

Chapter 2

Cardiology

SKILLS**ECG MONITORING****Charting Student Progress:**

1. *Learning skill*
2. *Performs skill with direction*
3. *Performs skill independently*

Procedure	1	2	3
1. Turn on the machine.			
2. Prepare the skin.			
3. Apply the electrodes.			
4. Ask the patient to relax and remain still.			
5. Check the ECG.			
6. Obtain a tracing.			
7. Examine the ECG strip.			
8. Continue ALS care.			

Comments:

SKILLS**DEFIBRILLATION****Charting Student Progress:**

1. *Learning skill*
2. *Performs skill with direction*
3. *Performs skill independently*

Procedure	1	2	3
1. Begin CPR while the defibrillator is being readied.			
2. Continue CPR for at least 2 minutes while the defibrillator pads are being applied.			
3. Charge the defibrillation paddles.			
4. Reconfirm the rhythm on the cardiac monitor.			
5. Verbally and visually clear everybody, including yourself, from the cardiac patient.			
6. Check the rhythm. If a shockable rhythm is detected, administer a shock by pressing both buttons simultaneously.			
7. Resume CPR immediately after the shock without a pulse check. Administer appropriate medications. After 2 minutes of CPR, check the rhythm again. Apply next shock if indicated.			
8. Reconfirm the rhythm on the cardiac monitor. Begin CPR or other appropriate care based on cardiac rhythm.			

Comments:

SKILLS**TRANSCUTANEOUS CARDIAC PACING****Charting Student Progress:**

1. *Learning skill*
2. *Performs skill with direction*
3. *Performs skill independently*

Procedure	1	2	3
1. Establish an IV line.			
2. Place ECG electrodes.			
3. Carefully assess vital signs and place appropriate monitors.			
4. If transcutaneous cardiac pacing is indicated, apply the pacing electrodes according to the manufacturer's recommendations. Consider sedation or analgesia.			
5. Connect the electrodes.			
6. Select the desired pacing rate and current.			
7. Monitor the patient's response to treatment.			

Comments:

SKILLS**CAROTID SINUS MASSAGE****Charting Student Progress:**

1. *Learning skill*
2. *Performs skill with direction*
3. *Performs skill independently*

Procedure	1	2	3
1. Initiate IV, oxygen (if patient is hypoxic) and ECG monitoring.			
2. Position patient on his back, slightly hyperextending the head.			
3. Listen to both carotids for the presence of bruits. Do not perform carotid sinus massage if bruit is present.			
4. Tilt the patient's head to either side. Place your index and middle fingers over one artery, below the angle of the jaw and as high up on the neck as possible.			
5. Firmly massage the artery by pressing it against the vertebral body and rubbing.			
6. Monitor the ECG and obtain a continuous readout. Terminate massage at the first sign of slowing or heart block.			
7. Maintain pressure no longer than 15–20 seconds.			
8. If the massage is ineffective, you may repeat it, preferably on the other side of the patient's neck.			

Comments:

SKILLS**12-LEAD PREHOSPITAL ECG MONITORING****Charting Student Progress:**

1. *Learning skill*
2. *Performs skill with direction*
3. *Performs skill independently*

Procedure	1	2	3
1. Prep the skin.			
2. Place the four limb leads according to the manufacturer's recommendations.			
3. Place lead V ₁ .			
4. Place lead V ₂ .			
5. Place lead V ₄ .			
6. Place lead V ₃ .			
7. Place lead V ₅ .			
8. Place lead V ₆ .			
9. Ensure that all leads are attached.			
10. Turn on the machine.			
11. Check the quality of the tracing being received from each channel.			
12. Record the tracing.			
13. Examine the tracing. Do not completely rely on the machine's interpretation of the tracing.			
14. Transmit the tracing to the receiving hospital, if appropriate.			

Comments:

- _____ 10. Stroke volume depends on three factors: preload, cardiac contractility, and:
- a. afterload.
 - b. circumflexion.
 - c. papillary contractility.
 - d. atrial response.
- _____ 11. The connection points between the arterial and venous systems are called:
- a. lumens.
 - b. capillaries.
 - c. venules.
 - d. tunica.
- _____ 12. Which of the following statements about arteries is TRUE?
- a. They always carry oxygenated blood.
 - b. They carry blood away from the heart.
 - c. They carry blood under low pressure.
 - d. They cannot change the size of their lumen.
- _____ 13. The period of time from the end of one cardiac contraction to the end of the next is called the cardiac:
- a. fraction.
 - b. diastole.
 - c. systole.
 - d. cycle.
- _____ 14. Pressure in the filled ventricle at the end of diastole is called:
- a. afterload.
 - b. preload.
 - c. cardiac output.
 - d. stroke volume.
- _____ 15. The equation used to determine cardiac output is:
- a. stroke volume \times heart rate.
 - b. systolic pressure \times heart rate.
 - c. preload \times stroke volume.
 - d. preload \times afterload.
- _____ 16. Which of the following statements about the nervous system's control of the heart is TRUE?
- a. In the heart's normal state, the sympathetic system is dominant.
 - b. During sleep, the parasympathetic and sympathetic systems balance.
 - c. In stressful situations, the sympathetic system becomes dominant.
 - d. In the heart's normal state, the parasympathetic system is dominant.
- _____ 17. A positive chronotropic agent will:
- a. increase the heart rate.
 - b. increase the respiratory rate.
 - c. strengthen cardiac contraction.
 - d. speed impulse conduction.
- _____ 18. Repolarization is influenced by:
- a. calcium.
 - b. sodium.
 - c. potassium.
 - d. magnesium.
- _____ 19. The return of a cardiac muscle cell to its preexcitation resting state is called:
- a. resting potential.
 - b. depolarization.
 - c. action potential.
 - d. repolarization.
- _____ 20. The term *automaticity* refers to a cell's capability of:

