

NREMT® EMT - Quiz Questions with Answers

Airway, Respiration & Ventilation

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1.

Which of the following are the correct steps for suctioning a patient's airway using a powered, portable suction unit?

Select the four answer options which are correct.

Before suctioning, clamp the tubing and ensure the unit generates a vacuum of at least 300 mmHg

Turn the patient's head (if no C-spine injury is suspected) to the side, open the mouth, and insert the catheter to the predetermined depth

Apply suction in a circular motion while withdrawing the catheter

Measure the catheter from the corner of the mouth to the earlobe or angle of the jaw

Measure the catheter from the corner of the mouth to the back of the throat

The steps to suction a patient's airway using a powered, portable suction unit are:

- 1. Assemble the unit and turn on the power.*
- 2. Clamp the tubing and ensure the unit generates a vacuum of more than 300 mmHg.*
- 3. Measure the catheter from the corner of the mouth to the earlobe or angle of the jaw.*
- 4. Turn the patient's head (if no C-spine injury is suspected) to the side, open the mouth, and insert the catheter to the predetermined depth.*
- 5. Apply suction in a circular motion while withdrawing the catheter.*
- 6. Avoid suctioning longer than 10 seconds. Some textbooks may reflect 15 seconds, but the current recommended practice is to limit suctioning in patients of all ages to 10 seconds.*

2.

What is the name of the cartilaginous ridge where the trachea divides into the right and left main-stem bronchi?

Carina

Cricoid cartilage

Pharynx

Epiglottis

Correct answer: Carina

The trachea divides into the two main bronchi at the anatomical point known as the carina. This ring of cartilage appears just superior to the bifurcation of the bronchi into the right and left lungs.

Cricoid cartilage is a firm ridge forming the lower part of the larynx. It is the only complete ring of cartilage around the trachea and is a landmark for cricothyrotomy, the surgical rescue technique of choice for a failed airway in adults.

The pharynx is the area between the mouth and the epiglottis, in which the trachea and esophagus separate.

The epiglottis is a thin, leaf-like structure that folds over the glottis to prevent food and liquid from entering the trachea.

3.

Which of the following may be indicated for an adult patient with pulmonary edema?

Select the two answer options which are correct.

Nitroglycerin

CPAP

Albuterol

Aspirin

Epi

Nitroglycerin is highly beneficial when used for patients with pulmonary edema, as it leads to a reduction in arteriolar pressure that decreases hydrostatic pressure in the capillary bed. This reduces fluid being forced from the capillaries into the lungs.

Follow local protocols and contact medical control for orders for nitroglycerin administration. CPAP treats pulmonary edema by increasing pressure in the alveoli, forcing fluid back into the interstitial space and out of the lungs. Always request ALS intercept when treating a patient with acute pulmonary edema.

Albuterol is a bronchodilator used frequently to reverse bronchospasm, but it has little effect on pulmonary edema. Aspirin is used in acute coronary syndromes to reduce thrombosis and slow the progression of myocardial infarction. It is not useful for managing pulmonary edema.

4.

A 23-year-old female is breathing at a rate of 45 breaths per minute and is visibly upset. She has no known medical conditions and takes no medications. She reports numbness and tingling in her hands. From which of the following is the patient **most** likely suffering?

Hyperventilation

Diabetic ketoacidosis

Pneumonia

Aspirin overdose

Correct answer: Hyperventilation

Hyperventilation is over-breathing (above a normal respiration rate), reducing arterial carbon dioxide. Hyperventilation may occur due to an elevated level of carbon dioxide, such as in diabetic ketoacidosis, an overdose of aspirin, or a severe infection.

Hyperventilation may also occur with anxiety, dizziness, numbness/tingling, and painful spasms in the hands and feet due to excess loss of carbon dioxide; this condition is known as hyperventilation syndrome or respiratory alkalosis. Instructing a responsive patient to slow their breathing, giving supplemental oxygen, and providing transport are appropriate when hyperventilation is occurring.

Diabetic ketoacidosis is a possible cause of hyperventilation; however, an altered mental status, body aches, abdominal pain, and nausea/vomiting may also occur.

Signs and symptoms of pneumonia vary, depending on the patient and the severity of the illness; typically, dyspnea and fever occur. A productive cough, chest discomfort, headache, nausea/vomiting, musculoskeletal pain, weight loss, and confusion are possible.

There is no indication the patient has overdosed on aspirin.

5.

A 21-year-old intoxicated male requires ventilatory assistance. He has a clenched jaw and is somewhat combative. Which of the following airway adjuncts would be appropriate to assist in opening his airway?

A nasopharyngeal airway

An oropharyngeal airway

A laryngeal mask airway

A King LTD airway

Correct answer: A nasopharyngeal airway

Nasopharyngeal airways are used for patients with an altered level of consciousness who have an intact gag reflex or who will not tolerate an oropharyngeal airway. Contraindications to a nasopharyngeal airway include a severe head injury with blood draining from the nose and a history of a fractured nasal bone.

Oropharyngeal airways keep the tongue from blocking the upper airway and make suctioning easier if necessary. Indications for an oropharyngeal airway include an unresponsive patient without a gag reflex or a patient being ventilated with a bag-valve mask. Contraindications to an oropharyngeal airway include a conscious patient or a patient who has an intact gag reflex.

A laryngeal mask airway and a King LTD airway are supraglottic airways that can secure the airway and provide artificial ventilation to unresponsive, apneic patients.

6.

Which of the following signs is **not** an indicator that a patient may be experiencing inadequate breathing?

Warm, dry skin with normal capillary refill

Cyanosis around the lips and nail beds

Tachypnea in the presence of shortness of breath

Adventitious breath sounds

Correct answer: Warm, dry skin with normal capillary refill

Inadequate breathing leads to inadequate oxygen perfusion, which may cause bradypnea or tachypnea in the presence of shortness of breath (dyspnea); irregular breathing rhythm; diminished, absent or noisy auscultated breath sounds; unequal or inadequate (shallow) chest expansion/depth; use of accessory muscles; cyanosis; cool or moist skin; or skin pulling in around the ribs (retractions).

Adventitious breath sounds are abnormal sounds such as crackles or rales, wheezes or rhonchi, pleural rubs, or stridor.

7.

An unresponsive 40-year-old male is apneic and cyanotic. He has a weak carotid pulse of 48 beats per minute. Rescue breathing via a bag-valve mask with a reservoir and supplemental oxygen is initiated.

What is the appropriate ventilation rate for this patient?

One breath every five seconds to mimic a normal respiration rate

One breath every other second until his heart rate improves

One breath every two seconds until the patient's color improves

One breath every 10 seconds to match his low cardiac output

Correct answer: One breath every five seconds to mimic a normal respiration rate

A patient in respiratory distress or failure requires artificial ventilation. A bag-valve mask is an adequate method of artificial ventilation and can deliver up to 100% oxygen flowing at 15 liters per minute and a reservoir bag.

Ventilation should be given to an adult patient every five seconds and to a child patient every three seconds; these rates mimic a normal ventilation rate. Any rate below these values may not provide adequate oxygenation. Ventilation should cause the chest to rise and fall and avoid gastric distension. Gastric distension may lead to vomiting and subsequent aspiration.

Rapid ventilation should be avoided due to the risk of gastric distension.

8.

Which of the following does **not** commonly happen during an asthma attack?

Narrowing pulse pressure

Agitation

Accessory muscle usage

Tachypnea

Correct answer: Narrowing pulse pressure

Asthma is a condition in which bronchioles are inflamed and swollen and produce excessive mucus. Common triggers for an asthma episode include upper respiratory infections, exercise, exposure to cold air or smoke, and emotional stress. Asthma is rare in children younger than one year of age. It is generally characterized by wheezing that can be heard without a stethoscope and respiratory distress.

Patients may present with agitation, anxiety, restlessness, stridor, accessory muscle use, retractions, tachypnea, tachycardia, nasal flaring, seesaw breathing, head bobbing, and assuming a position of comfort (e.g., the tripod position). Cyanosis and/or respiratory arrest may develop quickly. Albuterol via a metered-dose inhaler may be administered based on local protocols.

Narrowing pulse pressure occurs in cardiac tamponade.

9.

Which of the following statements concerning an infant's or a child's airway is **false**?

The tongues of infants and children are proportionately smaller than those of adults.

The tracheae of infants and children are smaller than those of adults.

The respiration rates of infants and children are greater than those of adults.

The diaphragms of infants and children support breathing to a greater degree than those of adults.

Correct answer: The tongues of infants and children are proportionately smaller than those of adults.

The tongues of infants and children are proportionately larger and take up more space within the mouth than the tongues of adults.

The tracheae of infants and children are smaller than those of adults and are more easily obstructed by secretions, blood, or swelling. The respiration rates of infants and children are greater than those of adults. The diaphragms of infants and children are relied upon more heavily to breathe than those of adults, who use more chest muscles in comparison.

10.

When should an oropharyngeal airway be used for a pediatric patient?

When the child is unconscious and unable to sustain an open airway spontaneously

When the child is conscious but unable to breathe

When the child is in respiratory distress and needs supplemental oxygen

When the child is unresponsive from ingesting a caustic substance

Correct answer: When the child is unconscious and unable to sustain an open airway spontaneously

Never attempt to insert an oropharyngeal (OP) airway in a conscious child. OP airways are used to maintain a patent airway in the event of respiratory insufficiency (failure) or obstruction (primarily from the tongue). Contraindications to OP airway placement include an intact gag reflex and the ingestion of a caustic or petroleum product.

A child in respiratory distress who needs supplemental oxygen may not require an oral airway unless an obstructed airway is suspected from the tongue and the patient meets the indications outlined above. A patient in respiratory distress may need assisted ventilation in addition to supplemental oxygen. Vesicular breath sounds are normal breath sounds.

11.

Which of the following statements regarding a non-rebreather mask is **false**?

It provides a lower concentration of oxygen.

It contains a reservoir bag that must be filled with oxygen prior to placement on the patient's face.

The recommended flow rate for a non-rebreather mask is 10-15 liters per minute.

Leaving the mask in place without flowing oxygen will cause the patient to rebreathe exhaled carbon dioxide.

Correct answer: It provides a lower concentration of oxygen.

A non-rebreather mask is used to provide up to 90% of a patient's oxygen when the reservoir bag is filled. The reservoir bag should be full before the mask is placed on the patient. The recommended flow of the mask is 10-15 liters per minute. If the mask is left in place while oxygen is not flowing, the patient will be exposed to rebreathing exhaled carbon dioxide.

A nasal cannula provides a lower concentration of oxygen (24%-44%). A typical flow for the nasal cannula is 1-6 liters per minute.

12.

Which of the following is the **most** appropriate initial intervention for a hypoxic patient with chronic obstructive pulmonary disease?

