’s skin for electrode attachment.  ☐  ☐  ☐
   a.  Provide privacy and have the patient in a sitting position.  ☐  ☐  ☐
   b.  Shave the skin if necessary and cleanse with antiseptic wipes.  ☐  ☐  ☐
8.  Apply the Holter electrodes at the specified sites:  ☐  ☐  ☐
   a.  The right manubrium border.  ☐  ☐  ☐
   b.  The left manubrium border.  ☐  ☐  ☐
   c.  The right sternal border at the fifth rib level.  ☐  ☐  ☐
   d.  The fifth rib at the anterior axillary line.  ☐  ☐  ☐
   e.  The right lower rib cage over the cartilage as a ground lead.  ☐  ☐  ☐
9.  To do this, expose the adhesive backing of the electrodes and follow the manufacturer’s instructions to attach each firmly. Check the security of the attachments.  ☐  ☐  ☐
10.  Position electrode connectors downward toward the patient’s feet.  ☐  ☐  ☐
11.  Attach the lead wires and secure with adhesive tape.  ☐  ☐  ☐
12.  Connect the cable and run a baseline ECG by hooking the Holter monitor to the ECG machine with the cable hookup.  ☐  ☐  ☐
13.  Assist the patient to carefully redress with the cable extending through the garment opening.  Note: Instruct the patient that clothing that buttons down the front is more convenient.  ☐  ☐  ☐
14. Plug the cable into the recorder and mark the diary.
   a. If needed, explain the purpose of the diary to the patient again.
   b. Give instructions for a return appointment to evaluate the recording and the diary.

15. Record the procedure in the patient's medical record.

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<thead>
<tr>
<th>14.</th>
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**CALCULATION**

Total Possible Points: _______

Total Points Earned: _______ Multiplied by 100 = _______ Divided by Total Possible Points = _______ %

**PASS**  **FAIL**  **COMMENTS:**

☐       ☐

Student’s signature __________________________ Date _______

Partner’s signature __________________________ Date _______

Instructor’s signature _________________________ Date _______