

For Instructor Use Only

1. A The rhythm shown is asystole.
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for cardiac arrest rhythms.

2. C While vasopressors, such as epinephrine and vasopressin, are used in the management of asystole, administration of antiarrhythmics (such as amiodarone and lidocaine) are not indicated. Atropine is used in the management of symptomatic bradycardias, but is no longer used in the management of adult cardiac arrest. Defibrillation is not indicated in the management of asystole.
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for cardiac arrest rhythms.

3. A The Chain of Survival represents the ideal series of events that should take place immediately following the recognition of onset of sudden illness. Following these steps gives the victim the best chance of surviving a heart attack or sudden cardiac arrest. Because time is critical when dealing with a victim of sudden cardiac death, a weak or missing link in the Chain of Survival can reduce the likelihood of a positive outcome. Ventricular fibrillation and pulseless ventricular tachycardia are shockable cardiac arrest rhythms. When a cardiac arrest is witnessed and the patient's heart rhythm is VF, the patient's survival rate decreases 7% to 10% per minute until defibrillation if no CPR is provided. The decrease in survival rates is less rapid (averaging 3% to 4% per minute from collapse to defibrillation) when bystander CPR is provided. Generally, chest compressions should be the initial action performed (instead of opening the airway or giving ventilations) when starting CPR in victims of sudden cardiac arrest. Performing chest compressions before ventilations enables better delivery of the oxygen that is already present in the lungs and arterial circulation to the heart and brain.
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for cardiac arrest rhythms.

4. D The rhythm shown is monomorphic ventricular tachycardia at a rate of about 214/min.
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for wide-QRS tachycardia.

5. B The patient is symptomatic (palpitations) but stable.
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for wide-QRS tachycardia.

6. A This patient is stable. For pharmacologic termination of a stable, monomorphic, wide-QRS tachycardia, procainamide, amiodarone, or sotalol may be used. These medications are considered first-line antiarrhythmics for monomorphic VT and have complex mechanisms of action. They are used for both atrial and ventricular dysrhythmias. Verapamil is contraindicated in the management of wide-QRS tachycardia unless it is known with certainty to be of supraventricular origin. CPR, defibrillation, and transcutaneous pacing are not indicated.
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for wide-QRS tachycardia.
7. C The rhythm shown is a second-degree AV block type I with a ventricular rate of 34 to 52/min.
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for symptomatic bradycardia.
8. C The patient is symptomatic and unstable (significant hypotension).
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for symptomatic bradycardia.
9. A The patient with this type of AV block is usually asymptomatic because the ventricular rate often remains nearly normal, and cardiac output is not significantly affected. If the patient is symptomatic (as in this scenario), the heart rate is slow, and serious signs and symptoms occur because of the slow rate, atropine is the drug of choice. This type of AV block usually responds well to atropine administration. Synchronized cardioversion is not indicated. Although epinephrine may be used in the management of a symptomatic bradycardia, it is administered as an IV infusion of 2 to 10 mcg/min - not IV push. In addition, supplemental oxygen should be administered because the patient's SpO₂ on room air is 90%.
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for symptomatic bradycardia.
10. A The rhythm shown is polymorphic ventricular tachycardia with a ventricular rate of 250 to 333/min.
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for irregular tachycardia.
11. C This patient is symptomatic and unstable (responsive only to pain, hypotension).
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for irregular tachycardia.