Place them in the Fowler position and apply oxygen via a non-rebreather mask

Place them in the recovery position and apply oxygen via a nasal cannula

Place them supine and provide respiration using a bag-valve mask

Place them in the semi-Fowler position and apply oxygen via a nasal cannula

Correct answer: Place them in the Fowler position and apply oxygen via a non-rebreather mask

Patients experiencing hypoxia should be given high-flow oxygen, preferably with a non-rebreather mask. A nasal cannula can be used if the patient does not need large volumes of oxygen or cannot tolerate a mask.

Patients with respiratory complaints should be placed in a position of comfort unless they are hypotensive. This is typically a Fowler or semi-Fowler position.

There is no indication that this patient has inadequate breathing, only hypoxia. Assisted ventilation (e.g., from a bag-valve mask) is indicated for patients with respiratory distress or failure.

Many people will mention that giving a COPD patient oxygen will suppress their breathing, as they are accustomed to low oxygen and high carbon dioxide levels. However, this is unlikely to be triggered with an hour or so of high-flow oxygen; unless a long transport time is expected, it is unlikely to be an issue. Nevertheless, it is always best to be ready for any possibility. Have a bag-valve setup close at hand, just in case. Never withhold oxygen.

13.

Which of the following is a late sign of respiratory distress for an adult patient?

Bradycardia

Tachypnea

Retractions

Vesicular breath sounds

Correct answer: Bradycardia

***Early** signs of respiratory distress for an adult patient may include the tripod position, tachypnea, and retractions.*

*As respiratory distress continues and the patient becomes tired from the effort of breathing, **late** signs include hypoxia, bradypnea, bradycardia, and an altered level of consciousness can occur. In severe respiratory distress, wheezing can be audible.*

*Vesicular breath sounds are **normal** breath sounds.*

14.

Overaggressive ventilation with a bag-valve-mask device can complicate a respiratory failure situation and can cause which of the following?

Select the three answer options which are correct.

Gastric distention

Vomiting

Barotrauma

High carbon dioxide

Overaggressive ventilation with a bag-valve-mask device can cause barotrauma from too much tidal volume or excessive pressure in the airway. Overaggressive ventilation with a bag-valve-mask device also causes gastric distension, which can lead to vomiting and aspiration. Hypocapnia, an excessive loss of carbon dioxide, is also common in overaggressive ventilation due to high minute volume.

Too much carbon dioxide (hypercapnia) is common in airway obstruction or a low respiratory drive, such as a narcotic overdose, and it is not a result of overaggressive ventilation. Aggressive ventilation can actually cause low carbon dioxide (hypocapnia).

15.

Which of the following signs is not commonly seen in a patient with a foreign body airway obstruction?

Vomiting

Non-productive coughing

Stridor

Cyanosis

Correct answer: Vomiting

Wheezing and coughing are commonly heard in patients with mild airway obstruction. A patient with mild airway obstruction should be monitored for adequate oxygenation and progression of the obstruction. Patients with mild airway obstruction and poor air exchange may present with an ineffective cough, stridor, increased difficulty breathing, and cyanosis. Vomiting is not commonly seen with airway obstruction but rather with a gastrointestinal problem.

A patient with poor air exchange should be treated as if they have severe airway obstruction. These patients will be unable to breathe, talk, or cough; cyanosis and extreme difficulty breathing are common. Opening the airway and performing abdominal thrusts are appropriate for severe airway obstruction. Do not attempt to remove a foreign body if it cannot be visualized.

16.

A responsive adult patient complaining of shortness of breath could benefit from oxygen delivered via a non-rebreather mask, but they are unable to tolerate a mask on their face. What is the most appropriate next step?

Use a nasal cannula with supplemental oxygen flowing at six liters per minute

A simple oxygen mask at 15 liters per minute held 4 inches away from the patient's face.

Use a nasal cannula with supplemental oxygen flowing at 15 liters per minute

Avoid providing oxygen altogether

Correct answer: Use a nasal cannula with supplemental oxygen flowing at six liters per minute

A nasal cannula has limited use in the prehospital setting; a non-rebreather mask is preferred. However, if a patient is unable to tolerate a non-rebreather mask, a nasal cannula is a suitable alternative. The maximum flow rate for a nasal cannula is 6 liters per minute. It is inappropriate to avoid providing oxygen to a patient who may benefit from it. A simple oxygen mask held 4 inches away from the face would not be an effective oxygen delivery method for this patient.

There are no indications that this patient requires artificial ventilation (for inadequate breathing) or a nasopharyngeal airway (for an inability to maintain the airway spontaneously).

17.

An adult male has ineffective spontaneous respirations. His ventilations are assisted with a bag-valve mask and supplemental oxygen.

Which of the following is the most reliable indicator that ventilations are being delivered effectively?

Improved skin color

Diminished breath sounds

Respiratory rate

Pulse rate

Correct answer: Improved skin color

The purpose of assisted ventilation is to improve oxygenation and ventilatory status. Patients in respiratory distress/failure are no longer able to maintain adequate oxygen levels for the body and are therefore in a hypoxic state.

The most reliable indicator of effective assisted ventilation is the reversal of symptoms of hypoxia. Hypoxia causes bradypnea; tachypnea; an irregular rhythm; diminished, absent, or noisy auscultated breath sounds; a reduced flow of air from the nose or mouth; unequal or inadequate chest expansion; accessory muscle use; and shallow depth.

18.

Which of the following positions would not be beneficial when managing a patient's airway?

Select the three answer options which are correct.

Placing the patient in the recovery position

Placing the head in a chin-down position

Placing the head in a hyperflexed position

Placing the head in a sniffing position

Placing the head in the neutral, hyperflexion or chin-down position would make it more difficult to perform airway management, as these positions can actually occlude the airway. The recovery position is only used for patients who are breathing on their own, and airway management is not anticipated.

Place any patient who needs airway management supine in the sniffing position.

19.

Which of the following statements are false regarding partial airway obstructions in a responsive patient?

Select the two correct answer options.

Allowing a patient to drink something will clear most partial airway obstructions

A patient cannot clear a partial airway obstruction on their own

Performing the Heimlich maneuver is not recommended for patients with a partial airway obstruction

Encourage the patient to cough if they have a partial airway obstruction

If a possibly choking patient is coughing or can speak, they have a partial airway obstruction. If the patient is unable to speak and is not coughing, they have a complete airway obstruction.

The abdominal thrust maneuver (Heimlich) is the most effective method of dislodging a complete airway obstruction in a conscious patient. However, do not attempt the Heimlich maneuver on a patient with a partial airway obstruction, as it can cause the object to shift down into the airway. The best treatment is to reassure the patient and encourage them to try to cough forcefully. Allowing the patient to drink something is not recommended.

20.

When providing assisted ventilation to an adult via a bag-valve mask, which approximate tidal volume will cause a noticeable rise of the chest?

500 mL

400 mL

800 mL

1000 mL

Correct answer: 500 mL

An adult bag-valve mask has a volume capacity of between 1200 and 1600 mL. When providing assisted ventilation via a bag-valve mask, squeeze the bag to cause a noticeable rise of the patient's chest. The approximate volume is about 500 mL provided over one second. This tidal volume helps reduce the risk of gastric distension.

21.

A semiconscious adult patient requires suctioning due to copious amounts of mucus without likely foreign bodies in the oropharynx. What is the most appropriate method of suctioning?

Turn the head to the side (if no spine injury is suspected)

Suction during withdrawal, ensuring the vacuum has a pressure of at least 150 mmHg

Suction during insertion for no more than 15 seconds

Suction during withdrawal for no more than 30 seconds

Correct answer: Turn the head to the side (if no spine injury is suspected)

Suctioning removes oxygen and can result in hypoxia. It is important to insert the catheter no further than can be visualized and to suction during withdrawal for no more than 10 seconds for adult or pediatric patients. The suctioning unit should have at least 300 mmHg of vacuum pressure.

Prolonged suctioning can actually obstruct an airway. Aggressive suctioning may cause vagal stimulation, especially in children, which may cause further hypoxia or bradycardia. It is recommended to limit suction attempts for patients of all ages to 10 seconds. Some textbooks may reflect 15 seconds, but the current recommended practice is 10 seconds.

22.

A 50-year-old male is breathing at a rate of 30 breaths per minute with normal breath depth and tidal volume. Which medical term describes this patient's respiration rate?

Tachypnea

Eupnea

Bradypnea

Hyperpnea

Correct answer: Tachypnea

Tachypnea is the condition of rapid breathing. Bradypnea is slower-than-normal breathing.

Hyperpnea describes rapid and deep breathing.

Eupnea describes normal breathing.

23.

Which of the following is part of the upper airway?

Uvula

Carina

Bronchioles

Alveoli

Correct answer: Uvula

The upper airway begins at the mouth and nose, consisting of everything superior to the vocal cords, part of the larynx. Other parts of the upper airway include the nasopharynx, oral cavity, tongue, and remaining parts of the mouth, uvula, laryngopharynx, and larynx, which houses the thyroid cartilage, cricoid cartilage, epiglottis, glottis, and vocal cords.

The lower airway begins below the vocal cords. It includes the trachea, carina, mainstem bronchi, smaller bronchi, bronchioles, and alveoli.

24.

Which of the following is **true** regarding the use of a pocket mask to ventilate an adult patient who is not breathing?

A one-way valve prevents the backflow of secretions, vomitus, and gases.

Supplemental oxygen cannot be connected to the barrier device.

There is direct contact between the rescuer and the patient's mouth.

Oxygen levels of 100% may be achieved.

Correct answer: A one-way valve prevents the backflow of secretions, vomitus, and gases.

A barrier device is a protective plastic tool that prevents direct patient contact. The one-way valve that accompanies the barrier device prevents the backflow of secretions, vomitus, and gases. Supplemental oxygen can be attached to a barrier device and provide approximately 55% oxygen to the patient, assuming a flow of 15 liters per minute.

25.

Which of the following medications are used in managing or treating asthma?

Select the two correct answer options.

Albuterol

Ipratropium

Lasix

Digoxin

Many medications are used to manage asthma. EMTs should recognize some of the most commonly prescribed medications used in asthma management. These include:

- *albuterol*
- *beclomethasone*
- *fluticasone*
- *ipratropium*
- *levalbuterol*
- *montelukast*
- *salmeterol*

Lasix is a diuretic drug that prevents the body from absorbing too much salt. Digoxin is used to treat heart failure.

26.

Which of the following defines dysphagia?

Difficulty swallowing

Difficulty urinating

Difficulty breathing

Difficulty speaking

Correct answer: Difficulty swallowing

Dysphagia can mean difficulty swallowing or eating, depending on the context.

Dyspnea is difficulty breathing. Common causes of dyspnea include pulmonary edema, hay fever, pleural effusion, airway obstruction, hyperventilation syndrome, environmental/industrial exposure, carbon monoxide poisoning, and drug overdose.

Dysuria is difficult or painful urination. Difficulty speaking is referred to as dysarthria.

27.

What is the purpose of the head-tilt/chin-lift technique?