- a. responding to electrical stimuli.
 - b. propagating an electrical impulse from one cell to another.
 - c. self-depolarization.
 - d. contraction or shortening.
- _____ 21. The AV node has an intrinsic rate of self-excitation, which is _____ beats per minute.
- a. 20 to 40
 - b. 40 to 60
 - c. 60 to 80
 - d. 80 to 100
- _____ 22. Muscle tremors, shivering, and loose electrodes can cause deflections on the ECG called:
- a. anomalies.
 - b. artifacts.
 - c. aberrant conduction.
 - d. FLBs.
- _____ 23. The three types of ECG leads include:
- a. augmented.
 - b. quadripolar.
 - c. triangle.
 - d. paradoxical.
- _____ 24. Leads I, II, and III form:
- A. Starling's triad.
 - b. Cushing's quadrant.
 - c. Einthoven's triangle.
 - d. circle of Willis.
- _____ 25. Leads I, II, and III are considered _____ leads.
- a. unipolar
 - b. bipolar
 - c. precordial
 - d. anterior
- _____ 26. Leads designated aVR, aVL, and aVF are known as _____ leads.
- a. unipolar
 - b. bipolar
 - c. precordial
 - d. anterior
- _____ 27. A single monitoring lead can indicate
- a. the presence or location of an infarct.
 - b. axis deviation or chamber enlargement.
 - c. right-to-left differences in impulse formation.
 - d. the time it takes to conduct an impulse through the heart.
- _____ 28. One small box on ECG graph paper equals:
- a. 0.20 seconds.
 - b. 0.02 seconds.
 - c. 0.04 seconds.
 - d. 0.40 seconds.
- _____ 29. Time interval markings on ECG paper are placed at _____ - second intervals.
- a. 1
 - b. 2
 - c. 3
 - d. 6
- _____ 30. Which of the following statements about the P wave is TRUE?
- a. It is a negative deflection in lead II.
 - b. It is a rounded wave appearing after the QRS complex.
 - c. It corresponds to atrial depolarization.
 - d. It follows the T wave on normal ECGs.
- _____ 31. The QRS complex reflects:
- a. atrial depolarization.
 - b. ventricular depolarization.
 - c. ventricular repolarization.
 - d. atrial repolarization.
- _____ 32. Waves that are associated with electrolyte abnormalities but that may be a normal finding are the _____ waves.
- a. P

- b. U
 - c. T
 - d. P, U, and T
- _____ 33. A prolonged PR interval:
- a. is 0.12–0.20 seconds.
 - b. indicates a delay in the AV node.
 - c. may indicate a bundle branch block.
 - d. is related to an increased risk of sudden death.
- _____ 34. The interval of time in the cardiac cycle when a sufficiently strong stimulus may produce depolarization is called the _____ refractory period.
- a. absolute
 - b. comparative
 - c. relative
 - d. prolonged
- _____ 35. The ST segment may be:
- a. affected by myocardial infarction.
 - b. positive and rounded.
 - c. invisible in the normal ECG.
 - d. isoelectric in the presence of ischemia.
- _____ 36. The five-step procedure for interpreting ECG rhythm strips includes analyzing all of the following EXCEPT:
- a. QRS complex.
 - b. rhythm.
 - c. PR interval.
 - d. ST segment.
- _____ 37. A nonpacemaker heart cell that automatically depolarizes is called a(n) _____ focus.
- a. ectopic
 - b. irritable
 - c. ischemic
 - d. reentry
- _____ 38. Dysrhythmias are defined as:
- a. rhythms resulting in chest pain.
 - b. myocardial infarctions.
 - c. rhythm absence.
 - d. heart rhythm abnormalities.
- _____ 39. Dysrhythmias that originate in the SA node include:
- a. asystole.
 - b. accelerated junctional rhythm.
 - c. sinus tachycardia.
 - d. atrial fibrillation.
- _____ 40. An ectopic focus in the atrium resulting in an early P wave is called:
- a. atrial fibrillation.
 - b. premature atrial contractions (PACs).
 - c. atrial tachycardia.
 - d. atrial flutter.
- _____ 41. Which of the following may be used in the treatment of symptomatic paroxysmal supraventricular tachycardia (PSVT)?
- a. Lidocaine
 - b. Epinephrine
 - c. Defibrillation
 - d. Vagal maneuvers
- _____ 42. Which of the following statements about first-degree AV blocks is TRUE?
- a. The rhythm is irregularly irregular.
 - b. The pacemaker site is the AV node.
 - c. The PR interval is greater than 0.20 seconds.
 - d. It is usually a life-threatening dysrhythmia.
- _____ 43. The absence of conduction between the atria and the ventricles is called _____ AV block.
- a. first-degree
 - b. second-degree
 - c. type II second-degree
 - d. third-degree