12. **B** When a long QT interval is observed during sinus rhythm, it is important to stop any medications the patient is taking that prolong the QT interval. Because the machine must be able to detect a QRS complex in order to “sync,” synchronized cardioversion is used to treat rhythms that have a clearly identifiable QRS complex and a rapid ventricular rate (such as some narrow-QRS tachycardias and ventricular tachycardia [VT]). It is not used to treat disorganized rhythms (such as polymorphic VT). Instead, defibrillation is indicated. Magnesium sulfate should be considered if the polymorphic VT is associated with a long QT interval (torsades de pointes). Medications that may prolong the QT interval (such as amiodarone and procainamide) are avoided in the patient who already has a prolonged QT interval.
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for irregular tachycardia.
13. **A** Most strokes are the result of blockages due to blood clots that develop within the brain artery itself (cerebral thrombosis) or clots that arise elsewhere in the body and then migrate to the brain (cerebral embolism).
- OBJ:* Describe the major types and initial emergency care for acute ischemic stroke.
14. **C** For a patient with symptoms of stroke on awakening, the time of onset is assumed to be the time the patient was last known to be symptom-free (last known well time) before retiring. If a patient had mild impairments but then had worsening over the subsequent hours, the time the first symptom began is assumed to be the time of onset.
- OBJ:* Describe the major types and initial emergency care for acute ischemic stroke.
15. **B** The National Institute of Neurological Disorders and Stroke (NINDS) has established recommended target times for hospitals receiving acute stroke patients: (1) Emergency department physician evaluation within 10 minutes of arrival; (2) stroke team notification within 15 minutes of arrival; (3) brain computed tomography (CT) within 25 minutes and interpretation within 45 minutes of arrival; (4) if indicated, door-to-drug treatment time of less than 60 minutes from arrival in the emergency department in at least 80% of patients; (5) door to neurosurgical availability (on-site or by transport) within 2 hours; and (6) door to admission to monitored bed within 3 hours.
- OBJ:* Describe the major types and initial emergency care for acute ischemic stroke.
16. **C** An apneic patient requires positive pressure ventilation. Although insertion of an advanced airway is acceptable in this situation, the patient requires oxygen administration by means of an alternate method (such as a bag-mask device) while the equipment is assembled and preparations are made to insert the airway. Chest compressions are not warranted at this time.
- OBJ:* Describe indications for and demonstrate how to provide positive-pressure ventilation with a barrier device, pocket face mask, and bag-mask (using 2 rescuers).
17. **B** When an adult victim with a pulse requires ventilatory support, give rescue breaths at a rate of about 1 breath every 5 to 6 seconds, or about 10 to 12 breaths per minute. Give each ventilation over 1 second with just enough force to cause visible chest rise.
- OBJ:* Describe indications for and demonstrate how to provide positive-pressure ventilation with a barrier device, pocket face mask, and bag-mask (using 2 rescuers).

18. **A** If breath sounds are absent on both sides of the chest after placing a tracheal tube, assume esophageal intubation. Deflate the tracheal tube cuff and remove the tube. If breath sounds are diminished on the left after intubation but present on the right, assume right primary bronchus intubation. Deflate the tracheal tube cuff, pull back the tube slightly, reinflate the cuff, and reevaluate breath sounds. Once placement is confirmed, note and record the depth (centimeter marking) of the tube at the patient's teeth and secure the tube in place. The presence of a mucus plug in the tracheal tube would likely result in increased resistance during positive pressure ventilation.
- OBJ:* Describe methods used to confirm correct placement of an advanced airway and describe ventilation of the patient with an advanced airway in place.
19. **B** In addition to clinical assessment, continuous quantitative waveform capnography is recommended as the most reliable method for confirmation and monitoring of tracheal tube placement. If waveform capnography is not available, an esophageal detector device or nonwaveform exhaled CO₂ monitor in addition to clinical assessment is considered reasonable. Gastric insufflation sounds should not be heard over the stomach if the tracheal tube is in the trachea. The presence of water vapor in the tube is not a completely reliable sign of proper tracheal tube placement. Oxygen saturation can be assessed with a pulse oximeter if the patient has a perfusing rhythm however, it is not the preferred method for confirming tracheal tube position.
- OBJ:* Describe methods used to confirm correct placement of an advanced airway and describe ventilation of the patient with an advanced airway in place.
20. **B** An oral airway may be used to help maintain an open airway in an unresponsive patient who is not intubated, help maintain an open airway in an unresponsive patient with no gag reflex who is being ventilated with a bag-mask or other positive-pressure device, and may be used as a bite block after insertion of a tracheal tube or orogastric tube. When properly positioned, an oral airway positions the tongue forward and away from the back of the throat. Correct size is determined by selecting an oral airway that extends from the corner of the mouth to tip of the earlobe or the angle of the jaw. If the airway is too long, it may press the epiglottis against the entrance of the larynx resulting in a complete airway obstruction. If the airway is too short, it will not displace the tongue and may advance out of the mouth. An oral airway may produce vomiting if used in a responsive or semi-responsive patient with a gag reflex. A petroleum-based lubricant should never be used because it may damage the airway device and cause tissue inflammation.
- OBJ:* Discuss the indications, contraindications, advantages, and disadvantages of oral and nasal airways and demonstrate how to correctly size and insert each of these airway adjuncts.
21. **D** Positive pressure ventilation is indicated because this patient has an inadequate tidal volume and ventilatory rate. Of the devices listed, the only device that can be used to deliver positive pressure ventilation is the bag-mask device.
- OBJ:* Describe indications for and demonstrate how to provide positive-pressure ventilation with a barrier device, pocket face mask, and bag-mask (using 2 rescuers).