To relieve an obstruction blocking an otherwise-patent airway when spinal trauma is not suspected

To relieve an obstruction blocking an otherwise-patent airway when spinal trauma is suspected

To allow access to a foreign body for removal

To prevent further damage until a C-collar can be applied

Correct answer: To relieve an obstruction blocking an otherwise-patent airway when spinal trauma is not suspected

The head-tilt/chin-lift maneuver is the primary method used to open the airway of non-trauma patients. Possible obstructive objects include the tongue, foreign objects (e.g., food, small toys, teeth/dentures), blood clots, damaged tissues, and aspirated vomitus. The head-tilt/chin-lift maneuver is completed by placing the patient in a supine position and the rescuer beside the patient's head. The heel of one hand is placed on the patient's forehead, and firm pressure is applied to tilt the patient's head back. The fingertips of the alternate hand are placed under the lower jaw, near the bony part of the chin; the chin is then lifted upward. The forehead is held to maintain the backward tilt.

If spinal trauma is suspected, the jaw-thrust maneuver is performed. The rescuer kneels above the patient's head with fingers behind the angles of the lower jaw. The jaw is then moved upward with the index and middle fingers, and the thumbs help position the lower jaw.

A patient is log-rolled to the side to help assist in the removal of foreign bodies. Only visible foreign bodies are to be removed.

Inline stabilization of the cervical spine is used to ensure no further damage occurs until a C-collar can be applied.

28.

An asthmatic patient is experiencing dyspnea. She feels better after self-administering a nebulized albuterol inhaler prior to EMS arrival. What is the primary function of albuterol?

Reverses bronchospasm

Reduces inflammation

Causes bronchoconstriction

Stops mucus secretion

Correct answer: Reverses bronchospasm

Albuterol is a medication that is often used for dyspnea. Patients who have asthma, bronchitis, or chronic obstructive pulmonary disease will commonly have a beta-agonist (e.g., albuterol) prescribed as a rescue inhaler. Like most medications used for respiratory distress, albuterol works by dilating the bronchioles, reversing bronchospasm. It does not affect swelling, myocardial oxygen demand, or moisture in the lungs. Common side effects include tachycardia, nervousness, and muscle tremors. Coughing is possible after inhalation of the medication.

Some respiratory medications (e.g., beclomethasone, fluticasone, montelukast) work via an anti-inflammatory pathway, reducing swelling and slowing mucus production in the airways.

29.

A conscious adult patient has a complete foreign-body airway obstruction. The patient is unable to speak or cough. What is the best way to clear the obstruction?

Perform the abdominal thrust maneuver

Try blind finger sweeps to clear the airway

Attempt to suction the object with rigid suction catheter

Perform chest thrusts

Correct answer: Perform the abdominal thrust maneuver

The abdominal thrust maneuver (Heimlich maneuver) is the appropriate way to clear a complete airway obstruction. This maneuver is performed by standing behind the patient, wrapping one's arms around the patient, making a fist with one hand and grasping the fist with the other hand, placing the thumb side of the fist against the patient's abdomen just above the umbilicus and below the xiphoid process, and pressing the fist into the abdomen in a quick inward and upward thrust.

If the choking adult patient loses consciousness, start CPR and perform chest compressions. Chest thrusts may be performed in lieu of abdominal thrusts for obese patients or those in later pregnancy. Never attempt blind finger sweeps or suctioning of a conscious patient.

30.

Which of the following is a sign of impending respiratory arrest in a pediatric patient?

Bradypnea

Strong central pulses

Tachycardia

Capillary refill of greater than 2 seconds

Correct answer: Bradypnea

Bradypnea is an ominous sign of impending respiratory arrest in a pediatric patient. Bradycardia also affects pediatric patients with impending cardiopulmonary arrest.

Red flags are respiratory rates below 20 breaths/minute for children younger than 6 years of age and below 12 breaths/minute for older children.

Strong central pulses are a good indication that a child is not hypotensive and their blood pressure is adequate. Tachycardia may be an early sign of hypoxia; it also accompanies fevers, anxiety, pain, and excitement. A capillary refill of greater than 2 seconds is an estimation of low end-organ perfusion but can be affected by environmental factors.

31.

Which of the following is not a sign of increased work of breathing in a pediatric patient?

Abdominal breathing

Nasal flaring

Head bobbing

Tachypnea

Correct answer: Abdominal breathing

Abdominal breathing is a normal finding in a pediatric patient. Their chest muscles are not well-developed, so pediatric patients will rely more on their diaphragm for breathing.

If oxygenation or ventilation is not adequate, a pediatric patient will increase their work of breathing. They may present with abnormal airway noises like grunting or wheezing, the use of accessory muscles, retractions (the drawing in of intercostal or substernal muscles), head bobbing, nasal flaring, tachypnea (relative to a normal rate for the patient), or the tripod position.

32.

An adult patient is experiencing a “feeling of impending doom.” Upon examination, pruritis and hypotension are noted.

Which of the following is the most likely cause of these symptoms?

Anaphylaxis

Asthma

Pneumonia

Exacerbation of chronic obstructive pulmonary disease

Correct answer: Anaphylaxis

Most allergic reactions remain localized. Anaphylaxis is a severe response with multi-system involvement. It can involve bronchospasms, wheezing, chest tightness, coughing, dyspnea, hypotension, anxiety, and gastrointestinal complaints. Intramuscular epinephrine is the primary treatment for anaphylaxis in the prehospital setting.

Asthma is an acute spasm of the bronchioles associated with excessive mucus production and swelling of the mucous lining of the respiratory passages. Asthma produces a characteristic wheeze that may be heard without a stethoscope. Respiratory distress often develops because asthmatics, after dealing with reactive airway disease for years, sometimes wait more than a day to call for EMS support.

Emphysema, a type of chronic obstructive pulmonary disease (COPD), involves a loss of elastic material within the alveolar air space. It is more common than chronic bronchitis, another form of COPD. Adventitious breath sounds (e.g., crackles, rhonchi, wheezing) may be heard on lung auscultation. Dyspnea, chronic coughing, chronic sputum, and long expiration phases are possible in patients with COPD, particularly with exacerbations.

Pneumonia is an infection of the lungs. Risk factors for pneumonia include institutional residency, recent hospitalization, chronic disease processes (e.g., renal failure), being immunocompromised, and a history of chronic obstructive pulmonary disease (COPD). Symptoms of pneumonia vary between cases, depending on the cause and severity of the illness, as well as the patient’s age and overall health. Fevers, tachycardia, hypotension (exertional), dyspnea, wheezing/crackles/rhonchi

on lung auscultation, dehydration, chest pain, weight loss, and altered mental status are all possible in pneumonia cases.

33.

Which of the following are potential continuous positive airway pressure (CPAP) administration complications?

Select the three correct answer options.

Claustrophobia

Gastric distention

Hypotension

Bradycardia

Hypertension

Some patients may find CPAP claustrophobic and will not tolerate the mask, complicating the ventilation process. Do not force the application for these patients; instead, choose another treatment. The pressure of CPAP is generally helpful but can lead to gastric distention. Although rare, CPAP may also increase intrathoracic pressure, which reduces the preload available to the heart, resulting in hypotension. It is important to monitor blood pressure in patients receiving CPAP closely.

Bradycardia is not known to be a complication of CPAP application. CPAP is likely to cause a drop in the blood pressure, not hypertension.

34.

A nasal cannula is an appropriate oxygenation method for which of the following patients?

A patient with mild respiratory distress and adequate pulse oximetry who cannot tolerate devices over their mouth

A COPD patient with 89% pulse oximetry reading

A geriatric patient who is confused and feeling short of breath

An unresponsive patient with unobtainable pulse oximetry

Correct answer: A patient with mild respiratory distress and adequate pulse oximetry who cannot tolerate devices over their mouth

A nasal cannula delivers 24% to 44% oxygen, with a supplemental flow of one to six liters per minute. A nasal cannula should be used if the patient has adequate oxygenation and is unable to tolerate a non-rebreather mask. A nasal obstruction will not allow adequate oxygenation to be obtained from a nasal cannula. Primarily, a non-rebreather mask should be used.

For a patient in respiratory distress (e.g., a severely dyspneic patient, pulse oximetry less than 90%), assisted ventilation, likely from a bag-valve-mask with a reservoir bag, is appropriate to deliver nearly 100% oxygen and provide the appropriate rate of ventilation.

Confusion and other altered mental statuses or unresponsiveness are potential signs of hypoxia and should be treated with high-flow oxygenation until an alternate cause can be determined or the patient has appropriate oxygenation.

35.

A 28-year-old female was involved in a motor vehicle accident. She is unresponsive and apneic. All attempts at opening her airway using the jaw-thrust maneuver have failed. What is the most appropriate next step?

Use the head-tilt/chin-lift maneuver to open her airway

Ventilate her with a bag-valve mask and reservoir bag

Insert two nasal airways and apply high-flow oxygen therapy

Attempt mouth-to-mask ventilation

Correct answer: Use the head-tilt/chin-lift maneuver to open her airway

The head-tilt/chin-lift maneuver may be used on a trauma patient when the jaw-thrust maneuver fails to open the airway. The head-tilt/chin-lift maneuver should not be used if spinal injury is suspected unless there is no other way of opening the airway. An open airway is the primary goal and should be ensured for all patients.

Ventilating the patient (e.g., a bag-valve mask or mouth-to-mask ventilation) is indicated for a patient with respiratory failure. However, ventilation can only be adequate if the airway is open. High-flow oxygen therapy will not be beneficial if the patient is not ventilating independently.

36.

Which of the following patients should not be treated with CPAP?

A patient with facial trauma

A patient with an SpO₂ of 84%

A patient with pulmonary edema

A patient in respiratory distress

Correct answer: A patient with facial trauma

Contraindications for CPAP (Continuous Positive Airway Pressure) include:

- *respiratory arrest or agonal respirations*
- *hypoventilation*
- *inability to speak or protect own airway*
- *systolic blood pressure < 90 mm Hg*
- *chest trauma or signs of pneumothorax*
- *active GI bleed or recent GI surgery*
- *inability to sit upright*
- *inability to tolerate the mask*
- *unable to get a good mask seal*

Respiratory distress, pulmonary edema, and hypoxia are all indications that a patient may need CPAP.

37.

A 10-year-old male is found unconscious from an unknown mechanism of injury. Which of the following is the most appropriate method to open his airway?

Jaw-thrust maneuver

Head-tilt/chin-lift maneuver

Padding the shoulders and placing the head in a "sniffing" position

Modified head-tilt/chin-lift maneuver

Correct answer: Jaw-thrust maneuver

The appropriate methods for opening an airway in a prehospital setting are the head-tilt/chin-lift maneuver and the jaw-thrust maneuver. If trauma is suspected, the jaw-thrust maneuver is the most appropriate method to open an airway. Do not modify the head-tilt/chin-lift method unless necessary.

