

IBSC CCP-C - Quiz Questions with Answers

1. Transport and Safety

1. Transport and Safety

1.

You are transporting a five-year-old female cardiac patient via ground transport to a specialty pediatric facility for emergency heart surgery. Regarding patient safety, you should:

Ensure the patient is secured properly to the stretcher

Always hold onto the top safety bar while standing

Relay all important patient information to the family during transport

Ensure all equipment is at arm's length for quick access

Correct answer: Ensure the patient is secured properly to the stretcher

The Agency for Healthcare Research and Quality (AHRQ) provides the following definition for patient safety: Patient safety is a discipline in the health care sector that applies safety science methods toward the goal of achieving a trustworthy system of health care delivery. Patient safety is also an attribute of health care systems: it minimizes the incidence and impact of, and maximizes recovery from, adverse effects.

The Critical Care Transport Paramedic (CCTP) must ensure patient safety. Ensuring the patient is secured properly to the stretcher is of the utmost importance.

It is recommended to secure yourself to the best of your ability while moving around during transport. Holding on to the top safety bar is a good choice but is not the top priority in addressing patient safety.

Relaying patient information to the family is not the responsibility of the CCTP during patient transport. The CCTP may certainly share patient information if allowed and time permits.

Ensuring all equipment is within arm's reach is a great idea but not a priority in patient safety.

2.

Wilderness rescues require extra planning, training, and specialized equipment. When preparing to respond to a hiker down in the woods, it's good to review the mnemonic, TOMAS. What does the *M* stand for?

Method

Material

Mastery

Mentality

Correct answer: Method

Method consists of the type of location and insertion, landing near or far from the patient, and the hover load.

The mnemonic TOMAS is helpful with planning and safety for a wilderness rescue.

- *T - Terrain*
- *O - Obstacles*
- *M - Method*
- *A - Alternatives*
- *S - Safety*

The other answer options are incorrect.

3.

A patient in the local hospital is evaluated for an abdominal aortic aneurysm. The patient is unstable and requires surgery, which is unavailable in the current hospital. The on-call physician refuses to come in to see the patient. When you arrive to transfer the patient to the receiving facility, the nurses share with you what happened and verbalize their disgust with their on-call physician.

Under the rules of EMTALA, what must the hospital do?

Follow the remaining rules of EMTALA, complete the patient transfer, and follow up with an internal investigation

Contact the receiving hospital to cancel the patient transfer due to physician non-compliance

Cancel the patient transfer and continue contacting the on-call physician until the physician comes to evaluate the patient

Immediately contact the hospital CEO and demand an internal investigation of the on-call physician

Correct answer: Follow the remaining rules of EMTALA, complete the patient transfer, and follow up with an internal investigation

Several EMTALA investigations are initiated because on-call physicians refuse to come in person to evaluate a patient or negate to stabilize the patient prior to transfer. It is expected that on-call physicians physically evaluate and treat their patients, but if the physician refuses, the hospital must document the refusal in the patient's records and hospital transfer paperwork. If the on-call physician refuses to physically examine the patient, the hospital staff must continue to follow the remaining EMTALA regulations, complete the patient transfer, and then follow up with an internal investigation.

Although the on-call sending physician has not physically evaluated the patient, the patient transfer process can still continue and does not have to be transferred due to physician non-compliance.

Also, definitive patient care must not be delayed because of the on-call physician not being present physically. This patient requires surgical intervention and should not remain in a facility that cannot provide the surgery while waiting for the hospital to convince the physician to come in to evaluate the patient.

The hospital must not delay the patient transfer to contact the CEO and complete an investigation. These actions can be performed after the patient transfer has been completed.

4.

Your adult patient diagnosed with acute respiratory distress syndrome (ARDS) is currently on a mechanical ventilator with the following setting: Vt 6 mL/kg of predicted body weight, PEEP 10 cmH₂O, and FiO₂ of 0.6. Despite these settings, the patient's oxygenation remains poor with a PaO₂ of 55 mmHg.

What is the most appropriate next step in managing this patient?

Increase the PEEP to 15 cmH₂O

Increase the FiO₂ to 1.0

Increase the tidal volume to 8 mL/kg of predicted body weight

Administer a recruitment maneuver

Correct answer: Increase the PEEP to 15 cmH₂O

Acute Respiratory Distress Syndrome (ARDS) is a severe form of acute respiratory failure characterized by diffuse alveolar damage, leading to impaired gas exchange and severe hypoxemia. Management typically involves mechanical ventilation with lung-protective strategies to minimize ventilator-induced lung injury. Increasing the PEEP to 15 cmH₂O helps recruit collapsed alveoli, improve lung compliance, and maintain alveolar recruitment.

Increasing the FiO₂ to 1.0 may improve oxygenation temporarily; however, it is not the most appropriate next step, as the patient is already receiving a high FiO₂.

Increasing the tidal volume to 8 mL/kg of predicted body weight is not recommended in ARDS management. Increasing tidal volume may exacerbate lung injury and should be avoided.

Administering a recruitment maneuver involves briefly increasing airway pressure to open collapsed alveoli and recruit additional lung volume.

5.

Which of the following is the accrediting body for medical transport systems?

CAMTS

CAAHEP

JCAHO

AAMS

Correct Answer: CAMTS

CAMTS, or the Commission for Accreditation of Medical Transport Systems, began in 1990 and is the premier accreditation body for the aeromedical industry. CAMTS works to ensure the safety of patients and crew members are at the forefront of all air medical transport companies.