- _____ **b.** type I second-degree **d.** third-degree
- _____ **44.** Ventricular escape rhythms:
- a.** should be treated with lidocaine.
 - b.** serve as safety mechanisms to prevent cardiac standstill.
 - c.** look identical to a normal QRS complex.
 - d.** cause an ST segment elevation.
- _____ **45.** Since PVCs do not usually depolarize the SA node:
- a.** the pause following the PVC is fully compensatory.
 - b.** the PVCs will appear as inverted QRS complexes.
 - c.** each PVC will appear to be from a different focus.
 - d.** increasing the heart rate will eliminate them.
- _____ **46.** PVCs are considered malignant when more than _____ occur(s) per minute.
- a.** 1 **c.** 4
 - b.** 2 **d.** 6
- _____ **47.** Ventricular fibrillation should be treated with immediate:
- a.** intubation.
 - b.** antidysrhythmics.
 - c.** synchronized cardioversion.
 - d.** defibrillation.
- _____ **48.** _____ has a prognosis for resuscitation that is very poor.
- a.** Asystole **c.** Complete AV block
 - b.** Ventricular fibrillation **d.** Ventricular tachycardia
- _____ **49.** The “P” in PEA stands for:
- a.** pneumothorax. **c.** pericardiocentesis.
 - b.** postdefibrillation. **d.** pulseless.
- _____ **50.** A kind of interventricular heart block in which conduction through either the right or the left bundle branch is blocked or delayed is called a:
- a.** third-degree AV block.
 - b.** bundle branch block.
 - c.** type II second-degree AV block.
 - d.** junctional block.

EVALUATION**CHAPTER 2 QUIZ, PART 2**

Write the letter of the best answer in the space provided.

- _____ 1. The letter "P" in OPQRST stands for:
- provocation.
 - past medical history.
 - pain.
 - provocation/palliation.
- _____ 2. The "feeling of impending doom" is caused by massive stimulation of the:
- parasympathomimetic system.
 - sympatholytic system.
 - sympathetic nervous system.
 - parasympathetic nervous system.
- _____ 3. All of the following can be a cause of poor ECG tracings EXCEPT:
- dry skin.
 - excessive hair.
 - poor electrode placement.
 - loose electrodes.
- _____ 4. Which of the following statements about a precordial thump is TRUE?
- There is little risk of causing rib fractures or other problems.
 - It is most effective immediately after the onset of ventricular fibrillation.
 - Strike the midsternum from a distance of no more than 6 inches.
 - It stimulates polarization of ventricular cells, causing a resumption of an organized rhythm.
- _____ 5. The parasympatholytic agent used to treat symptomatic bradycardias is:
- adenosine.
 - verapamil.
 - atropine sulfate.
 - amiodarone.
- _____ 6. Stable and unstable narrow-complex tachycardias are managed by:
- amiodarone.
 - adenosine.
 - lidocaine.
 - bretylum.
- _____ 7. Sympathomimetic agents are similar to naturally occurring hormones, one of which is:
- atropine sulfate.
 - lidocaine.
 - verapamil.
 - epinephrine.
- _____ 8. The drug used in cardiac arrest resuscitation that acts on both alpha- and beta-adrenergic receptors is:
- dopamine.
 - epinephrine.
 - isoproterenol.
 - atropine sulfate.
- _____ 9. Dopamine stimulates:
- alpha receptors.

- b. beta receptors.
 - c. both alpha and beta receptors.
 - d. neither alpha nor beta receptors.
- _____ 10. Which of the following statements about nitrous oxide is TRUE?
- a. It is used to treat MI because of its hemodynamic effects.
 - b. It can be used to increase myocardial oxygen supply.
 - c. Its effects subside within 10–15 hours.
 - d. You may give it to intoxicated patients.
- _____ 11. Morphine sulfate is important in managing MI because it:
- a. increases myocardial oxygen demand.
 - b. has few side effects, none of which are toxic.
 - c. increases sympathetic nervous system discharge.
 - d. acts directly on the central nervous system.
- _____ 12. Aspirin is used in the treatment of myocardial ischemia because it:
- a. is a thrombolytic.
 - b. has analgesic effects.
 - c. inhibits the aggregation of platelets.
 - d. can cause gastric upset and bleeding.
- _____ 13. When using alteplase, a potent fibrinolytic, an important point to remember is that:
- a. it must be administered within 3 hours after the onset of coronary ischemia.
 - b. the typical dose is a single 10-unit bolus given IV push over 2 minutes.
 - c. complications include potentially life-threatening arrhythmias.
 - d. unlike other fibrinolytics, hemorrhage is not a complication.
- _____ 14. The purpose of defibrillation is to:
- a. deliver an electric shock to jump-start the heart.
 - b. depolarize the cells and allow them to repolarize uniformly.
 - c. deliver a regular impulse to pace a bradycardic heart.
 - d. suppress ectopic beats, such as PVCs.
- _____ 15. Several factors influence the success of defibrillation, including:
- a. duration of ventricular fibrillation.
 - b. age of the patient.
 - c. antidysrhythmic drugs.
 - d. previous medical history.
- _____ 16. Steps in performing defibrillation include:
- a. making sure the defibrillator paddles are clean and dry.
 - b. using firm downward pressure on the paddles to decrease transthoracic resistance.
 - c. verifying that the synchronizer is turned on.
 - d. charging the defibrillator to 100 joules for all shocks.
- _____ 17. Indications for emergency synchronized cardioversion of an unstable patient include:
- a. pulseless ventricular tachycardia.
 - b. ventricular fibrillation.
 - c. rapid atrial fibrillation.
 - d. pulseless electrical activity.
- _____ 18. The procedure for synchronized cardioversion is the same as that for defibrillation EXCEPT that:
- a. the button on only one paddle is pressed.