The sniffing position is when a patient spontaneously flexes their neck forward and extends their head up and back in order to open a partially obstructed upper airway. It is not appropriate for a trauma patient due to the risk of cervical spine injury.

38.

An unconscious patient is found with blood and possibly broken teeth or debris in the upper airway. What is the **best** way to clear the patient's airway safely and effectively?

Log-roll the patient to the side and clear the mouth carefully with a gloved finger, clearing only visible foreign bodies

Apply a non-rebreather mask with high-flow oxygen and allow the secretions to drain into the stomach

Use a rigid catheter to suction away the debris

Log-roll the patient to the side and clear the mouth carefully with a gloved finger using a blind finger sweep

Correct answer: Log-roll the patient to the side and clear the mouth carefully with a gloved finger, clearing only visible foreign bodies

Solid objects—teeth, foreign bodies, or food—may obstruct an otherwise patent airway. Suction is often not adequate to remove such objects. Log-rolling the patient to the side and removing visible objects is the most appropriate method. A blind finger sweep may push objects farther into the airway. Continuous ventilation, whether via a non-rebreather mask or a bag-valve mask, is inappropriate if particles are present within the airway.

39.

An unconscious adult patient has an active gag reflex and snoring respirations. Which of the following is most appropriate?

Open the patient's airway using the head-tilt/chin-lift maneuver and insert a nasopharyngeal airway

Open the patient's airway using the head-tilt/chin-lift maneuver and insert an oropharyngeal airway

Insert a laryngeal mask airway and confirm the ventilation port

Tilt the patient's head back slowly and ventilate using a bag-valve mask

Correct answer: Open the patient's airway using the head-tilt/chin-lift maneuver and insert a nasopharyngeal airway

A nasopharyngeal airway is used for a patient who is semiconscious or has an intact gag reflex or a patient who will not otherwise tolerate an oropharyngeal airway. Severe head injury with blood draining from the nose and a history of a fractured nasal bone are contraindications for use.

An oropharyngeal airway is contraindicated in patients who are conscious or have an intact gag reflex. The main purpose of the oropharyngeal airway is to prevent the tongue of an unconscious patient, without a gag reflex, from blocking the upper airway.

A laryngeal mask airway is a supraglottic airway. It is reserved for cases where intubation with an endotracheal tube fails. Generally, ALS will perform intubation. Intubation is indicated for patients who cannot otherwise maintain a patent airway with another airway device.

There is no indication that the patient requires assisted ventilation at this time (i.e., the patient lacks apnea or respiratory distress/failure). A non-rebreather mask should be attempted prior to a bag-valve mask, as assisted ventilation may increase the risk of gastric distension or induce vomiting.

40.

A 45-year-old male is having difficulty breathing. He is unable to speak in complete sentences, but his breathing depth is adequate. His pulse oximetry is 86%. Which of the following is the **most** appropriate treatment?

Supplemental oxygen via non-rebreather mask at 15 liters per minute

Supplemental oxygen via nasal cannula at 6 liters per minute

Supplemental oxygen via continuous positive airway pressure (CPAP)

Give a nebulized bronchodilator treatment

Correct answer: Supplemental oxygen via non-rebreather mask at 15 liters per minute

Hypoxia is low oxygenation throughout the body. Early signs of hypoxia in an adult patient include the following:

- *restlessness*
- *irritability*
- *apprehension*
- *anxiety*

Late signs of hypoxia in an adult patient include the following:

- *altered mental status*
- *weak, thready pulse*
- *cyanosis*
- *dyspnea in conscious patients*
- *inability to speak in complete sentences*

Since this patient is in a later stage of hypoxia, he requires supplemental oxygenation. A non-rebreather mask is the preferred way of giving oxygen to patients with suspected or confirmed hypoxia but adequate breathing. A nasal cannula should be reserved for patients who are unable to tolerate a non-rebreather mask. The appropriate flow of a non-rebreather mask is 10-15 liters per minute, delivering up to 95% oxygen.

This patient may require CPAP or a nebulized bronchodilator, but oxygen is the most appropriate next step in the effort to determine the cause.

41.

An unresponsive but restrained child is in the backseat of a vehicle at the scene of an MVA. The car has sustained minimal damage, and the child has no signs of obvious trauma. What is the **most** appropriate way to open this child's airway?

With the jaw-thrust maneuver

With the head-tilt/chin-lift maneuver

With the cross-finger technique

By pulling the tongue forward with one hand and pushing backward on the forehead

Correct answer: With the jaw-thrust maneuver

The jaw-thrust maneuver is used when trauma is suspected. It is appropriate to suspect trauma in this scenario even if damage is not obvious.

The head-tilt/chin-lift maneuver is the most appropriate method to open an airway for a patient with no suspected trauma. The cross-finger technique is used to open the mouth of a patient who has already had the airway opened by either the jaw-thrust or head-tilt/chin-lift maneuver, but the mouth remains closed.

42.

What is the purpose of opening and closing the oxygen tank prior to attaching the regulator?

To remove dirt or contaminants from the opening

To ensure the valve is working properly

To ensure the tank is filled

To check the pressure inside the tank

Correct answer: To remove dirt or contaminants from the opening

An oxygen cylinder is "cracked" before attaching the regulator to remove dirt and other particles. The tank key (wrench) is used to rotate the valve counterclockwise to open the tank and then clockwise to close the tank. "Cracking" the tank proves that the valve is working properly, but functionality is not the primary reason for cracking a tank.

The pressure regulator, which is attached after cracking a tank, is used to determine whether the tank is full or find the remaining pressure within the tank.

43.

When is the jaw-thrust maneuver the most appropriate method of opening the airway?

For an unconscious patient with suspected cervical spinal trauma

A conscious trauma patient with penetrating cervical spinal injury

For an unconscious person who is snoring

A conscious trauma patient who has no motor or sensation below the nipple line

Correct answer: For an unconscious patient with suspected cervical spinal trauma

The jaw-thrust maneuver is the appropriate method of opening the airway for a patient with suspected cervical spinal trauma. In-line stabilization of the cervical spine is used to ensure no further damage occurs until a C-collar can be applied. The rescuer kneels above the patient's head with fingers behind the angles of the lower jaw. The jaw is then moved upward with the index and middle fingers, and the thumbs help position the lower jaw.

A conscious trauma patient would not require a jaw thrust to open the airway.

44.

An adult trauma patient is unresponsive but breathing at a rate of 12 breaths per minute with snoring respiration. Which of the following is the most appropriate intervention?

Open the airway using the jaw-thrust maneuver while maintaining in-line cervical spine stabilization and apply an oropharyngeal airway

Open the airway using a head-tilt/chin-lift maneuver while maintaining in-line cervical spine stabilization and apply an oropharyngeal airway

Open the airway using the jaw-thrust maneuver while maintaining in-line cervical spine stabilization and provide assisted ventilation using a bag-valve mask

Open the airway using a head-tilt/chin-lift maneuver while maintaining in-line cervical spine stabilization and apply a nasopharyngeal airway

Correct answer: Open the airway using the jaw-thrust maneuver while maintaining in-line cervical spine stabilization and apply an oropharyngeal airway

The jaw-thrust maneuver is the appropriate method of opening the airway for a patient with suspected cervical spinal trauma. If the mechanism of injury is unknown, as in this case, suspect a possible cervical spine injury. In-line stabilization of the cervical spine is used to ensure no further damage occurs until a cervical collar can be applied. To perform the jaw-thrust maneuver, the rescuer kneels above the patient's head with their fingers behind the angles of the lower jaw. The jaw is then moved upward with the index and middle fingers while the thumbs help position the lower jaw.

The head-tilt/chin-lift maneuver is used to open the airway of patients who do not have suspected spinal trauma.

An oropharyngeal airway keeps the tongue from obstructing the airway and eases suctioning, if necessary. It is contraindicated in patients who are conscious or have an active gag reflex.

A nasopharyngeal airway is generally reserved for patients who have an active gag reflex and cannot maintain a patient's airway spontaneously. It is contraindicated in patients with severe trauma to the head or face or a history of a fractured nasal bone.

Assisted ventilation is appropriate for patients who are in respiratory distress or arrest.

45.

Which of the following results from infections and will most likely cause respiratory distress in pediatric patients?

Select the 3 answer options which are correct.

Tracheitis

Croup

Epiglottitis

Asthma

Croup is a viral infection of the upper airway. Epiglottitis is swelling of the epiglottis that results from an upper respiratory infection. Bacterial tracheitis is an acute bacterial infection of the subglottic area of the upper airway. All of these conditions are likely to cause respiratory distress in pediatric patients.

Asthma is a reactive airway disease and is not caused by an infection. It also leads to respiratory distress in pediatric patients.

46.

Which of the following conditions can cause crackles/rales in lung sounds?

Select the two correct answer options.

Pulmonary edema

Congestive heart failure

Asthma

COPD

Bronchitis

Emphysema

Crackles (also known as rales) are caused by air trying to pass fluid in the alveoli. It is a crackling or bubbling sound heard on inhalation. These sounds are often a result of pulmonary edema or congestive heart failure.

Asthma, bronchitis, and COPD cause rhonchi, wheezing lung sounds, and/or decreased or absent breath sounds. These conditions are not likely to cause crackles in lung sounds.

47.

A 36-year-old male patient took a large dose of heroin. He is supine and semiconscious and begins to vomit. Which of the following is the **most** appropriate intervention?

Roll the patient onto his left side

Suction as much of the vomit as possible

Insert an oropharyngeal airway

Begin assisted ventilation

Correct answer: Roll the patient onto his left side

If nausea or vomiting occurs, the patient should be placed on their left side to prevent aspiration of vomitus. Suctioning may be required, but this should be done after the patient is done vomiting.

Oropharyngeal airways are contraindicated in conscious or semiconscious patients. Inserting an oropharyngeal airway may further induce vomiting.

Assisted ventilation is indicated for patients with severe respiratory distress/failure; assisted ventilation may also induce further vomiting.

A patient who may have an altered level of consciousness is likely to aspirate when vomiting if they are not placed on their side. The left lateral recumbent position is preferred, but either side is acceptable.

48.

What is the maximum oxygen concentration that can be delivered via a nasal cannula?

44%

36%

95%

22%

Correct answer: 44%

A nasal cannula will commonly deliver between 24% and 44% oxygen and has a flow rate range of one to six liters per minute. A nasal cannula should be reserved for patients who are unable to tolerate a non-rebreather mask.

A non-rebreather mask with a reservoir of supplemental oxygen at 15 liters per minute can deliver oxygen up to 95%.

49.

An 87-year-old female is showing early signs of hypoxia. The patient is prescribed continuous oxygen therapy via nasal cannula at a rate of two liters per minute; the oxygen is currently turned off because the patient states she does not like it. Which of the following is the **most** appropriate next step?