CAAHEP is the Commission on Accreditation of Allied Health Education Programs and is the accrediting body of several medical education programs, such as paramedic programs.

JCAHO is the Joint Commission on Accreditation of Healthcare Organizations. JCAHO excels in the accreditation of hospitals.

AAMS is the Association of Air Medical Services and promotes a culture of safety in the field of transport medicine.

6.

You are dispatched to the scene of a car versus truck accident on the highway. Upon your arrival at the scene, you find a tanker truck on its side with thick, white smoke billowing out of the trailer. You are unable to visualize any placards. The truck driver is lying prone approximately 30 feet on the backside of the truck.

You should do which of the following?

Park uphill and upwind and stage back until haz-mat arrives

Rapidly remove the driver from the scene to your ambulance

Proceed as normal, as white smoke is not harmful

Call the company of the wrecked truck and inform them of the accident

Correct answer: Park uphill and upwind and stage back until haz-mat arrives

The white smoke can most definitely be harmful, and you should not proceed on to the scene without knowledge of what the truck was hauling, proper protection, and haz-mat training. It is recommended to park your ambulance uphill and upwind and stage back until trained help arrives.

Do not step on the scene to remove the driver until the scene has been deemed safe. You must protect yourself first and your partner second. You are no good to the patient if you are harmed by the fumes.

Unless you can visualize the truck's placards and/or know exactly what the truck was hauling, you cannot assume the white smoke is harmless. Do not take chances.

Your first action is not to contact the truck's company. This can be done after the scene is assessed and cleared and the patient is treated and transported.

7.

You are completing an interfacility transfer of a 37-year-old cardiac patient. Per requirement, you must obtain the form required by insurers for reimbursement. This form must be signed and represent the patient's condition at the time of transport. Which of the following is the correct name of the form?

Physician Certification Statement

History and Physical

Physician Specialty Notes

Transport Certification Statement

Correct answer: Physician Certification Statement

The Physician Certification Statement, also known as the medical necessity certification statement, is required on all inter-facility transfers. The form provides the reason for transfer, the transfer risks, the treatment and monitoring required by the patient, and the patient's condition at the time of transport.

The History and Physical (H&P) accompanies all patient paperwork and provides a detailed record of the patient's medical history and current physical status. The H&P is not required for reimbursement and provides valuable information to the healthcare team during transport.

Physician Specialty Notes are an objective resource that can be used by the critical care transport paramedic to help guide patient assessment.

Transport Certification Statement is a fictional term.

8.

According to OSHA regulations, hearing protection is required for employees exposed to average noise levels of 85 dB or greater. What is the average sound level produced by a running helicopter?

90-100 dB

150-200 dB

75-85 dB

120-140 dB

Correct answer: 90-100 dB

Hearing protection must be provided to employees if the average noise levels are 85 dB or greater. Because the average noise level of a running helicopter is 90-100 dB, HEMS employers are required to provide hearing protection. Hearing protection includes ear plugs, ear muffs, and flight helmets.

The other answer options are incorrect.

9.

You are preparing to complete an inter-facility transfer of a 72-year-old male cardiac patient. According to EMTALA, which of the following must be transferred with the patient from the sending facility to the receiving facility?

Patient assessment findings

A printed copy of the medical chart

The patient's belongings

Payment agreement statement

Correct answer: Patient assessment findings

The Emergency Medical Treatment and Active Labor Act (EMTALA) was passed by Congress in 1986. The federal law ensures patients receive emergency medical care at an Emergency Department (ED) and prevents hospitals from transferring patients regardless of insurance status or ability to pay for services. EMTALA provides transfer obligations for healthcare teams providing inter-facility transfers. Patient assessment findings are a requirement for the sending facility to send to the receiving facility.

The patient's medical chart is required to be sent, but it does not have to be a printed copy. An electronic patient chart is acceptable.

The patient's belongings should be sent with the patient, but it is not an EMTALA requirement.

A payment agreement statement is not a required document under EMTALA regulations.

10.

During a patient flight, in an unpressurized cabin, the temperature continues to drop as the aircraft climbs higher in elevation. Because of this, patients may need extra blankets to maintain normal body temperature. This is expressed by which gas law?

Gay-Lussac's Law

Fick's Law

Henry's Law

Graham's Law

Correct answer: Gay-Lussac's Law

Gay-Lussac's Law is expressed as $P_1/T_1 = P_2/T_2$, where V and n are always constant. Gay-Lussac's Law refers to pressure and temperature and states that the pressure of a gas is directly proportional to the absolute temperature for a constant amount of gas. As the aircraft climbs higher, the temperature tends to drop and become cooler.

Fick's Law is commonly used in ventilator management in reference to oxygenation. It states that the diffusion rate of a gas is proportional to the concentration gradient.

Henry's Law refers to the solubility of gases in liquids. The law states the quantity of gas dissolved in liquid is proportional to the partial pressure of the gas in contact with the liquid.

Graham's Law is another law of diffusion. It states that lower molecular weights will dissolve faster and gases with higher solubility remain in liquids longer.

11.

Which of the following gas laws demonstrates how increasing altitude causes a proportional decrease in the partial pressure of the gas without altering the percentage concentration of the gas?