- b. the energy used is much less.
 - c. the electrodes are placed in different positions.
 - d. clearing the patient before delivery is unnecessary.
- _____ 19. Symptomatic patients in atrial fibrillation with a slow ventricular response may be treated with:
- a. defibrillation.
 - b. synchronized cardioversion.
 - c. external cardiac pacing.
 - d. none of the above.
- _____ 20. _____ occurs when the heart's blood supply is transiently exceeded by myocardial oxygen demands.
- a. Myocardial infarction
 - b. Heart failure
 - c. Prinzmetal's angina
 - d. Angina pectoris
- _____ 21. The major difference between stable and unstable angina is that unstable angina:
- a. occurs at rest.
 - b. responds more readily to treatment.
 - c. indicates that the patient's condition is improving.
 - d. causes cardiac muscle cell death.
- _____ 22. Which of the following statements about angina pectoris is TRUE?
- a. It results from underlying coronary artery disease.
 - b. For relief, angina pain requires morphine.
 - c. With angina, peripheral pulses are typically unequal.
 - d. Blood pressure will decrease during the episode.
- _____ 23. Myocardial infarction:
- a. is the death of a portion of the heart muscle.
 - b. can result from coronary artery spasm.
 - c. may be caused by hypotension.
 - d. is all of the above.
- _____ 24. The MOST common complication of myocardial infarction is/are:
- a. heart failure.
 - b. arrhythmias.
 - c. ventricular aneurysm.
 - d. pulmonary edema.
- _____ 25. To determine specifics about chest pain, use _____ to help you.
- a. SAMPLE
 - b. AVPU
 - c. DCAP-BTLS
 - d. OPQRST
- _____ 26. Rapid transport of a patient with chest pain is indicated if:
- a. the patient has a cardiac history.
 - b. pathological Q waves are present on the 12-lead.
 - c. the ST segment has no changes.
 - d. the patient is over 35 years of age.
- _____ 27. The clinical syndrome in which the heart's mechanical performance is compromised so cardiac output cannot meet the body's needs is called:
- a. angina pectoris.
 - b. pneumothorax.
 - c. heart failure.
 - d. cardiac tamponade.
- _____ 28. The condition in which the heart's reduced stroke volume causes an overload of fluid in the body's other tissues is called:
- a. congestive heart failure.
 - b. myocardial infarction.
 - c. Prinzmetal's angina.
 - d. angina pectoris.

- _____ 29. Management of the responsive adult patient with a history congestive heart failure who presents with respiratory distress, respiratory rate of 32, and SpO₂ of 88% includes:
- a. placing the patient supine position with legs slightly raised.
 - b. administration of furosemide.
 - c. use of continuous positive airway pressure.
 - d. establishing an IV and administering large boluses of fluid.
- _____ 30. Your patient is extremely hypertensive with a diastolic reading of over 130 mmHg. He complains of a severe headache, vomiting, and dizziness. You should suspect:
- a. noncardiogenic pulmonary edema.
 - b. hypertensive encephalopathy.
 - c. dissecting aortic aneurysm.
 - d. meningitis.
- _____ 31. Sudden death is defined as death:
- a. immediately after the onset of symptoms.
 - b. without any signs or symptoms.
 - c. within 1 hour after the onset of symptoms.
 - d. that is unexpected for any reason.
- _____ 32. Return of spontaneous circulation (ROSC) occurs when resuscitation results in:
- a. survival.
 - b. sudden death.
 - c. a spontaneous pulse and respirations.
 - d. a spontaneous pulse, with or without breathing.
- _____ 33. According to the MOST recent science of cardiac arrest:
- a. airway has priority over circulation.
 - b. circulation has priority over breathing.
 - c. breathing has priority over circulation.
 - d. defibrillation has priority over circulation.
- _____ 34. The thickening, loss of elasticity, and hardening of the walls of the arteries from calcium deposits are called:
- a. arteriosclerosis.
 - b. atherosclerosis.
 - c. claudication.
 - d. an aneurysm.
- _____ 35. Which of the following statements about an abdominal aortic aneurysm is TRUE?
- a. It is more common in women than in men.
 - b. It is most prevalent between the ages of 60 and 70.
 - c. It occurs most frequently above the renal arteries.
 - d. Signs and symptoms include pain in the calf muscles.

EVALUATION

CHAPTER 2 QUIZ, PART 3

Write the letter of the best answer in the space provided.

- _____ 1. Passage of an electrical current away from the positive electrode will cause _____ deflection on the recorder.
- a. no
 - b. a positive
 - c. a negative
 - d. an upward
- _____ 2. The frontal plane leads consist of leads:
- a. I, II, III, aVR, aVL, and aVF.
 - b. V₁, V₂, V₃, V₄, V₅, and V₆.
 - c. I, II, and III.
 - d. aVR, aVL, and aVF.
- _____ 3. Leads I, II, and III are:
- a. unipolar.
 - b. bipolar.
 - c. precordial.
 - d. pericardial.
- _____ 4. When the electrical current moves through the heart from the right arm toward the left arm, lead I will record a:
- a. negative deflection.
 - b. positive deflection.
 - c. biphasic deflection.
 - d. deflection that depends on the placement.
- _____ 5. In lead II, the negative electrode is placed on the:
- a. left arm, and the positive electrode is placed on the left leg.
 - b. right arm, and the positive electrode is placed on the left arm.
 - c. right arm, and the positive electrode is placed on the left leg.
 - d. right leg, and the positive electrode is placed on the right arm.
- _____ 6. Leads I, II, and III form:
- a. Cushing's triad.
 - b. Starling's triad.
 - c. Einthoven's triangle.
 - d. Brewster's islet.
- _____ 7. The precordial leads provide a look at the _____ plane of the heart.
- a. vertical
 - b. horizontal
 - c. parallel
 - d. diagonal
- _____ 8. The heart's normal electrical axis is 59 degrees. In the normal tracing, which lead will have the most positive deflection?
- a. Lead I
 - b. Lead II
 - c. Lead III
 - d. Lead aVF
- _____ 9. Any time the axis equals or exceeds +105 degrees, the patient is said to have a(n):
- a. normal electrical axis.
 - b. left axis deviation.
 - c. right axis deviation.
 - d. indeterminate axis.
- _____ 10. Which quadrant of the frontal plane is considered normal?
- a. 0 to +90 degrees
 - b. +90 to +180 degrees
 - c. 0 to -90 degrees
 - d. -90 to -180 degrees
- _____ 11. An infarction that affects only the deeper levels of the myocardium is a(n) _____ infarction.
- a. transmural
 - c. endocardial