22. B Monitoring of ST-segment changes can provide useful diagnostic and predictive information in the patient experiencing an ACS. Obtain the first 12-lead ECG with 10 minutes of patient contact. Obtain a repeat 12-lead ECG with each set of vital signs, when the patient's symptoms change, and as often as necessary. Reperfusion therapy is the mainstay of treatment for ST-elevation MI (STEMI). Since STEMI is usually the result of a blocked coronary artery, the blockage may be removed by giving fibrinolytics (pharmacologic reperfusion) or primary percutaneous coronary intervention (PCI) (mechanical reperfusion). Pulse oximetry should be used to guide the need for supplemental oxygen administration in patients experiencing an ACS. At this time, there is insufficient evidence to recommend the routine use of oxygen therapy in patients experiencing an uncomplicated acute MI or an ACS without signs of hypoxemia or heart failure. Supplemental oxygen is warranted if the patient is cyanotic, hypoxic, having difficulty breathing, has obvious signs of heart failure or shock, or if his oxygen saturation declines to less than 94%.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
23. A In an acute coronary syndrome, the zone of injury produces ST-segment elevation in the ECG leads facing the affected area as a result of abnormal repolarization.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
24. A Patients experiencing an ACS who are most likely to present atypically include older adults, diabetic individuals, women, patients with prior cardiac surgery, and patients in the immediate postoperative period of noncardiac surgery.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
25. C ST elevation observed in leads II, III, aVF, V5 and V6 suggest an inferolateral myocardial infarction is present.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
26. B Right ventricular infarction (RVI) should be suspected when ECG changes suggesting an inferior infarction (ST elevation in leads II, III, and/or aVF) are observed. To view the right ventricle, right chest leads are used. If time does not permit the acquisition of all six right-sided chest leads, the lead of choice is V4R. Although relief of chest discomfort is a priority in the management of acute coronary syndromes, it is important to first rule out RVI before giving medications (such as nitroglycerin [NTG] and morphine). NTG and morphine are vasodilators, and thus they reduce preload. This reduction in preload, while usually beneficial, can be undesirable in the setting of RVI and may cause profound hypotension. Therefore caution must be exercised when giving nitroglycerin and morphine to patients experiencing RVI. Increased parasympathetic activity is common in patients with inferior MIs and often results in bradycardias that are usually transient, resolving over 24 to 72 hours. Patients may use one of many possible terms to describe ischemic chest discomfort. When obtaining the patient's history, use the patient's words for the discomfort. For example, the patient may not consider their symptom "discomfort" or "pain" but instead have another appropriately descriptive term to describe their symptom (e.g., heaviness, pressure, strangling feeling, burning). Whatever term the patient uses, continue to use that term when interacting with the patient.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.