Discuss the appropriateness of supplemental oxygen, place the patient on two liters of oxygen per minute via nasal cannula, and continue the assessment

Continue with the assessment, noting the patient's signs and symptoms

Begin assisted ventilation

Immediately transport the patient and inform the hospital that she has inadequate oxygenation and refused treatment

Correct answer: Discuss the appropriateness of supplemental oxygen, place the patient on two liters of oxygen per minute via nasal cannula, and continue the assessment

Since the patient is prescribed supplemental oxygen and is currently showing early signs of hypoxia, this treatment is appropriate to resume. Supplemental oxygen should not be delayed for patients showing signs of hypoxia or inadequate breathing. Hypoxia is low oxygenation throughout the body. Early signs of hypoxia in an adult patient include the following:

- *restlessness*
- *irritability*
- *apprehension*
- *anxiety*

Late signs of hypoxia in an adult patient include the following:

- *altered mental status*
- *weak, thready pulse*
- *cyanosis*
- *dyspnea in conscious patients*
- *inability to speak in complete sentences*

A non-rebreather mask may be an appropriate adjustment in treatment, but the patient's prescribed treatment should be attempted before any changes are made by EMS personnel.

There are no indications in this scenario that this patient has inadequate breathing; therefore, assisted ventilation is not appropriate. Assisted ventilation is reserved for patients who are in respiratory distress or respiratory failure.

An alert, competent adult patient may refuse treatment; however, risks, benefits, and alternatives to the treatment and its refusal should be explained to the patient prior to accepting a refusal. Any refusal of treatment/transport should be documented and signed by the patient, with a witness.

50.

What are the parts of the pediatric assessment triangle?

Select the three correct answer options.

Appearance

Work of breathing

Circulation to the skin

Awake

Capillary refill

The pediatric assessment triangle was developed to help EMS providers gain a "from the doorway" general impression of pediatric patients. It is composed of appearance, work of breathing, and circulation to the skin.

Capillary refill is an important aspect of pediatric assessment but not a part of the assessment triangle because it requires touching the patient. The pediatric assessment triangle is what you see before touching the patient, and it is used to form a general impression.

51.

Which of the following is a good indication of the successful placement of an airway device?

Presence of bilateral breath sounds during ventilation

Presence of gastric sounds during ventilation

Improved level of consciousness

Absence of resistance during ventilation

Correct answer: Presence of bilateral breath sounds during ventilation

Airway devices such as an LMA or King-LT are used to provide airway management in the prehospital setting. EMS providers must ensure proper airway device placement. An end-tidal waveform carbon dioxide (ETCO₂) detector may be placed between the device and the bag to check for proper placement. Additionally, a patient with a properly placed airway device should have positive bilateral breath sounds and absent gastric sounds during ventilation. Always follow local protocols regarding the insertion, assessment, and maintenance of airway devices.

A patient's level of consciousness is not directly linked to the proper placement of an airway device.

The absence of resistance during ventilation does not necessarily indicate proper airway device placement; resistance may not occur if EMS personnel are ventilating the patient's stomach.

52.

Which of the following is an early sign of respiratory distress?

Irritability

Bradycardia

Bradypnea

Lethargy

Correct answer: Irritability

Respiratory distress occurs when a patient cannot gain adequate ventilation to support adequate oxygenation of vital organs. Respiratory distress is treated with assisted ventilation (e.g., a bag-valve mask).

Common signs and symptoms of respiratory distress include irritability, agitation, anxiety, restlessness, stridor, wheezing, retractions, tachypnea, mild tachycardia, nasal flaring, seesaw breathing, and head bobbing. If respiratory distress continues, respiratory failure may occur. Signs and symptoms of respiratory failure include lethargy, tachypnea with periods of bradypnea or agonal respirations, inadequate chest rise, inadequate respiratory rate/effort, bradycardia, and diminished muscle tone.

53.

What is the **most** appropriate treatment for a patient with respiratory failure?

Assisted ventilation

Non-rebreather mask

Airway adjunct and non-rebreather mask

Nasal cannula

Correct answer: Assisted ventilation

Assisted ventilation (e.g., the bag-valve mask technique) is indicated for patients who are not breathing adequately or are experiencing respiratory distress or respiratory failure. Assisted ventilations are meant to improve the overall oxygenation and ventilatory status of a patient.

A non-rebreather mask should be used for patients with adequate breathing with suspected or confirmed hypoxia. Restlessness, irritability, apprehension, tachycardia, and anxiety are early signs of hypoxia. Late signs of hypoxia include altered mental status, a weak/thready pulse, and cyanosis.

An airway adjunct is used to prevent the obstruction of the upper airway by the tongue.

A nasal cannula should be reserved for patients who do not tolerate a nonrebreather mask, and it would not be beneficial for a patient with respiratory failure.

54.

When should the head-tilt/chin-lift maneuver be used on a trauma patient?

When the jaw-thrust maneuver fails to open the airway

When cervical spine stabilization is accomplished

When basic life support resuscitation has been performed for at least 15 minutes

When no medical backup is available for assistance

Correct answer: When the jaw-thrust maneuver fails to open the airway

The head-tilt/chin-lift maneuver may be used on a trauma patient when the jaw-thrust maneuver fails to open the airway. The head-tilt/chin-lift maneuver should not be used if spinal injury is suspected unless there is no alternative way of opening the airway. An open airway is the primary goal and should be ensured for all patients.

55.

Which anatomical structure marks the end of the upper airway and the beginning of the lower airway?

Larynx

Carina

Glottis

Oropharynx

Correct answer: Larynx

The larynx is a structure formed by independent cartilaginous structures, the epiglottis, the glottis, and the vocal cords (superior aspect); the thyroid cartilage (middle structure); and the cricoid cartilage (inferior aspect), which lies opposite the sixth cervical vertebra. The cricoid cartilage of the larynx marks the end of the upper respiratory tract.

The lower respiratory tract includes the trachea, bronchi, bronchioles (23 bifurcations), and alveoli.

The carina is where the trachea divides into the two mainstem bronchi. The glottis is the space between the vocal cords and the narrowest portion of the adult airway, forming the superior part of the larynx. The oropharynx is the posterior portion of the oral cavity; it lies above the larynx and is also part of the upper airway.

56.

Which of the following terms describes a harsh, high-pitched breathing sound that is heard on inhalation or exhalation and often indicates some degree of airway obstruction?

Stridor

Rhonchi

Wheezing

Crackles

Correct answer: Stridor

Stridor is a brassy, high-pitched crowing sound heard during inhalation. It suggests a partially occluded airway.

Rhonchi are low-pitched, noisy sounds that are most prominent on exhalation, suggesting mucus in the lungs.

Wheezing is a high-pitched whistling sound that is most prominent on exhalation. It suggests an obstruction or narrowing of the lower airway.

Crackles are wet, crackling breath sounds that are heard on inhalation and exhalation. They indicate the presence of fluid within the lungs.

57.

What occurs when an adult's diaphragm and intercostal muscles relax?

The exhalation phase of spontaneous respiration

The inhalation phase of spontaneous respiration

Apnea

Ataxic respirations

Correct answer: The exhalation phase of spontaneous respiration

During the inhalation phase, the diaphragm contracts and moves down slightly, enlarging the chest cavity from top to bottom; additionally, the intercostal muscles contract, moving the ribs up and out. The enlargement of the chest cavity creates negative pressure, allowing air to be pulled into the lungs. During exhalation, the diaphragm and intercostal muscles relax, decreasing the chest cavity, increasing pressure within the lungs, and forcing air out.

Apnea is the absence of spontaneous respiration. Ataxic respirations have no identifiable pattern.

58.

An adult patient is found unresponsive. They demonstrate spontaneous respirations at a rate of 12 breaths per minute with adventitious breath sounds auscultated in both lungs. The patient has an active gag reflex and a strong carotid pulse. What is the **most** appropriate next step?

Insert a nasopharyngeal airway and apply high-flow oxygen therapy

Insert an oropharyngeal airway

Begin mouth-to-mask ventilation

Suction the patient's airway

Correct answer: Insert a nasopharyngeal airway and apply high-flow oxygen therapy

A nasopharyngeal airway is indicated for a patient with an intact gag reflex who is not able to maintain their airway. Since the patient is exhibiting abnormal breathing (i.e., adventitious breath sounds on auscultation), high-flow oxygen therapy is appropriate.

An oropharyngeal airway is contraindicated for conscious patients or any patient with an intact gag reflex.

This patient's respiratory rate is adequate and does not suggest respiratory distress or failure, so assisted ventilation (i.e., mouth-to-mask ventilation) is not indicated.

Suctioning is used to clear an airway of fluid or secretions that may create an obstruction. This patient is not exhibiting signs of fluid or secretions in the airway (e.g., gurgling).

59.

Which of the following is the correct procedure for initiating high-flow oxygen therapy via a non-rebreather mask?

Select the correct mask size. Turn on the oxygen source. Adjust the flow of oxygen to 10 to 15 liters per minute. Ensure the reservoir bag is inflated by placing a finger over the bag outlet. Place the mask over the patient's face and adjust accordingly.

Select the correct mask size. Turn on the oxygen source. Adjust the flow of oxygen to 10 to 15 liters per minute. Place the mask over the patient's face and adjust accordingly; there is no need to wait for inflation of the reservoir bag.

Select the correct mask size. Turn on the oxygen source. Adjust the flow of oxygen to 1 to 6 liters per minute. Ensure the reservoir bag is inflated by placing a finger over the bag outlet. Place the mask over the patient's face and adjust accordingly.

Select the correct mask size. Turn on the oxygen source. Adjust the flow of oxygen to 10 to 15 liters per minute. Inflate the reservoir bag by attaching the tubing directly to the bag. Run the tubing from the oxygen source to the non-rebreather mask. Place the mask over the patient's face and adjust accordingly.

Correct answer: Select the correct mask size. Turn on the oxygen source. Adjust the flow of oxygen to 10 to 15 liters per minute. Ensure the reservoir bag is inflated by placing a finger over the bag outlet. Place the mask over the patient's face and adjust accordingly.

A properly fitting mask is extremely important, particularly in the pediatric population. The oxygen should be turned on, and the flow should be adjusted to 10 to 15 liters per minute. The reservoir bag should be inflated prior to placing the mask on the patient's face; this can be accomplished by placing a gloved finger over the reservoir bag outlet. Much like selecting an appropriately sized mask, fitting the mask to the patient after placement is important for adequate flow.

One to six liters per minute is the appropriate flow for a nasal cannula, not a non-rebreather mask.

60.

Which anatomical landmark(s) may be involved when performing abdominal thrusts on a conscious child with an airway obstruction?

Above the umbilicus and below the lower tip of the sternum

Below the cricoid cartilage and above the upper tip of the sternum

Along the body of the sternum

Approximately at the level of the umbilicus

Correct answer: Above the umbilicus and below the lower tip of the sternum

If a child can still cough, cry, or speak, the airway is only partially blocked; therefore, keeping the child comfortable, avoiding anything that may agitate the child, and using only noninvasive treatments while transporting them immediately are the best actions.