- _____ **12.** ST segment elevation, T wave inversion, and the development of significant Q waves in the _____ leads indicate myocardial infarction involving the anterior surface of the heart.
- a.** V₅ and V₆
 - b.** II, III, and aVF
 - c.** I, V₂, V₃, and V₄
 - d.** I and aVL
- _____ **13.** True posterior infarctions can be diagnosed by looking:
- a.** for reciprocal changes in V₁ and V₂.
 - b.** at leads II, III, and aVF.
 - c.** at leads V₅ and V₆.
 - d.** for none of the above.
- _____ **14.** The dysrhythmia that is characterized by each impulse arriving at the AV junction being progressively delayed until, eventually, AV conduction is completely blocked is called _____ AV block (Mobitz I).
- a.** first-degree
 - b.** second-degree
 - c.** partial
 - d.** third-degree
- _____ **15.** Your patient's ECG shows a broad S wave in lead I and an R-S-R prime complex in lead V₁. This indicates a:
- a.** third-degree AV block.
 - b.** hemiblock.
 - c.** right bundle branch block.
 - d.** chamber enlargement.

EVALUATION**CHAPTER 2 SCENARIO 1**

Review the following real-life situation. Then answer the question that follow.

You are called to the local shopping center, where a 70-year-old woman has collapsed while shopping. Her daughter called the ambulance. The daughter states that the patient weighs approximately 110 pounds and that she had been experiencing substernal chest pains for approximately 20 minutes when she suddenly “passed out.” The patient has not responded to verbal stimuli in the past 5 minutes. Bystanders inform you that the patient was breathing on her own until a few minutes before your arrival.

The store manager, who has recently been trained in CPR, initiated rescue breathing but has not begun chest compressions because he “thought he felt a pulse.” You immediately connect the patient to the cardiac monitor and note the rhythm to be sinus tachycardia, with frequent PVCs. You note at this time that the patient has resumed spontaneous respirations.

1. What steps would you take in the management of this patient?

EVALUATION**CHAPTER 2 SCENARIO 2**

Review the following real-life situation. Then answer the questions that follow.

You and your partner are called to the scene of a rural residence where you find a 57-year-old male who is complaining of chest pain. The patient reports a history of recent surgery that was performed to repair a fractured pelvis. Approximately 2 hours ago, he began to experience “tightening in his chest,” chest discomfort, and shortness of breath. He now reports that he feels nauseated.

1. What would be your initial assessment considerations with this patient?

Your partner records the patient's vital signs as follows: blood pressure, 180/120; heart rate, 140; and respirations, 32. When you connect the patient to the ECG, you see a wide-complex tachycardia (uncertain type). When you contact the base hospital, your medical direction physician instructs you to follow the ACLS algorithm for wide-complex tachycardia and to keep her informed of the patient's status.

2. Before initiating drug therapy, what questions would you ask the patient?
3. What is the most important step in the initial management of this patient?
4. Five minutes into your management of this patient, his blood pressure drops to 130/74, and he exhibits a decreased level of consciousness. What should you do next?

REINFORCEMENT**CHAPTER 2 REVIEW**

Write the word or words that best complete each sentence in the space(s) provided.

1. The heart consists of three tissue layers: the _____, _____, and _____.
2. The two superior chambers of the heart are the _____. The larger, inferior chambers are the _____.
3. The heart contains two pairs of valves, the _____ valves and the _____ valves.
4. The _____ receives deoxygenated blood from the head and upper extremities. The _____ receives blood from the areas below the heart.
5. The only veins in the body that carry oxygenated blood are the _____ veins.
6. _____ law states that blood flow through a vessel is directly proportional to the radius of the vessel to the fourth power.
7. The period of time from the end of one cardiac contraction to the end of the next is called the _____.
8. The period of time when the myocardium is relaxed and cardiac filling and coronary perfusion occur is called _____.
9. _____ is the period of the cardiac cycle when the myocardium is contracting.
10. The ratio of blood pumped from the ventricle to the amount of blood remaining at the end of diastole is called the _____.
11. The term _____ refers to the pressure within the ventricles at the end of diastole.
12. The term _____ refers to the resistance against which the heart must pump.
13. The amount of blood pumped by the heart in one minute is called the _____.