27. **D** Aspirin is effective for patients with STEMI and in patients with NSTEMI. Nitroglycerin should be avoided in inferior wall MI with a possible associated right ventricular infarction because these patients require adequate right ventricular preload. Morphine is the preferred analgesic for patients with STEMI who experience persistent chest discomfort unresponsive to nitrates. Chewable aspirin (160 to 325 mg) is recommended because it is absorbed more quickly than swallowed tablets. Consider the use of an aspirin suppository (300 mg) for patients with severe nausea, vomiting, or disorders of the upper gastrointestinal tract.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
28. **C** Treatment options for unstable angina/NSTEMI include conservative management (which includes analgesic, anti-ischemic, antiplatelet, and anticoagulant therapy), early intervention with PCI, or surgical revascularization (angioplasty, stenting, or bypass surgery). For STEMI, fibrinolytic therapy is an additional option but is generally not recommended for patients presenting between 12 and 24 hours after symptom onset unless persistent ischemic pain is present with continuing ST elevation.
- The benefits of reperfusion therapy are often time-dependent; time is muscle. If the patient has a STEMI, time targets to minimize total ischemic time, which is defined as the time from onset of symptoms of STEMI to initiation of reperfusion therapy, are to give fibrinolytics within 30 minutes of patient contact or provide primary PCI within 90 minutes of arrival (door-to-balloon inflation [D2B]). Optimally, PCI should be performed at a high-volume facility with surgical backup. STEMI alert programs have been implemented in many EMS systems and hospitals across the country in an attempt to minimize total ischemic time. Although mechanical catheter-based intervention has been proven to produce better outcomes when performed in a timely manner, fibrinolytic therapy continues to play a major role in the treatment of acute MI because it is estimated that only 25% of U.S. hospitals have PCI capability. As a result, a system of referral to a PCI-capable hospital is necessary.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
29. **D** Despite the presence of an organized rhythm (sinus tachycardia) on the cardiac monitor, the patient is pulseless. The clinical situation is pulseless electrical activity (PEA). Start CPR, establish vascular access, give epinephrine, and search for a reversible cause of the arrest. Vasopressin may be substituted for the first or second dose of epinephrine. Defibrillation and transcutaneous pacing are not indicated in the management of PEA. Atropine is no longer used in the management of adult cardiac arrest.
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for cardiac arrest rhythms.
30. **D** Hypotension that results from nitroglycerin or morphine administration usually responds to supine positioning and administration of IV fluids. Based on the information provided, it is reasonable to give a fluid challenge of 250 to 500 mL of normal saline and reassess. Because the patient is clearly hypotensive, additional doses of nitroglycerin are contraindicated. Vagal maneuvers, adenosine, and synchronized cardioversion are not warranted for a sinus tachycardia.
- OBJ:* Describe the initial management of a patient experiencing an acute coronary syndrome.
31. **C** This patient is symptomatic and unstable (chest discomfort, disorientation, hypotension, difficulty breathing, presence of crackles).
- OBJ:* Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for narrow-QRS tachycardia.

32. B The rhythm shown is a narrow-QRS tachycardia (supraventricular tachycardia).
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for narrow-QRS tachycardia.
33. B Administer sedation and perform synchronized cardioversion starting with 50 J (or the energy level recommended by the defibrillator manufacturer), and reassess the patient. Nitroglycerin is contraindicated because of the patient's rapid heart rate and low blood pressure. Verapamil may be used for stable patients with a symptomatic narrow-QRS tachycardia (after adenosine). Since the patient has a pulse, CPR is not indicated.
OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for narrow-QRS tachycardia.

34. D

Emergency Actions	Rhythm	Recommended Energy Levels
Defibrillation	Pulseless VT/VF	Varies depending on the device used: <ul style="list-style-type: none"> • The biphasic defibrillator effective dose is typically 120 J to 200 J. • If the effective dose range of the defibrillator is unknown, consider using at the maximal dose. • If using a monophasic defibrillator, use 360 J for all shocks.
	Sustained polymorphic VT	
Synchronized cardioversion	Unstable narrow-QRS tachycardia	The biphasic dose is typically 50 J to 100 J initially; increase in a stepwise fashion if the initial shock fails
	Unstable atrial flutter	The biphasic dose is typically 50 J to 100 J initially; increase in a stepwise fashion if the initial shock fails
	Unstable atrial fibrillation	The biphasic dose is typically 120 J to 200 J initially; increase in a stepwise fashion if the initial shock fails; begin with 200 J if using monophasic energy, and increase if unsuccessful
	Unstable monomorphic VT	The biphasic dose is typically 100 J initially; it is reasonable to increase in a stepwise fashion if the initial shock fails

OBJ: Given a patient situation, 1) Identify the patient experiencing a cardiac dysrhythmia as asymptomatic, symptomatic but stable, symptomatic but unstable, or pulseless, 2) Describe the ECG characteristics, and 3) Initial emergency care for wide-QRS tachycardia.

35. C Ventilation does not require interruption (or even pausing) of chest compressions once an advanced airway is in place. The patient should be ventilated at a rate of 1 breath about every 6 to 8 seconds (about 8 to 10 breaths per minute). Current resuscitation guidelines do not recommend bag-mask ventilation by a single rescuer. Instead, the single rescuer is encouraged to use the mouth-to-mouth or mouth-to-mask methods of ventilation because they are more efficient. There is a knowledge gap (lack of published research) regarding use of bag-mask ventilation by both inexperienced and experienced providers. Bag-mask ventilation should be a two-rescuer operation. With two rescuers, one is assigned the responsibility of opening and maintaining the airway while creating a good seal with the mask. The correct ratio of compressions to ventilations in adult CPR is 30:2.
OBJ: Describe methods used to confirm correct placement of an advanced airway and describe ventilation of the patient with an advanced airway in place.