Dalton's Law

Charles' Law

Fick's Law

Henry's Law

Correct answer: Dalton's Law

Dalton's Law states that each individual gas present in a mixture exerts a partial pressure that when summed equals the total pressure of the gas. Dalton's Law is expressed as:

$$P = P_1 + P_2 + P_3 \dots P_n$$

As altitude increases, the partial pressure decreases, which explains why supplemental oxygen is required at higher altitudes.

Charles' Law states when pressure is constant, the volume of a gas is very nearly proportional to its absolute temperature. It describes how aircraft is affected by atmospheric temperatures.

Fick's Law is a law of diffusion. Fick's Law concludes that the diffusion of a gas is proportional to the difference in partial pressure and a membrane's surface area.

Henry's Law states the quantity of gas dissolved in a liquid is proportional to the partial pressure of the gas in contact with the liquid.

12.

When examining the effects of hypoxia, within air transport, there are four stages of hypoxia that are divided by altitude. The compensatory stage, which is the second stage, occurs at which atmospheric height?

10,000 - 15,000 feet

3,000 - 8,000 feet

15,000 - 20,000 feet

5,000 - 10,000 feet

Correct answer: 10,000 - 15,000 feet

The four stages of hypoxia are divided by altitude. 10,000 - 15,000 feet is the second stage.

The stages are as follows:

- 1. The first stage, also known as the indifferent stage, is sea level to 10,000 feet.*
 - 2. The second stage, the compensatory stage, extends from 10,000 to 15,000 feet.*
 - 3. The third stage, known as the disturbance stage, measures 15,000 to 20,000 feet.*
 - 4. The fourth stage, the critical stage, extends from 20,000 to 30,000 feet.*
-

13.

Critical care air transport provides many benefits for patients, but there is also a list of relative contraindications that accompany air transport. Which of the following patients is a relative contraindication to air transport?

64-year-old male with unstable atrial fibrillation uncontrolled with diltiazem

24-year-old female, 22 weeks pregnant, with a hypertensive crisis

46-year-old female 3-weeks post-Chiari malformation decompression surgery

55-year-old male, intubated and in left-sided heart failure

Correct answer: 64-year-old male with unstable atrial fibrillation uncontrolled with diltiazem

Recent history has proven that air medical transport has been shown to decrease mortality rates and provide access to more specialized medical facilities for patients who would otherwise not have access. Even with all the benefits of air medical transport, there are a handful of relative contraindications that require a risk-benefit analysis.

- *Severe anemia*
- *Uncontrolled, unstable arrhythmias*
- *Recent optical globe surgery*
- *Pregnancies further than 24-weeks gestation*
- *Nonacute hypovolemia*
- *Recent MI within 10 days or MI complications within five days of the flight*

The patients described in the other answer options may benefit from air medical transport.

14.

You are transferring a critical pediatric patient to a specialized pediatric trauma center. According to EMTALA, the sending physician is in charge of the patient until which of the following?

The patient arrives at the next facility

The transport team leaves the sending facility

The transport team travels past the halfway point to the next facility

The patient is turned over to the transport team

Correct answer: The patient arrives at the next facility

Emergency Medical Treatment and Active Labor Act (EMTALA) is a part of COBRA and states that an emergency physician must act if someone requires emergency care to sustain life or is actively giving birth. On patient transfers, EMTALA requires and states that the sending physician is responsible for the patient being transferred until the patient arrives at the next facility.

If the transfer team needs to contact medical control, it is recommended to call the sending physician.

If the transport team needs to detour to another hospital due to a patient emergency, the sending physician is responsible for the patient until the patient arrives at the new facility.

15.

Crew Resource Management (CRM) began in the 1970s in the airline industry. One safety concept of CRM, in which all crew members must play an equal role, is the decision of:

Flight acceptance

To hot fuel or cold fuel

Landing zone quality

Flight altitude increase

Correct answer: Flight acceptance

Crew resource management began in 1977 in response to the crash of a Pan American commercial flight in the Canary islands. CRM focuses on the interpersonal and cognitive skills of maintaining a safe flight and the concept of maintaining situational awareness. CRM allows for all crew members to play an active role in the decision-making process, although it does not imply that all decisions are made without rank consideration.

Of the following, all crew members must play an active role in the decision on whether to accept a flight. The pilot must perform weather checks and completely assess the situation prior to flight acceptance, but medical crew members also play an active role in flight acceptance. The term all to go, one to say no is a common rule followed by most flight medical providers when determining flight acceptance.

The decision to hot fuel or cold fuel, landing zone quality, and altitude of flight are all decisions made by the pilot. The pilot may converse with the crew members about these decisions, but the ultimate decision is made by the pilot.

16.

Spatial disorientation is responsible for a large percentage of aviation crashes that end in fatalities. Which type of spatial disorientation occurs when the pilot experiences an overwhelming sensation of movement and is unable to regain spatial awareness?

Type III spatial disorientation

Type IV spatial disorientation

Type I spatial disorientation

Type II spatial disorientation

Correct answer: Type III spatial disorientation

Spatial disorientation occurs when an individual experiences a misunderstanding of their body's position with respect to the earth. There are three types of spatial disorientation: Type I, Type II, and Type III. Type III occurs when the pilot is unable to regain spatial awareness due to the illusion of intense movement.