If the child has severe respiratory distress and is at risk of deterioration during transport, foreign-body airway obstruction maneuvers should be considered. Never do this if the child can cough, cry, or speak.

Kneeling behind the child, wrap your arms around the child's body. Make a fist and place your thumb just above the umbilicus, well below the lower tip of the sternum. The opposite hand is placed over the fist, and thrusts are performed in an inward and upward direction.

If the child becomes unresponsive, begin CPR with chest compressions.

61.

Which of the following delivers the highest percentage of oxygen?

Bag-valve mask with a reservoir bag with supplemental oxygen flowing at 15 liters per minute

Non-rebreather mask with a reservoir bag with supplemental oxygen flowing at 15 liters per minute

Mouth-to-mask device with supplemental oxygen flowing at 15 liters per minute

Nasal cannula with supplemental oxygen flowing at 15 liters per minute

Correct answer: Bag-valve mask with a reservoir bag with supplemental oxygen flowing at 15 liters per minute

A bag-valve mask with a reservoir bag with supplemental oxygen flowing at 15 liters per minute will provide nearly 100% oxygen to a patient. Assisted ventilation is indicated for patients who are not breathing adequately or are in respiratory distress or respiratory failure.

A non-rebreather mask with a reservoir bag with supplemental oxygen flowing at 15 liters per minute will provide up to 95% oxygen to a patient. It should be used for patients with adequate breathing who have suspected or confirmed hypoxia.

A mouth-to-mask device with supplemental oxygen flowing at 15 liters per minute will provide a maximum of 55% oxygen to a patient.

A nasal cannula should be reserved for patients who do not tolerate a non-rebreather mask; nasal cannulas deliver at a rate of 1 to 6 liters per minute, providing 24%-44% oxygen.

62.

A 59-year-old male with a history of chronic obstructive pulmonary disease (COPD) complains of difficulty breathing that wakes him at night. His skin is hot, and pedal edema is noted. On auscultation, rales can be heard throughout his lungs.

Which of the following conditions is a possible cause of this patient's dyspnea?

Any of these

Pneumonia

Congestive heart failure

Emphysema

Correct answer: Any of these

Any of the listed conditions is a possible cause of the patient's dyspnea.

Causes of dyspnea include pulmonary edema, allergic reaction, pleural effusion, airway obstruction, infection, hyperventilation syndrome, environmental/industrial exposure, carbon monoxide poisoning, and drug overdose.

Pneumonia is an infection of the lungs. Risk factors for pneumonia include institutional residency, recent hospitalization, chronic disease processes (e.g., renal failure), immunocompromise, and a history of chronic obstructive pulmonary disease (COPD).

Symptoms of pneumonia vary between cases, depending on the cause and severity of the illness as well as the patient's age and overall health. Fevers (i.e., hot skin in this scenario), tachycardia, hypotension (exertional), dyspnea, wheezing/crackles/rhonchi on lung auscultation, dehydration, chest pain, weight loss, and altered mental status are all possible.

Congestive heart failure occurs when damaged ventricular heart muscles cannot keep up with the return flow of blood from the atria. Blood tends to back up in the pulmonary veins, causing lung congestion and subsequent pulmonary edema. Tachycardia, hypertension, tachypnea, dyspnea that is alleviated when sitting upright, retractions, rales heard on lung auscultation, chest pain, distended neck veins, peripheral edema, and pale, cyanotic, sweaty skin are all possible.

Emphysema, a type of COPD, is a loss of elastic material within the alveolar air space. It is more common than chronic bronchitis, the alternate form of COPD. Adventitious breath sounds (e.g., crackles, rhonchi, wheezing) may be heard on lung

auscultation. Dyspnea, chronic coughing, chronic sputum, and long expiration phases are possible in patients with COPD.

63.

How many lobes are there in a normal left lung?

Two

One

Three

Four

Correct answer: Two

The human body has two lungs. The right lung is divided into three lobes (upper, middle, and lower), while the left lung has two lobes (upper and lower).

64.

Which of the following best describes the epiglottis?

A valve that allows air to pass into the trachea but prevents food and liquid from entering

A valve that allows air to pass into the esophagus but prevents food and liquid from entering

A valve that is the narrowest portion of an adult's airway

A valve where the upper airway ends and the lower airway begins

Correct answer: A valve that allows air to pass into the trachea but prevents food and liquid from entering

The glottis is the space in between the vocal cords that is the narrowest portion of the adult's airway. The larynx is where the upper airway ends and the lower airway begins. This complex structure is formed by many independent cartilaginous structures that all work together.

65.

A 50-year-old patient is found semi-conscious. They have a palpable carotid pulse of 120 beats per minute. They are breathing at a rate of 30 breaths per minute; the patient's respirations are shallow. Which of the following is the **most** appropriate way to provide assisted ventilation initially?

Provide assisted ventilation at the same rate as the patient's and slowly adjust to a normal rate

Provide assisted ventilation at a rate of 12-20 breaths per minute

Give two initial breaths and check again for a pulse

Give two initial breaths and initiate CPR

Correct answer: Provide assisted ventilation at the same rate as the patient's and slowly adjust to a normal rate

Signs of inadequate breathing in an adult patient may include the following: irregular rhythm; noisy, diminished, or absent breath sounds; reduced flow of expired air; unequal or inadequate chest expansion; use of accessory muscles; shallow depth; skin that is pale, cyanotic, cool, or clammy; and retractions.

Assisted ventilation should be given to a conscious or semi-conscious patient initially at the same rate that the patient is breathing; after the initial five to 10 breaths, slowly adjust the rate to mimic a normal respiratory rate and be sure to deliver an appropriate tidal volume. The normal respiratory range is 12-20 breaths per minute for an adult, 15-30 breaths per minute for a child, and 25-50 breaths per minute for an infant.

This patient has already been determined to have a palpable carotid pulse; reassessing the pulse or initiating CPR is inappropriate and will delay required ventilation.

66.

In which of the following situations would the administration of albuterol via a metered-dose inhaler (MDI) be the most beneficial?

An alert 16-year-old female with a history of asthma who has respirations of 24 breaths per minute and is wheezing

An alert 6-year-old male with an active upper-respiratory infection who has respirations of 24 breaths per minute but no respiratory complaints

An alert 64-year-old male with a history of emphysema who complains of difficulty breathing and has an inhaler that was prescribed for his son

An unresponsive 52-year-old female with a history of severe asthma, respirations of 28 breaths per minute, and wheezing

Correct answer: An alert 16-year-old female with a history of asthma who has respirations of 24 breaths per minute and is wheezing

Albuterol via a metered-dose inhaler (MDI) may be used for acute asthma or chronic obstructive pulmonary disease (COPD) exacerbation or bronchitis. The 16-year-old is likely suffering from an asthma exacerbation since she has a history of asthma, her respirations are elevated (above 20 breaths per minute), and she is wheezing. Contraindications to MDI use include a patient who is unable to help coordinate inhalation with depression of the trigger (i.e., confused, unconscious) or a patient who has already had the maximum prescribed dose.

A patient with an active upper-respiratory infection (e.g., bronchitis) may not need albuterol via an MDI if no respiratory complaints are evident. An MDI may be used only if the EMT has verified that it is prescribed to the patient and not expired. Always follow local protocols for assisting with MDI use.

67.

A 52-year-old female patient complains of chest discomfort. She is placed in a comfortable position but appears restless and anxious. The patient's respiratory rate is 28, and her pulse oximetry is 89%. What is the most appropriate next step?

Administer oxygen with a non-rebreather mask at 15 liters per minute

Ventilate the patient using a bag-valve mask with supplemental oxygen at 15 liters per minute

Administer oxygen with a non-rebreather mask at 6 liters per minute

Administer oxygen with a nasal cannula at 15 liters per minute

Correct answer: Administer oxygen with a non-rebreather mask at 15 liters per minute

A non-rebreather mask should be used on patients with adequate breathing with suspected or confirmed hypoxia. Restlessness, irritability, apprehension, tachycardia, and anxiety are early signs of hypoxia. Late signs of hypoxia include altered mental status, a weak/thready pulse, and cyanosis. Supplemental oxygen via a non-rebreather mask should be delivered at a rate of 10 to 15 liters per minute, providing up to 95% oxygen.

A nasal cannula has little use in the prehospital setting. It should be reserved for patients who do not tolerate a non-rebreather mask. Supplemental oxygen via nasal cannula is limited to rates of 1 to 6 liters per minute, providing 24% to 44% oxygen. Assisted ventilation (e.g., a bag-valve mask) is appropriate for patients experiencing severe respiratory distress/failure and inadequate breathing, delivering nearly 100% oxygen.

68.

A call is received during cold weather for a 7-year-old with general malaise and vomiting. The patient's mother states that overnight, all three of her children developed a "bug." In addition to malaise, the children are lethargic, slightly confused, nauseated, and complaining of headaches. Which of the following is the **most** likely cause of these symptoms?

Carbon monoxide poisoning

Carbon dioxide poisoning

Food poisoning

Cyanide poisoning

Correct answer: Carbon monoxide poisoning

Carbon monoxide is a colorless, odorless, tasteless, and highly poisonous gas. It is the leading cause of accidental poisoning death in the United States, especially during winter months when portable gas heaters may be in use. Exposure to carbon monoxide poisoning involves flu-like symptoms: headaches, dizziness, fatigue, nausea, vomiting, dyspnea, chest pain, impaired judgment, confusion, or hallucinations. Syncope and seizures are possible.

There is no such thing as carbon dioxide poisoning. Common signs and symptoms include restlessness, irritability, apprehension, and anxiety that can progress to altered mental status; a weak, thready pulse; cyanosis; dyspnea in conscious patients; and an inability to speak in complete sentences.

Food poisoning generally causes gastrointestinal symptoms (abdominal pain, nausea, vomiting, diarrhea) and possibly fevers.

Cyanide is a metabolic agent. Patients who are exposed to cyanide will present with dyspnea, respiratory distress/arrest, tachypnea, flushed skin, tachycardia, altered mental status, seizures, coma, and cardiac arrest. There is no indication that this patient has been exposed to cyanide, and this is not a common occurrence.

69.

What is the anatomical location of the cricoid cartilage?

Inferior to the thyroid cartilage, at the lowest portion of the larynx

Superior to the epiglottis

At the same level as the carina

Within the oropharynx

Correct answer: Inferior to the thyroid cartilage, at the lowest portion of the larynx

The cricoid cartilage is a firm ring that is located inferior to (below) the thyroid cartilage at the lowest portion of the larynx.

The carina is the level at which the trachea divides into the two mainstem bronchi. The epiglottis appears at the base of the oropharynx, superior to (above) the cricoid cartilage.

70.

Which of the following statements is true regarding epiglottitis?

Epiglottitis has a rapid onset of signs and symptoms.

Epiglottitis is a non-life-threatening respiratory condition.

Epiglottitis affects adults more often than children.