14. The term _____ refers to the amount of blood ejected by the heart in one cardiac contraction.
15. The term *chronotropy* pertains to heart _____.
16. The term *inotropy* pertains to cardiac _____.
17. The term _____ pertains to the speed of impulse transmission.
18. A reversal of charges at a cell membrane so that the inside of the cell becomes positive in relation to the outside is called cardiac _____.
19. The normal electrical state of cells is called _____.
20. The stimulation of myocardial cells that subsequently spreads across the myocardium is called the _____.
21. The return of a muscle cell to its preexcitation resting state is called _____.
22. The term _____ pertains to cells being able to respond to an electrical stimulus.
23. The term _____ pertains to cells being able to propagate the electrical impulse from one cell to another.
24. The pacemaker cells' capability of self-depolarization is called _____.
25. A deflection on the ECG produced by factors other than the heart's electrical activity is called a(n) _____.
26. Leads I, II, and III are known as _____ limb leads.
27. Leads V₁ through V₆ are called the _____ leads.
28. Unipolar limb leads are also called _____ limb leads.
29. On ECG graph paper, one small box is equal to _____ seconds.
30. On ECG graph paper, one large box is equal to _____ seconds.
31. The P wave corresponds to _____ depolarization.
32. The QRS complex reflects _____ depolarization.

33. _____ waves may be associated with electrolyte abnormalities.
34. The normal duration of the PR interval is _____ to _____ seconds.
35. The normal QRS complex is _____ to _____ seconds.
36. The period of time when myocardial cells have not yet completely repolarized and cannot be stimulated again is called the _____ period.
37. The _____ is the period of the cardiac cycle when a sufficiently strong stimulus may reproduce depolarization.
38. A heart rate greater than _____ beats per minute is called tachycardia.
39. A heart rate less than 60 beats per minute is called _____.
40. Any deviation from the normal electrical rhythm of the heart is called _____.
41. The absence of cardiac electrical activity is called _____.
42. A nonpacemaker cell that automatically depolarizes is called a(n) _____ focus.
43. Forced expiration against a closed glottis is called a _____ maneuver.
44. The sound of turbulent blood flow through a vessel is called a(n) _____.
45. A uniform delay in conduction at the level of the AV node is called a(n) _____-degree AV block.
46. An intermittent block at the level of the AV node is called a(n) _____-degree AV block.
47. The absence of conduction between the atria and the ventricles resulting from complete electrical block at or below the AV node is called a(n) _____-degree AV block.
48. A single ectopic impulse arising from an irritable focus in either ventricle that occurs earlier than the next expected beat is called a(n) _____.
49. PVCs are termed as malignant if there are more than _____ per minute.

50. _____ is a chaotic ventricular rhythm usually resulting from the presence of many reentry circuits within the ventricles.
51. The dysrhythmia in which there are electrical complexes but no accompanying mechanical contractions of the heart is called _____.
52. Conduction of the electrical impulse through the heart's conductive system in an abnormal fashion is called _____ conduction.
53. A(n) _____ is a kind of interventricular heart block in which conduction through either the right or the left bundle branches is blocked or delayed.
54. _____ is the most common presenting symptom in cases of cardiac disease.
55. Use the _____ acronym to help you obtain the patient's description of pain.
56. Systematic, thorough physical examinations involve three components: _____, _____, and _____.
57. _____ life support is the primary skill for managing serious cardiovascular problems.
58. Having the patient bear down as if attempting to have a bowel movement is called a(n) _____ maneuver.
59. Atropine, lidocaine, adenosine, amiodarone, and diltiazem are all _____ medications.
60. _____ is a parasympatholytic agent used to treat symptomatic bradycardia.
61. _____ is a medication used to manage supraventricular tachydysrhythmia.
62. _____ is a first-line antidysrhythmic used to treat and prevent life-threatening ventricular dysrhythmia.
63. _____, the mainstay medication of cardiac arrest resuscitation, acts on both alpha- and beta-adrenergic receptors.
64. _____ is a medication that reduces myocardial oxygen demand by reducing preload and afterload.
65. _____ is a medication that inhibits the aggregation of platelets.

66. The process of passing a current through a fibrillating heart to depolarize the cells is called _____.
67. The term _____ refers to the passage of an electrical current through the heart during a specific part of the cardiac cycle to terminate certain kinds of dysrhythmia.
68. Chest pain that results when myocardial oxygen demands exceed the heart's blood supply is called _____.
69. A variant of angina pectoris caused by vasospasm of the coronary arteries is called _____ angina.
70. Ischemia and subsequent necrosis of the heart muscle caused by inadequate blood supply take place in _____.
71. _____ is the clinical syndrome in which the heart's mechanical performance is compromised such that cardiac output cannot meet the body's needs.
72. A blood clot in one of the pulmonary arteries is called a pulmonary _____.
73. In _____, the heart's reduced stroke volume causes an overload of fluid in the body's other tissues.
74. A sudden episode of difficult breathing that occurs after lying down is called _____.
75. The accumulation of excess fluid inside the pericardium is called _____.
76. A cerebral disorder of hypertension indicated by severe headache, nausea, vomiting, and altered mental status is called _____.
77. The inability of the heart to meet the metabolic needs of the body, resulting in inadequate tissue perfusion, is called _____ shock.
78. The absence of any ventricular contraction is called _____.
79. _____ death is death within 1 hour after the onset of symptoms.
80. The thickening, loss of elasticity, and hardening of the walls of the arteries from calcium deposits are known as _____.