Type I occurs when the pilot's senses confirm the experience is real, and the pilot is unaware that spatial disorientation is occurring. For example, the pilot may fly into the side of a mountain without even realizing where the aircraft is heading.

With Type II spatial disorientation, the pilot initially senses a problem but does not recognize the beginnings of spatial disorientation.

Type IV spatial disorientation is a fictitious term.

17.

You are transporting a patient in respiratory failure with a history of HIV. Which of the following is the most important initial step to ensure the safety of both the patient and the paramedic?

Implement infection control measures, including the use of PPE

Initiate IV antibiotics to treat potential opportunistic infections

Intubate the patient immediately to secure the airway

Administer high-flow oxygen via non-rebreather mask

Correct answer: Implement infection control measures, including the use of PPE

When transporting a patient with HIV in respiratory failure, the most critical initial step is to ensure the safety of both the patient and the paramedic. Implementing strict infection control measures, including the use of Personal Protective Equipment (PPE), is essential for the following reasons:

- *protection of healthcare providers*
- *prevention of nosocomial infections*
- *adherence to standard precautions*

Initiating IV antibiotics can be crucial for treating opportunistic infections in an HIV patient, but it is not the immediate priority before ensuring a safe working environment for the paramedic.

Intubation may indeed be necessary to secure the airway in respiratory failure, but it poses significant exposure risks. Without first implementing PPE and infection control measures, it could endanger the healthcare provider.

Administering high-flow oxygen via a non-rebreather mask is important for a patient in respiratory failure, but it is not the most critical initial step if the paramedic and patient safety measures are not first ensured.

18.

The time is 2323, and you and your crew have been notified of an emergency patient scene flight in a small rural town. Your pilot will need to land in a large grassy field located near the patient. What is the recommended landing zone size for this flight?

125 x 125 feet

75 x 75 feet

50 x 50 feet

50 x 100 feet

Correct answer: 125 x 125 feet

Since this flight occurs at night, the recommended size for a landing zone is 125 x 125 feet. The recommended landing zone size for daytime hours is 75 x 75 feet. The ultimate decision-maker of all landing zones is the pilot of the aircraft. It is important for the pilot and the ground crew to be able to communicate when landing and taking off.

19.

Altitude physiology highlights the concepts of gas laws. All the following are variables that affect gas volumetric relationships, except:

Relative velocity

Temperature

Volume

Relative mass

Correct answer: Relative velocity

All flight medical providers must possess a thorough knowledge of altitude physiology and the negative effects it can have on patients. There are four basic variables that interfere with gas volumetric relationships. The variables are temperature, relative mass, volume, and pressure. Relative velocity is not a variable of altitude physiology. Relative velocity is the velocity of an object relative to another object by an observer.

Temperature is expressed in kelvin (K) and indicates the level of energy of a gas. Relative mass is measured in gram molecules. Volume is interpreted by cubic units. Pressure is expressed in atmospheres (torr).

20.

During patient flights on a helicopter, there is a decrease in humidity that can cause chapped lips and a sore throat. Patients receiving in-flight oxygen therapy are twice as susceptible to what complication because of the humidity decrease?

Dehydration

Barodontalgia

Abdominal gas pains

Barotitis media

Correct answer: Dehydration

Temperature is inversely proportional to altitude, so as the transport helicopter climbs higher, there is a decrease in atmospheric temperature, which leads to a decrease in humidity. Before long, the only moisture remaining in the aircraft cabin is produced by the aircrew, patient, and the aircraft's fresh-air system. The decrease in humidity can produce dehydration in everyone on board. Patients receiving in-flight oxygen double the risk of dehydration because oxygen is a drying agent. It is recommended to use humidified oxygen on long air transports.

Barodontalgia is a toothache caused by the alternating barometric pressures during flight. Gas pains do occur during flight, but they are not caused by the humidity decrease.

Abdominal gas pains occur because the changes in barometric pressures directly affect the gases located in the body.

Barotitis media is an earache caused by a change in atmospheric pressure. The increasing pressure can result in a failure of the middle ear space to ventilate properly.

21.

While on shift at your flight service, you have been experiencing some sinus pressure and congestion. You have been dispatched to a two-vehicle MVC and begin your flight to the scene. Once in the air, your head begins to hurt, and you have sharp pains shooting through your face. Within minutes, your nose begins to bleed.

What is the most likely cause of these symptoms?

Barosinusitis

Barodontalgia

Barotitis Media

Barocongestion

Correct answer: Barosinusitis

Barosinusitis is the inflammation of one or more paranasal sinuses due to the pressure gradient between the atmosphere and the sinus cavity. This can occur on both ascent and descent. Barosinusitis is generally uncommon but primarily affects the frontal sinuses when it occurs. Epistaxis is a common symptom that occurs after the rupture of the sinus membranes.

Barodontalgia is nicknamed flyer's toothache. Barodontalgia only occurs on ascent and occurs primarily because of Boyle's Law. Air bubbles trapped with an individual's tooth fillings expand and cause pain and pressure. This is common in divers and military pilots because of the severe rapid changes in pressure.

Barotitis Media occurs only on descent and is a common gas-trapping problem. Barotitis Media is air trapping in the middle ear that is unable to vent through the blocked eustachian tube. This problem occurs in individuals with a head cold.

Barocongestion is a fictional term.

22.

During takeoff, landing, and any critical phases of the flight, this communication technique supersedes all conversations within the helicopter. What is the term for this communication technique?