Epiglottitis can cause the epiglottis to shrink up to five times its normal size.

Correct answer: Epiglottitis has a rapid onset of signs and symptoms.

Epiglottitis is a life-threatening infection of the soft tissue above the vocal cords. The epiglottis can swell to two to three times its normal size. Bacterial infections are the most common cause.

Epiglottitis is more common in infants and children than in adults and has a rapid onset. Patients may look ill, have a very sore throat and high fever, and commonly assume the tripod position to assist with breathing. The airway may be compromised.

71.

The Heimlich maneuver is indicated for which of the following patients?

A responsive four-year-old who has a foreign body and is unable to speak as a result

A responsive 20-year-old with stridor due to a foreign body obstruction

An unresponsive infant with a potential airway obstruction

An unresponsive 35-year-old with a severe airway obstruction

Correct answer: A responsive four-year-old who has a foreign body and is unable to speak as a result

The abdominal thrust (Heimlich) maneuver is recommended for removing severe airway obstructions in responsive adults and children older than one year of age. This technique creates an artificial cough by causing a sudden increase in intrathoracic pressure. If a patient is unresponsive, chest compressions should be initiated.

The unresponsive infant and unresponsive 35-year-old require chest compressions. Signs of a severe airway obstruction include a weak or absent cough, a decreasing level of consciousness, and cyanosis.

The 20-year-old has a mild (partial) airway obstruction since they can exchange air, as evidenced by stridor. Supplemental oxygen and monitoring are appropriate, as his condition may rapidly deteriorate.

72.

Which of the following are common complications of providing artificial ventilation with a bag-mask device?

Select the three correct answer options.

Decreased cardiac output from increased intrathoracic pressure

Improper positioning of the patient's head

Gastric distention

Hypertension

Increased cardiac output from decreased intrathoracic pressure

A bag-mask device is the most common tool used to provide artificial ventilation to a patient who is apneic or has inadequate ventilation. Common complications include:

- *failure to maintain a good mask seal*
 - *improper positioning of the patient's head*
 - *over- or under-ventilation*
 - *gastric distention (which can lead to vomiting and aspiration)*
 - *barotrauma from too much pressure on the airways*
 - *decreased cardiac output from increased intrathoracic pressure (which leads to hypotension)*
-

73.

Which of the following are signs of airway device complications?

Select the 2 answer options which are correct.

Sudden drop in end-tidal CO₂ levels

Decreasing SpO₂ levels

Absence of breath sounds during ventilation

End-tidal CO₂ levels of 35–45 mmHg

Signs of airway device complications include a sudden drop in end-tidal carbon dioxide (CO₂) levels, which can indicate tube dislodgment or airway obstruction, and decreasing peripheral oxygen saturation (SpO₂) levels, which signal impaired oxygenation. Absence of breath sounds during ventilation suggests improper tube placement or obstruction, which can lead to inadequate ventilation and oxygenation.

Normal end-tidal CO₂ levels between 35–45 mmHg indicate that the airway device is functioning correctly, so this is not a sign of complications. The absence of abnormal sounds in the epigastrium when ventilating is also an indicator that the device is correctly placed, not a complication.

74.

Which of the following are signs of respiratory distress in a pediatric patient?

Select the 3 correct answer options.

Nasal flaring

Retractions

Inspiratory stridor

Coughing

Signs of pediatric respiratory distress include:

- *nasal flaring*
- *irritability*
- *tachypnea*
- *retractions*
- *inspiratory stridor*
- *grunting*
- *abdominal breathing*

Coughing may be a sign of congestion or infection, but it is generally not considered a sign of respiratory distress.

75.

In which of the following situations would the use of an oropharyngeal airway be warranted?

An unconscious patient with a closed-head injury without a gag reflex and clear fluid draining from the nose and ears

A semiconscious diabetic who has copious secretions

An unconscious patient with an active gag reflex

A stroke patient who is semiconscious and having problems breathing

Correct answer: An unconscious patient with a closed-head injury without a gag reflex and clear fluid draining from the nose and ears

Oropharyngeal airways are used to keep a patient's airway from obstruction, primarily from the tongue. They should only be used on an unconscious patient without a gag reflex. Consciousness, semiconsciousness, and an active gag reflex are contraindications to the use of an oropharyngeal airway.

A head injury is a contraindication to a nasopharyngeal airway. A nasopharyngeal airway may be used if the patient is unable to tolerate an oropharyngeal airway.

76.

Which of the following statements are correct regarding the provision of artificial ventilation for a patient with a stoma?

Select the 2 answer options which are correct.

If air leaks through the nose and mouth while ventilating the stoma, cover the nose and mouth with a gloved hand to seal it.

Ventilate with a bag-mask device using a pediatric mask placed directly over the stoma.

If a stoma becomes clogged, suction it with a rigid suction catheter.

Ventilate with a bag-mask device placed over the nose and mouth and cover the stoma with a gloved hand.

A stoma is a surgical opening that provides a passage directly into the trachea. Patients with a stoma should be ventilated with a bag-mask device using a pediatric mask placed directly over the stoma. If air leaks through the nose and mouth while ventilating the stoma, cover the nose and mouth with a gloved hand to seal it.

Do not use a rigid suction catheter to suction a stoma, as it is for suctioning the mouth and nose only.

77.

Regarding the insertion of an oropharyngeal airway for a child, which of the following statements is **true**?

Rough insertion can cause bleeding.

Airways should be given at a size larger than measured on length-based resuscitation tape.

Airways should be given at a size smaller than measured by placing the flange at the level of the central incisor and the bite block parallel to the hard palate.

After the airway is inserted, immediately resume assisted ventilation.

Correct answer: Rough insertion can cause bleeding.

An oropharyngeal airway (OPA) is used to keep the tongue from blocking the airway and assists with the ease of suctioning the airway. An oropharyngeal airway should be used on patients who are unconscious and lack a gag reflex. An oropharyngeal airway should be appropriately sized by placing the airway with the flange at the level of the central incisor and the bite block at the segment parallel to the hard palate. The tip of the airway should reach the angle of the jaw. Alternatively, length-based resuscitation tape can be used to estimate the appropriately sized oropharyngeal airway.

The patient's airway should be opened using the head-tilt/chin-lift method or jaw-thrust maneuver, as appropriate. If needed, open the mouth by applying pressure on the chin with the thumbs. The airway can then be inserted by pointing the tip of the airway toward the roof of the mouth and depressing the tongue. (A tongue depressor can allow the proper placement of an OPA for a pediatric patient). As the airway passes through the mouth, gently rotate it into position. The flange should rest against the lips. The airway should always be reassessed after insertion prior to completing any further interventions or assisted ventilation. Be wary, as rough insertion can cause bleeding, aggravating airway problems or provoking vomiting. Also, ensure the tongue is not pushed into the pharynx. If the airway is too large, it may obstruct the larynx.

It would be inappropriate to choose a size larger or a size smaller than is properly measured. An OPA for a child should not be rotated like in an adult; it should be inserted straight.

78.

Which of the following will **not** interfere with the accuracy of a pulse oximeter?

Hypertension

Hypovolemia

Carbon monoxide poisoning

Hypothermia

Correct answer: Hypertension

Common reasons for an inaccurate pulse oximetry reading include the following:

- *hypovolemia*
- *severe peripheral vasoconstriction (secondary to chronic hypoxia, smoking, or hypothermia)*
- *time delay in detecting respiratory insufficiency*
- *dark/metallic nail polish*
- *dirty fingers*
- *carbon monoxide poisoning*

Hypertension would not interfere with pulse oximetry readings.

79.

Which of the following is considered a parenteral route of medication administration?

Intramuscular

Transcutaneous

Oral

Inhalation

Correct answer: Intramuscular

There are five commonly used routes of parenteral (i.e., other than digestive tract) administration: subcutaneous (SC/SQ), intraperitoneal (IP), intravenous (IV), intradermal (ID), and intramuscular (IM).

Inhalation medications are inhaled into the lungs so they can be absorbed into the bloodstream or work in the lungs. Inhalation medications can be aerosols, fine powders, or sprays. A common medication delivered through the inhalation route in a pre-hospital setting is albuterol.

Transcutaneous medications are absorbed through the skin (e.g., the nicotine patch). Some transcutaneous patches are meant to have a longer-lasting effect, such as the nitroglycerin patch.

The oral route is the safest and most reliable route of medication administration and is known as an enteral route.

Intramuscular (IM) medications are usually administered by an injection into the muscle. Complications of IM administration include possible damage to muscle tissue and uneven/unreliable absorption of the dose. Autoinjectors, such as an EpiPen, are examples of intramuscular medications.

80.

A 56-year-old female has respirations at a rate of 34 breaths per minute that are shallow and labored. She has an altered level of consciousness and is cool, cyanotic, and diaphoretic on physical examination. What is the **most** appropriate treatment?

Assisted ventilation with a bag-valve mask and high-flow oxygen

Non-rebreather mask with supplemental oxygen flowing at a rate of 10 liters per minute

Nasal cannula with supplemental oxygen flowing at a rate of 6 liters per minute

Mouth-to-mask assisted ventilation with a one-way valve

Correct answer: Assisted ventilation with a bag-valve mask and high-flow oxygen

This patient is exhibiting symptoms of inadequate breathing. The bag-valve mask is the most appropriate method of delivering oxygen to patients with inadequate breathing. Aside from skin that is cool, cyanotic, or moist, other symptoms of inadequate breathing include bradypnea/tachypnea in the presence of shortness of breath, an irregular breathing rhythm, adventitious breath sounds, use of accessory muscles, shallow breathing, and retractions.

81.

An adult male has sustained a severe facial injury. Which of the following is not a likely cause of an airway obstruction?

Cervical spinal injury

Bleeding

Loosened teeth

Swelling

Correct answer: Cervical spinal injury

Airway obstruction can occur secondary to facial injuries to the face and neck. Clots that are subsequent to severe bleeding, loosened teeth or dentures that become dislodged, and swelling that accompanies an injury can contribute to or cause airway obstruction. Suctioning can be performed for bleeding; however, foreign bodies may require abdominal thrusts, and swelling may require airway management.

A cervical spinal injury may affect respirations but will rarely cause an airway obstruction.

82.

A 36-year-old female with a history of asthma is in respiratory distress with wheezing and labored respirations. Her vitals are as follows:

- blood pressure 160/96
- heart rate 88
- respiratory rate 26
- SpO₂% 89%

Which of the following meets the criteria for the assistance of a metered-dose inhaler?

If the patient has a prescribed inhaler and medical-direction approval is obtained

If the patient has an inhaler but is unable to use it due to altered mental status from hypoxia

If she has an expired inhaler for COPD

If your service carries rescue inhalers for the administration of albuterol

Correct answer: If the patient has a prescribed inhaler and medical-direction approval is obtained

For any medication, verification that it is prescribed to the patient and the correct indications are present must be completed before administering the medication. This patient requires a prescribed inhaler for use. Additionally, medical-direction approval must be obtained for any intervention that is not allowed by local protocols (typically the administration of medication).