81. Severe pain in the calf muscle due to inadequate blood supply is called _____.
82. The condition in which the ballooning of an arterial wall results from a defect or weakness in the wall is called a(n) _____.
83. _____ is the death or degeneration of a part of the wall of an artery.
84. _____ is a blockage that occurs when a blood clot or other particle lodges in a pulmonary artery.
85. Sudden occlusion of arterial blood flow is called _____ occlusion.
86. Leads I, II, and III are called _____ limb leads.
87. Leads aVR, aVL, and aVF are called _____ limb leads.
88. Leads V₁ through V₆ are known as the _____ leads.
89. A force that has both magnitude and direction is called a(n) _____.
90. The reduction of all the heart's electrical forces to a single vector represented by an arrow moving in a single plane is called the _____ axis.
91. A calculated axis of the heart's electrical energy that equals or exceeds +105° is known as _____.
92. A calculated axis of the heart's electrical energy that equals or exceeds -30° is known as _____.
93. Deprivation of oxygen and other nutrients to the myocardium is called _____.
94. _____ is the death of myocardial tissue.
95. Myocardial infarction that affects only the deeper levels of the myocardium is called _____ infarction.
96. Myocardial infarction that affects the full thickness of the myocardium is called _____ infarction.
97. A mirror image seen typically on the opposite wall of the injured area is said to be _____.

98. _____ is enlargement without any additional cells.
99. Myocardial ischemia occurs _____ following loss of blood supply.
100. If myocardial ischemia is allowed to progress untreated, _____ will result.

REINFORCEMENT

ECG ANALYSIS

List the five-step procedure for ECG analysis.

1. _____
2. _____
3. _____
4. _____
5. _____

REINFORCEMENT**DYSRHYTHMIA MATCHING**

Write the letter of the term in the space provided next to the appropriate description.

- | | |
|---|--|
| a. sinus bradycardia | q. 2:1 AV block |
| b. sinus tachycardia | r. third-degree AV block |
| c. sinus dysrhythmia | s. premature junctional contractions |
| d. sinus arrest | t. junctional escape complexes and rhythm |
| e. sinus block | u. junctional bradycardia |
| f. sinus pause | v. accelerated junctional rhythm |
| g. wandering atrial pacemaker | w. ventricular escape complexes and rhythms |
| h. multifocal atrial tachycardia | x. accelerated idioventricular rhythm |
| i. premature atrial contractions | y. premature ventricular contraction |
| j. paroxysmal supraventricular tachycardia | z. ventricular tachycardia |
| k. supraventricular tachycardia | aa. torsades de pointes |
| l. atrial flutter | bb. ventricular fibrillation |
| m. atrial fibrillation | cc. asystole |
| n. first-degree AV block | dd. artificial pacemaker rhythm |
| o. type I second-degree AV block | |
| p. type II second-degree AV block | |

- _____ 1. Polymorphic ventricular tachycardia that differs in appearance and cause from ventricular tachycardia in general. It is more common in women than in men.
- _____ 2. Intermittent block characterized by P waves that are not conducted to the ventricles but without associated lengthening of the PR interval before the dropped beats.
- _____ 3. Results from slowing of the SA node.
- _____ 4. Delay in conduction at the level of the AV node rather than an actual block. This is a condition superimposed on another rhythm.
- _____ 5. Single ectopic impulse arising from an irritable focus in either ventricle that occurs earlier than the next expected beat.
- _____ 6. Results from an increased rate of SA node discharge.

- _____ 7. Passive transfer of pacemaker sites from the sinus node to other latent pacemaker sites in the atria and AV junction.
- _____ 8. Chaotic ventricular rhythm usually resulting from the presence of many reentry circuits within the ventricles.
- _____ 9. Results from regular cardiac stimulation by an electrode implanted in the heart and connected to a power source.
- _____ 10. Occurs when the sinus node fires on time but the impulse is blocked before it exits the sinus node. This results in a pause that varies in length depending on how many sinus beats are blocked.
- _____ 11. Often results from a variation of the R-R interval.
- _____ 12. Results from a single electrical impulse originating in the atria outside the SA node, which in turn causes a premature depolarization of the heart before the next expected sinus beat.
- _____ 13. Accelerated junctional rhythm resulting from increased automaticity in the AV junction, causing the AV junction to discharge faster than its intrinsic rate.
- _____ 14. Dysrhythmia with a heart rate less than the intrinsic rate of the AV node.
- _____ 15. Refers to tachycardias that originate above the ventricles. The pacemaker site is often difficult to determine because of the heart rate.
- _____ 16. Wandering pacemaker rhythm with a rate greater than 100.
- _____ 17. Results from multiple areas of reentry within the atria or from multiple ectopic foci bombarding an AV node that physiologically cannot handle all of the incoming impulses.
- _____ 18. Intermittent block at the level of the AV node. It produces a characteristic cyclic pattern in which the PR intervals become progressively longer until an impulse is blocked (not conducted).
- _____ 19. Results from a rapid atrial reentry circuit and an AV node that physiologically cannot conduct all impulses through to the ventricles.
- _____ 20. Absence of conduction between the atria and the ventricles resulting from complete electrical block at or below the AV node. The atria and ventricles subsequently pace the heart independently of each other.
- _____ 21. Single electrical impulse originating in the AV node that occurs before the next expected sinus beat.
- _____ 22. Dysrhythmia that results when the rate of the primary pacemaker, usually the SA node, is slower than that of the AV node. The AV node then becomes the pacemaker.
- _____ 23. Type of second-degree AV block in which there are two P waves for each QRS complex. The first P wave of each pair of P waves is blocked.
- _____ 24. Occurs when rapid atrial depolarization overrides the SA node. It often occurs in paroxysm with sudden onset, may last minutes to hours, and terminates abruptly.
- _____ 25. Results either when impulses from higher pacemakers fail to reach the ventricles or when the discharge rate of higher pacemakers becomes less than that of the ventricles.