Sterile cockpit

Cockpit cessation

Closed-loop communication

Mission critical rules

Correct answer: Sterile cockpit

Sterile cockpit is the communication technique, instituted by the pilot-in-command, to cease all talking within the aircraft. This occurs during takeoff, landing, and other critical phases of the flight. This is especially important during any type of flight emergency. The pilot-in-command can call for a sterile cockpit at anytime.

Closed loop communication involves the person receiving the message repeating the information to ensure understanding. Cockpit cessation and mission critical rules are fictional terms.

23.

All the following regarding the use of NVGs during air medical transport missions are correct except for which one?

Wearing NVGs does not increase the weight of the flight helmet

Both pilot and medical crew members typically wear NVGs during night transport missions

A small laser pointing at an aircraft can cause significant eye damage to someone wearing NVGs

NVGs use an electronic system to improve night visibility

Correct answer: Wearing NVGs does not increase the weight of the flight helmet

Wearing NVGs improves safety by multiplying light up to 5,000 times. The use of NVGs by Helicopter Emergency Medical Service (HEMS) crews has increased rapidly in the last few years after many years of usage by military pilots. However, there is some added weight to the flight helmet as well as a decrease in depth perception and peripheral vision.

The use of rotating strobe-type lights on the ground at Landing Zones (LZ) during taking off and landing should be minimized.

Lights should never be directed at the aircraft during night transport missions. Overhead lighting of LZs is not advisable, as it tends to erode the perimeter lighting used to mark off the LZ.

It is most common for both the pilot and members of the medical team, or at minimum one member, to wear NVGs during night transport missions.

24.

Malpractice is based on a professional standard of care and the professional attributes of the caregiver. There must be six elements of malpractice present to prove malpractice. All the following are elements of malpractice, except:

Vicarious liability

Presence of duty

Breach of duty

Causation

Correct answer: Vicarious liability

Vicarious liability is the term used to describe one person guilty of an action because of the actions of another individual.

To prove malpractice, six elements must be present. These elements are:

- *Presence of duty*
 - *Breach of duty*
 - *Causation*
 - *Foreseeability*
 - *Injury*
 - *Damages*
-

2. Airway, Anesthesia, and Analgesics

2. Airway, Anesthesia, and Analgesics

25.

Ventilator-induced lung injury can occur in patients on mechanical ventilation. It is most common in patients with ARDS, COPD, and asthma, all of which are associated with high transpulmonary pressures (TPP). What is the formula for calculating transpulmonary pressure?

Alveolar pressure - pleural pressure = TPP

$(PaCO_2 - PECO_2) / PaCO_2 = TPP$

$\text{Respiratory Rate} \times (\text{Tidal Volume} - \text{Deadspace}) = TPP$

$\text{Change in pressure} \times \text{change in volume} = TPP$

Correct answer: Alveolar pressure - pleural pressure = TPP

TransPulmonary Pressure (TPP) is calculated using the following formula: Alveolar Pressure (AP) - Pleural Pressure (PP).

$(PaCO_2 - PECO_2) / PaCO_2$ is the formula used to calculate dead space.

Respiratory rate x (Tidal Volume - Deadspace) is the formula used to calculate alveolar minute ventilation.

Change in pressure X change in volume is the formula to calculate the work of breathing.

26.

The larynx consists of three single cartilages and six paired cartilages. Which of the single cartilages is formed by the fusing of two curving cartilage plates to make it the largest of the cartilages?

Thyroid cartilage

Cricoid cartilage

Epiglottis

Arytenoids

Correct answer: Thyroid cartilage

The three single cartilages of the larynx are the thyroid cartilage, the cricoid cartilage, and the epiglottis. The largest of the three single cartilages is the thyroid cartilage. It is nicknamed the Adam's Apple, and its primary job is to protect the vocal cords.

The cricoid cartilage is located below the thyroid cartilage and connected by the cricothyroid membrane. The cricoid cartilage is the location for a cricothyrotomy.

The epiglottis is the third single cartilage and is located over the glottic opening. The epiglottis serves as a primary landmark when intubating.

The arytenoids are a paired cartilage and provide an anchor for the vocal cords.

27.

A 45-year-old male with a history of COPD is admitted to the ICU with severe pneumonia and ARDS. He is intubated and placed on mechanical ventilation.

Which of the following is the most appropriate approach to setting PEEP on the ventilator for this patient?

Set PEEP based on the ARDSnet protocol, starting at 5 cm H₂O and titrating upward

Set PEEP at 5 cm H₂O to avoid barotrauma

Set PEEP at 10 cm H₂O immediately to maximize alveolar recruitment

Avoid using PEEP to prevent hyperinflation in COPD

Correct answer: Set PEEP based on the ARDSnet protocol, starting at 5 cm H₂O and titrating upward

Setting the appropriate PEEP on the ventilator is crucial for managing patients with ARDS, especially those with underlying conditions like COPD. The Acute Respiratory Distress Syndrome Network (ARDSnet) protocol provides evidence-based guidelines for optimizing PEEP to improve oxygenation and prevent ventilator-induced lung injury. The ARDSnet protocol recommends starting PEEP at 5 cm H₂O and titrating based on oxygenation targets and patient response. Adjust PEEP to achieve optimal oxygenation with the lowest possible FiO₂ (fraction of inspired oxygen), typically aiming for PaO₂ of 55-80 mm Hg or SpO₂ of 88-95%.