Contraindications to the use of a metered-dose inhaler include an inability of the patient to help coordinate inhalation with depression of the trigger (i.e., too confused or physically unable), and meeting the maximum number of prescribed doses (listed on the medication or within local protocol). Administration of albuterol via rescue inhaler that is carried by EMS, if available, would be an advanced skill.

83.

Which of the following findings is most likely for a patient with a core body temperature below 80°F (26.7°C)?

Apnea

Confusion and lethargy

Rapid breathing

Constricted blood vessels

Correct answer: Apnea

A patient suffering from severe hypothermia, whose core body temperature is below 80°F (26.7°C), may show signs and symptoms of apparent death, including unresponsiveness and cessation of cardiorespiratory activity (i.e., apnea and a nonpalpable pulse due to cardiac dysrhythmias).

A patient with a core body temperature between 93°F (33.9°C) and 95°F (35°C) may present with shivering, rapid breathing, and constricted blood vessels and may be withdrawn. A patient with a core body temperature between 89°F (31.7°C) and 92°F (33.3°C) will likely have a loss of coordination, muscle stiffness, and slowing respirations/pulses and will be confused, lethargic, and sleepy. A patient with a core body temperature between 80°F (26.7°C) and 88°F (31.1°C) will likely be unresponsive in a coma-like state, with a weak pulse and very slow respirations.

84.

An adult patient keeps pulling off his non-rebreather mask, stating that he cannot have it on his face. The patient needs supplemental oxygen. Which of the following is **most** appropriate?

Provide oxygen via a nasal cannula at a rate of six liters per minute

Insist that the patient use the non-rebreather mask

Apply a partial rebreather mask at a rate of 15 liters per minute

Do not continue to administer oxygen

Correct answer: Provide oxygen via a nasal cannula at a rate of six liters per minute

Nasal cannulas are commonly used for patients who do not require high-flow oxygen, cannot tolerate a non-rebreather mask, or have specific illnesses (e.g., COPD, bronchopulmonary dysplasia). Nasal cannulas are not appropriate if hypoxia (a deficiency in the amount of oxygen reaching the tissues) is suspected.

Forcing a patient to complete any treatment/intervention with which they are uncomfortable is inappropriate.

A partial rebreather mask is similar to a non-rebreather mask, with the exception that there is no one-way valve between the mask and the reservoir. It is reasonable to assume that the patient in this scenario will not be able to tolerate a partial rebreather mask.

Withholding supplemental oxygen from a patient who requires it is inappropriate.

85.

Which of the following are indications for CPAP administration?

Select the 3 answer options which are correct.

Pulmonary edema

COPD exacerbation

Pneumonia

Apnea

CPAP is indicated for patients experiencing respiratory distress (e.g., from COPD, asthma, or pneumonia). Pulmonary edema is the most common reason for CPAP administration.

Apnea is a contraindication to CPAP administration, as the patient must be breathing and able to support their airway for it to be effective.

86.

Which of the following would be contraindications to using CPAP?

Select the two correct answer options.

Inability to protect the airway

History of recent upper GI surgery

Respiratory distress after a recent submersion incident

Rapid respiratory rate

CPAP provides pressure to keep alveoli open and reverse atelectasis caused by pulmonary edema. If a patient is unable to maintain their airway or has altered mental status, hypotension, a tracheostomy, facial trauma, a closed head injury, signs of pneumothorax, or recent upper GI surgery, CPAP is contraindicated.

Patients with respiratory distress after a recent submersion incident may be experiencing pulmonary edema and would benefit from CPAP if they do not exhibit any contraindications. Patients who need CPAP commonly have rapid respiratory rates, so this finding is not a contraindication.

87.

An apneic patient is receiving assisted ventilation. Which of the following is the best way to determine an adequate tidal volume?

Assess the patient's chest for adequate chest rise and fall

Assess the time it takes to deliver the breath

Assess end-tidal readings

Assess pulse oximetry

Correct answer: Assess the patient's chest for adequate chest rise and fall

The appropriate tidal volume should be enough to cause a noticeable rise of the patient's chest (approximately 600 mL or 6-7 mL/kg) over one second for an adult.

Assisted ventilation is appropriate for a patient in respiratory distress or failure.

End-tidal, delivery time, and pulse oximetry results may be affected by respiratory distress/failure and subsequent hypoxia, but they are not good indications of whether the tidal volume is adequate.

88.

An adult patient has shallow spontaneous breathing at 18 breaths per minute. Medical direction orders the delivery of at least 90% oxygen to the patient. Which of the following is the most appropriate method of oxygen delivery in this case?

A non-rebreather mask with a reservoir bag and supplemental oxygen flowing at 15 liters per minute

A bag-valve mask with reservoir bag and supplemental oxygen flowing at 15 liters per minute

A nasal cannula and supplemental oxygen flowing at six liters per minute

A simple face mask and supplemental oxygen flowing at 12 liters per minute

Correct answer: A non-rebreather mask with a reservoir bag and supplemental oxygen flowing at 15 liters per minute

A non-rebreather mask is the preferred method of giving oxygen to patients with suspected or confirmed hypoxia and adequate breathing. A nasal cannula should be reserved for patients who are unable to tolerate a non-rebreather mask.

The appropriate flow of a non-rebreather mask is 10-15 liters per minute, delivering up to 95% oxygen when used with a reservoir bag. A nasal cannula delivers a range of 24% to 44% oxygenation, depending on the flow of supplemental oxygen (the advised range of flow is one to six liters per minute).

A patient in respiratory distress or failure requires artificial ventilation. A bag-valve mask is an adequate method of artificial ventilation and can deliver up to 100% oxygen with supplemental oxygen flowing at 15 liters per minute and a reservoir bag. Ventilations should be given to an adult patient every five seconds and a child patient every three seconds; these rates mimic a normal ventilation rate. A lower rate may not provide adequate oxygenation.

A simple face mask is usually used to deliver a low to moderate amount of oxygen. A simple mask has holes on the sides to let exhaled air through. It can deliver around 40% to 60% oxygen at six to 10 liters per minute.

89.

Which of the following is **not** a sign of labored respiration and inadequate oxygenation?

Vesicular breath sounds

Adventitious breath sounds

Nasal flaring

Inadequate chest expansion

Correct answer: Vesicular breath sounds

Vesicular breath sounds are considered normal and do not indicate any form of respiratory inadequacy, distress, or failure.

Adventitious breath sounds, nasal flaring, and inadequate chest expansion are all indicators of inadequate breathing. Other signs are dyspnea/shortness of breath, altered mental status associated with shallow/slow breathing, anxiousness in an adult patient, listlessness in a pediatric patient, bradypnea/tachypnea, irregular breathing rhythm, decreased or noisy breath sounds, an inability to speak more than a few words between breaths, excessive coughing, the tripod position, breathing through pursed lips, and pale, cool, clammy or cyanotic skin.

90.

A four-year-old child is choking and has a complete foreign body airway obstruction. Which of the following would be the **most** effective removal method?

Abdominal thrusts

Chest compressions

Back blows

Encouraging forceful coughing

Correct answer: Abdominal thrusts

The abdominal thrust (Heimlich) maneuver is recommended for removing severe airway obstructions in responsive adults and children older than one year of age. This technique creates an artificial cough by causing a sudden increase in intrathoracic pressure. If a patient is unresponsive, chest compressions should be initiated. Signs of a severe airway obstruction include a weak or absent cough, decreasing level of consciousness, and cyanosis.

Back blows, with alternating chest thrusts, are reserved for the removal of a foreign body airway obstruction in infants.

A patient who has a complete airway obstruction is unable to cough or move air through the airway.

91.

An oropharyngeal airway is in place of a patient who is attempting to remove it. What is the most appropriate action?

Remove the oropharyngeal airway

Tell the patient loudly that the device is helping them breathe

Restrain the patient and hold the airway in place until they feel calm

Increase the oxygen flow rate being delivered and prepare for suctioning

Correct answer: Remove the oropharyngeal airway

Oropharyngeal airways are contraindicated in conscious patients and patients with an intact gag reflex. This patient is attempting to remove the device, which indicates consciousness and a likely gag reflex. Keeping the oral airway in place may result in vomiting and aspiration. A nasopharyngeal airway is an option for patients who cannot tolerate an oropharyngeal airway.

92.

Which of the following tip color and size combinations are correct for a King LT airway?

Select the 3 answer options which are correct.

Red - Size 4

Yellow - Size 3

Purple - Size 5

White - Size 3

An easy way to identify the size of a King LT airway is by the color of the superior tip. Yellow is a size 3 for a patient 4-5 ft tall, red is a size 4 for a patient 5-6 ft tall, and purple is a size 5 for a patient over 6 ft tall.

White is size 1 for a patient who is 5-12 kg.

93.

Which of the following is **not** a common sign of airway obstruction in an unconscious adult patient?

Rhonchi

Apnea

Gurgling

Stridor

Correct answer: Rhonchi

Airway obstruction can be partial or complete. An inadequate or non-patent airway may result in permanent disability or death. Potential signs of airway obstruction in an unconscious adult patient include noisy breathing (e.g., snoring, bubbling, gurgling, crowing, or stridor), extremely shallow breathing, and apnea. Obvious trauma, blood, or obstructions may be seen on an assessment of the airway.

Rhonchi are low-pitched rattling sounds caused by mucous secretions in the airway. They are commonly heard in patients with chronic obstructive pulmonary disease (COPD), pneumonia, or bronchitis.

94.

Which of the following treatments could an EMT provide for a patient in respiratory distress?

Select the three correct answer options.

Assisting with nebulizer medication administration

Providing high-flow supplemental oxygen

Administering CPAP

Implementing endotracheal intubation

EMTs possess many skills and tools that can be used to treat a patient with respiratory distress. These include providing high-flow supplemental oxygen, providing positive pressure ventilation with a bag-mask device, using airway adjuncts such as an oral or nasal airway, providing CPAP, positioning the patient upright, and assisting with respiratory medication prescribed to the patient such as an albuterol inhaler or a small volume nebulizer.

An EMT is not able to provide endotracheal intubation, as this is an advanced life support skill that a paramedic would perform.

95.

Positive pressure ventilation forces air into the lungs and is used for ineffective or absent breathing. Which of the following can result from positive pressure ventilation?

Select the two correct answer options.

Decreased blood pressure

Decreased blood return to the heart (preload)

Decreased intrathoracic pressure

Decreased afterload

Positive pressure ventilation, which can be delivered by a bag-valve device or ventilator, increases intrathoracic pressure. This creates a pressure gradient that the heart must pump blood against, which elevates afterload (i.e., pressure the heart must pump against).

High intrathoracic pressure from positive pressure ventilation can squeeze the heart and vena cava, which will cause a decrease in venous blood returning to the heart (i.e., preload), blood pressure, and cardiac output.