- _____ **26.** Abnormally wide ventricular dysrhythmia that usually occurs during an acute myocardial infarction. Typically, the rate is 60 to 110 beats per minute.
- _____ **27.** Occurs when the sinus node fails to discharge for a brief period, resulting in missing a single PQRST complex.
- _____ **28.** Three or more ventricular complexes in succession at a rate of 100 beats per minute or more.
- _____ **29.** Sinus node fails to discharge for a brief period, resulting in short periods of cardiac standstill. One or more of the subsequent PQRST complexes will be missing.
- _____ **30.** Absence of all cardiac electrical activity.

Chapter 2 Answer Key

Handout 2-6: Chapter 2 Quiz, Part 1

1. c	14. b	27. d	40. b
2. b	15. a	28. c	41. d
3. c	16. c	29. c	42. c
4. b	17. a	30. c	43. d
5. a	18. c	31. b	44. b
6. c	19. d	32. b	45. a
7. b	20. c	33. b	46. d
8. c	21. b	34. c	47. d
9. c	22. b	35. a	48. a
10. a	23. a	36. d	49. d
11. b	24. c	37. a	50. b
12. b	25. b	38. d	
13. d	26. a	39. c	

Handout 2-7: Chapter 2 Quiz, Part 2

1. d	10. b	19. c	28. a
2. c	11. d	20. d	29. c
3. a	12. c	21. a	30. b
4. b	13. c	22. a	31. c
5. c	14. b	23. d	32. d
6. b	15. a	24. b	33. b
7. d	16. b	25. d	34. a
8. b	17. c	26. b	35. b
9. c	18. b	27. c	

Handout 2-8: Chapter 2 Quiz, Part 3

1. c	5. c	9. c	13. a
2. a	6. c	10. a	14. b
3. b	7. b	11. d	15. c
4. b	8. b	12. c	

Handout 2-9: Chapter 2 Scenario 1

1. Steps in the management of this patient would include the following:
 - a. Immediately reassess the patient's level of consciousness and ABCs.
 - b. Place the patient on 100% oxygen via nonrebreather mask.
 - c. Obtain baseline vital signs and contact medical direction.
 - d. Establish an IV per protocols or medical direction.

- e. Consider an IV bolus of lidocaine per protocols or medical direction.

Handout 2-10: Chapter 2 Scenario 2

1. As with all patients who are ill or injured, the initial assessment considerations include immediate assessment of the patient's level of consciousness, airway, breathing, and circulatory status.
2. Do you have any allergies? Have you ever experienced this type of pain before? What medications are you currently taking?
3. Administration of high-flow oxygen (100% at 15 L/min) via nonrebreather mask.
4. An IV NS would have been established. Administer amiodarone 150 mg IV over 10 minutes. Repeat as needed to a maximum dose of 2, 2 g over 24 hours. If SVT with aberrancy is suspected, administer adenosine, 6 mg rapid IV push. Adenosine can be repeated in one to two minutes if necessary at 12 mg rapid IV push. Consider synchronized cardioversion with sedation as well. Carefully monitor the patient en route to the hospital, maintaining contact with medical direction.

Handout 2-11: Chapter 2 Review

1. endocardium, myocardium, pericardium
2. atria, ventricles
3. atrioventricular, semilunar
4. superior vena cava, inferior vena cava
5. pulmonary
6. Poiseuille's
7. cardiac cycle
8. diastole
9. Systole
10. ejection fraction
11. preload
12. afterload
13. cardiac output

14. stroke volume
15. rate
16. contractile force
17. dromotropy
18. depolarization
19. resting potential
20. action potential
21. repolarization
22. excitability
23. conductivity
24. automaticity
25. artifact
26. bipolar
27. precordial
28. augmented
29. 0.04
30. 0.20
31. atrial
32. ventricular
33. Q
34. 0.12, 0.20
35. 0.08, 0.12
36. absolute refractory
37. relative refractory period
38. 100
39. bradycardia
40. dysrhythmia

41. arrhythmia
42. ectopic
43. vagal (or Valsalva)
44. bruit
45. first
46. second
47. third
48. premature ventricular contraction (PVC)
49. six
50. Ventricular fibrillation
51. pulseless electrical activity
52. aberrant
53. bundle branch block
54. Chest pain
55. OPQRST
56. inspection, auscultation, palpation
57. Basic
58. vagal (or Valsalva)
59. antidysrhythmic
60. Atropine sulfate
61. Adenosine
62. Amiodarone
63. Epinephrine
64. Morphine sulfate
65. Aspirin
66. defibrillation
67. synchronized cardioversion

68. angina pectoris
69. Prinzmetal's
70. myocardial infarction
71. Heart failure
72. embolism
73. congestive heart failure
74. paroxysmal nocturnal dyspnea
75. cardiac tamponade
76. hypertensive encephalopathy
77. cardiogenic
78. cardiac arrest
79. Sudden
80. arteriosclerosis
81. claudication
82. aneurysm
83. Cystic medial necrosis
84. Acute pulmonary edema
85. acute arterial
86. bipolar
87. unipolar
88. precordial
89. vector
90. QRS
91. right axis deviation
92. left axis deviation
93. myocardial ischemia
94. Myocardial infarction

95. subendocardial
96. transmural
97. reciprocal
98. Hypertrophy
99. almost immediately
100. myocardial injury

Handout 2-12: ECG Analysis

1. Rate
2. Rhythm
3. P waves
4. PR interval
5. QRS complex

Handout 2-13: Dysrhythmia Matching

1. aa
2. p
3. a
4. n
5. y
6. b
7. g
8. bb
9. dd
10. e
11. c
12. i
13. v

14. u
15. k
16. h
17. m
18. o
19. l
20. r
21. s
22. t
23. q
24. j
25. w
26. x
27. f
28. z
29. d
30. cc