Starting at 5 cm H₂O is reasonable, but avoiding titration upward based on patient response is not optimal for managing ARDS.

While higher PEEP may be necessary, starting immediately at 10 cm H₂O without titration could increase the risk of barotrauma.

Avoiding PEEP entirely can worsen oxygenation and atelectasis. Careful titration is essential.

28.

You are treating a 12-year-old male with vomiting and a decreased level of consciousness. The patient's respirations are rapid and deep, and he is lethargic and irritable in response to stimulation. He has poor skin turgor and dry mucous membranes. His mother states he has a one week history of polyuria and weight loss. The patient's ABG results are pH 7.25, PaO₂ 90 mm Hg, PaCO₂ 23 mm Hg, and HCO₃ 12 mmol/L.

What do the ABG results show?

Partially compensated, metabolic acidosis

Uncompensated metabolic alkalosis

Uncompensated respiratory acidosis

Compensated respiratory acidosis

Correct answer: Partially compensated, metabolic acidosis

The patient is exhibiting signs and symptoms of diabetic ketoacidosis, and the ABG results show partially compensated metabolic acidosis. The patient's pH is 7.25, which is acidotic. The patient's HCO₃ is considerably low, making this a metabolic issue, and the CO₂ is low, representing partial compensation.

Uncompensated metabolic alkalosis would have an elevated pH and an elevated HCO₃ with an abnormal PCO₂. Uncompensated respiratory acidosis would have a lower pH, elevated PCO₂, and a normal HCO₃. Compensated respiratory acidosis would have an abnormal HCO₃.

29.

You are treating a four-year-old female in respiratory distress. She has a pulse oximetry of 90% and a fever of 101°. The patient is lethargic and responsive only to verbal stimuli. Which of the following would cause suspicion of a lower airway obstruction?

Bronchovesicular wheezes

Stridor

Drooling

Vesicular breath sounds

Correct answer: Bronchovesicular wheezes

Bronchovesicular wheezes are indicative of lower airway obstruction, most commonly bronchospasm. The patient may have a history of asthma, which makes her susceptible to respiratory infections.

Stridor and drooling are both related to upper airway sounds. Stridor is common in pediatric patients with croup or a foreign body airway obstruction.

Vesicular breath sounds are normal breath sounds. Inspiratory sounds are longer than expiratory sounds.

30.

Which of the following ventilator modes can help reduce the risk of Ventilator Induced Lung Injury (VILI) during air medical transport?

Pressure-controlled ventilation

Pressure-regulated volume-controlled ventilation

Volume-controlled pressure-variable ventilation

Pressure-support ventilation

Correct answer: Pressure-controlled ventilation

In pressure-controlled ventilation mode, the ventilator delivers an inspiratory breath to the patient but only to a preset level of pressure. In addition, the healthcare provider is responsible for setting the rate of ventilations delivered by the ventilator as well as the length of time it will take for the ventilator to deliver the ventilation. Once the interval time of inspiration (rise time) has been met, the ventilator ceases delivery of the breath and exhalation begins.

The Tidal Volume (V_t) delivered is dependent upon the patient's lung compliance and resistance. The main advantage of using a pressure-controlled ventilation mode is that it can prevent the development of barotrauma, as the pressure limits that are set can obviously be set using lower pressure parameters

In pressure-regulated volume-controlled ventilation, the ventilator works to achieve a tidal volume at the lowest possible airway pressure.

In volume-controlled pressure-variable ventilation, airway pressure increases in response to reduced compliance.

In pressure-support ventilation, spontaneous breaths are matched or supported.

31.

You have arrived at a small ER to transfer a 32-year-old female with a head injury. The patient has been intubated, and the ER staff have been providing positive pressure ventilations via bag-mask for 45 minutes prior to your arrival. While receiving the report from the RN, you note the ER staff member is ventilating the patient at a rate of 32 breaths/min. The patient's BP has decreased from 128/78 to 98/64, and the ETCO₂ is 24 mmHg.

Which of the following should you suspect may be happening?

Auto-PEEP

Oxygen toxicity

Hemothorax

Ventilator-associated pneumonia

Correct answer: Auto-PEEP

Rapid ventilation is the primary cause of auto-PEEP. Auto-PEEP is caused by air-trapping from rapid ventilation preventing expiration before initiation of the next ventilation. A drop in blood pressure and decreasing ETCO₂ are both signs of auto-PEEP.

Oxygen toxicity is caused by the production of oxygen-free radicals and can occur with higher than normal FiO₂ settings over a long period of time.

A hemothorax would not occur spontaneously, such as a pneumothorax. A hemothorax is typically caused by blunt trauma.

Ventilator-Associated Pneumonia (VAP) can occur after prolonged ventilation, which has not been achieved in 45 minutes.

32.

You determine that your 54-year-old male patient is a difficult airway patient. You are providing bag-mask ventilations with 100% oxygen and cannot maintain pulse oximetry above 90%. What is your next step?

Begin the failed airway algorithm

Consider Blind Nasotracheal Intubation (BNTI)

Perform a surgical cricothyrotomy

Continue manual ventilations until SpO₂ rises above 90%

Correct answer: Begin the failed airway algorithm

The Failed Airway algorithm is activated when you are unable to effectively oxygenate and ventilate your patient during attempts at airway management. According to the Difficult Airway algorithm, if the clinician is unable to maintain SpO₂ at or above 90% with bag-mask ventilation, then the next step is to enact the Failed Airway algorithm.

According to the Failed Airway algorithm, the clinician should consider BNTI if the clinician can successfully maintain SpO₂ at or above 90% with bag-mask ventilation.

A surgical cricothyrotomy is performed when standard means of airway management are unsuccessful. This occurs in the Failed Airway algorithm when the clinician is unable to place a supraglottic airway.

It is not recommended in the Difficult or Failed Airway algorithms to continue bag-mask ventilations until SpO₂ possibly rises at or above 90%.

33.

A 45-year-old female with sepsis has developed Disseminated Intravascular Coagulation (DIC). She now requires urgent intubation due to worsening respiratory failure.

Which of the following is the most appropriate consideration for performing video-assisted intubation in this patient?

Ensure the availability of a surgical airway kit due to potential complications

Use a large-bore endotracheal tube to facilitate suctioning

Avoid video-assisted intubation due to increased bleeding risk

Administer a high dose of a paralytic agent to minimize movement

Correct answer: Ensure the availability of a surgical airway kit due to potential complications.

Intubating a patient with Disseminated Intravascular Coagulation (DIC) presents unique challenges due to the increased risk of bleeding and potential for difficult airway management. Video laryngoscopy provides improved visualization of the vocal cords and surrounding structures, potentially reducing the risk of trauma compared to traditional direct laryngoscopy. Increased first-pass success rate is crucial in critically ill patients to minimize repeated attempts and associated complications.

While suctioning is important, using a large-bore tube may not be necessary and could increase the risk of trauma.

Video-assisted intubation actually helps in reducing trauma and associated bleeding by providing better visualization and control during the procedure.

Paralytic agents are necessary, but the dose should be appropriate to the patient's condition. High doses are not specifically required and may have adverse effects.

34.

You are transporting a 68-year-old male patient weighing 98 kg with severe COPD exacerbation and a recent history of upper gastrointestinal bleeding. During transport, your patient experiences a decrease in mental status, and his respirations are slow and shallow. You prepare to perform rapid sequence intubation on this patient.

Which of the following plans is most appropriate for this patient, considering the need to minimize respiratory depression while ensuring adequate sedation and analgesia?

Fentanyl 100 mcg IV and Propofol 196 mg IV for induction and sedation and Rocuronium 98 mg IV for post-intubation

Fentanyl 250 mcg IV and Versed 10 mg IV for induction and Succinylcholine 100 mg for post intubation

Ketamine 98 mg IV and Versed 4 mg IV, and avoid paralytics due to the patient's COPD exacerbation

Morphine 10 mg IV and Ativan 2 mg and avoid paralytics to monitor spontaneous breathing efforts

Correct answer: Fentanyl 100 mcg IV and Propofol 196 mg IV for induction and sedation and Rocuronium 98 mg IV for post-intubation

The dose of fentanyl is 50-250 mcg (1-2.5 mcg/kg) and the dose of propofol is 2-2.5 mg/kg for induction and sedation. After the patient is intubated, it is recommended to administer a longer-acting paralytic, such as rocuronium. The dose of rocuronium is 0.5-1 mg/kg, making 98 mg an appropriate dose for this patient.

The dose of versed is 0.5-2 mg, which makes 10 mg too large of a dose for this patient. Also, succinylcholine is not recommended for post-intubation because of its short duration of effect.

The dosage of ketamine is 1-2 mg/kg, which makes 98 mg the correct dose for this patient, but it is not indicated to withhold paralytics due to COPD exacerbation. Paralytics should still be administered.

The correct dose of morphine is 1-2 mg/kg, but fentanyl is preferred over morphine. Fentanyl has greater lipid solubility and less histamine release, which creates a faster onset. Paralytics should not be withheld in this patient.

35.

What important airway structure anchors the vocal cords in the larynx?

Arytenoids

Epiglottis

Cuneiform

Corniculate

Correct answer: Arytenoids

The most important paired cartilages of the larynx are the arytenoids. These structures anchor the vocal cords in the larynx. They are a unique pyramid shape.

The epiglottis is a single cartilage that lies directly over the glottic opening. It is spoon-shaped and prevents anything but air from entering the trachea.

The cuneiform are small cartilages that support the epiglottis and vocal cords.

The corniculate sit on top of the arytenoid cartilage.

36.

All the following are contraindications for nasotracheal intubation, except which one?

Fractured mandible

Basilar skull fracture

Acute epiglottitis

Anticoagulation therapy

Correct answer: Fractured mandible

A fractured mandible may be a contraindication in orotracheal intubation, depending on degree of fracture. It is an indication of nasotracheal intubation.

Contraindications for nasotracheal intubation are the following:

- *Suspected basilar skull fracture*
 - *Acute epiglottitis*
 - *Anticoagulation therapy or other coagulopathies*
 - *Severe nasal or maxillofacial fractures*
 - *Upper airway foreign body, abscess, or tumor*
-

37.

Fentanyl is often used in the induction phase of rapid sequence intubation (RSI) and delayed sequence intubation (DSI). In doses greater than 5 mcg/kg and more commonly in neonates and pediatrics, what effect can Fentanyl cause that impedes ventilation?

Chest wall rigidity

Bronchospasms

Increase in histamine release

Decrease in surfactant

Correct answer: Chest wall rigidity

Although it is more associated with administration rate and higher than normal therapeutic doses, Fentanyl may cause chest wall rigidity, which can make ventilation difficult and possibly impossible. It is more common in neonatal and pediatric patients than in adult patients.

Fentanyl does not cause bronchospasm, a histamine release, or a decrease in surfactant.

38.

You are dispatched to a local restaurant for an adult male choking. You arrive to find the patient unresponsive and lying supine on the floor. Your partner attempts to ventilate the patient via a bag-mask device but is unsuccessful. You re-open the airway and ensure the correct position but are still unsuccessful with assisted ventilations.

You should do which of the following?

Begin chest compressions and visualize the airway with direct laryngoscopy

Provide abdominal thrusts and manual ventilations

Suction the airway and begin chest compressions

Perform a needle cricothyrotomy and ventilate

Correct answer: Begin chest compressions and visualize the airway with direct laryngoscopy

When a patient is suffering from a foreign body airway obstruction, it is important to follow AHA guidelines for the choking adult. Once the patient becomes unresponsive and not breathing, you must begin chest compressions. If chest compressions are not successful, the airway must be visualized via direct laryngoscopy in hopes of removing the foreign body with Magill forceps.

Abdominal thrusts are not indicated because the patient is unresponsive.

Suctioning the airway will not work, as the foreign body is obviously further down in the airway.

A needle cricothyrotomy is a last-ditch effort intervention, which is not indicated in this patient because the next step is direct laryngoscopy.

39.

Which of the following interventions is a cornerstone in the management of a patient with esophageal varices?

Initiation of beta-blockers to reduce portal pressure

Administering high doses of antacids to reduce gastric acid secretion

Performing a liver biopsy to confirm the diagnosis

Surgical resection of the varices for immediate symptom relief

Correct answer: Initiation of beta-blockers to reduce portal pressure

Esophageal varices are a serious complication of portal hypertension, often associated with liver cirrhosis. The primary goal in managing esophageal varices is to prevent bleeding episodes and reduce the risk of mortality. Beta blockers help to reduce portal pressure by decreasing cardiac output and splanchnic blood flow.

Reducing gastric acid secretion does not improve esophageal varices.

Performing a liver biopsy is not indicated, as an ultrasound is used to measure scarring in the liver in conjunction with esophageal varices.

Surgical resection of the varices is not a treatment priority. Beta blockers and possible endoscopic band ligation are the treatment priorities in the management of esophageal varices.

40.

You are treating a 48-year-old male with a history of coronary artery disease, who presents with a new onset of severe difficulty breathing. His respirations are labored with accessory muscle use and a respiratory rate of 60/min. When assessing waveform capnography you note very low amplitude waves at a value of 10 mmHg.

What should you suspect?

Pulmonary embolism

Tension pneumothorax

Asthma exacerbation

Respiratory alkalosis

Correct answer: Pulmonary embolism

Low amplitude waveforms and very low ETCO₂ should alert you to obstructed alveolar blood flow from a pulmonary embolism.

A tension pneumothorax is associated with increased levels of carbon dioxide. Asthma exacerbation would cause a shark-fin appearance of the capnography waves. Respiratory alkalosis is associated with low levels of ETCO₂ but would not include respiratory distress.

41.

Which of the following does not meet the criteria for a failed airway as defined by *The Difficult Airway* course?

Inability of an experienced intubator to perform a successful orotracheal intubation after 2 failed attempts

Failure to maintain adequate SpO₂ during or after a failed laryngoscopic attempt

Inability of an experienced intubator to perform a successful orotracheal intubation after 3 failed attempts

The "best attempt" at orotracheal intubation fails in the "forced to act" situation

Correct answer: Inability of an experienced intubator to perform a successful orotracheal intubation after 2 failed attempts

*A failed airway is defined as "a failure to ventilate or oxygenate the patient," according to *The Difficult Airway* course. If the clinician is unable to secure a difficult airway, the clinician must enact the failed airway algorithm.*

The Difficult Airway course defines a failed airway as meeting the following three criteria:

- 1. Failure to maintain adequate SpO₂ during or after a failed laryngoscopic attempt.*
 - 2. Inability of an experienced intubator to perform a successful orotracheal intubation after 3 failed attempts.*
 - 3. The "best attempt" at orotracheal intubation fails in the "forced to act" situation.*
-

42.

You have just administered the combination of sedative and paralytic medications to your 38-year-old female patient and are preparing to place your laryngoscope blade. You have asked your partner to provide cricothyroid pressure. Approximately how many pounds of pressure are recommended to bring the vocal cords within sight?

10 pounds of pressure

5 pounds of pressure

8 pounds of pressure

2 pounds of pressure

Correct answer: 10 pounds of pressure

Cricothyroid pressure is an effective method to facilitate successful intubation. You should direct your partner to provide approximately 10 pounds of pressure straight downward. The next step is the BURP technique. This technique is used to facilitate a central view of the vocal cords. Your assistant should apply Backward, Upward, and the Right Pressure on the cricothyroid membrane.

The other answer options are incorrect.

43.

Transport ventilators are classified as automatic resuscitators and sophisticated ventilators. What is the most common mode of ventilation used on transport ventilators?

Volume-controlled pressure-variable ventilation

Continuous mandatory ventilation

Pressure-regulated volume-controlled ventilation

Synchronized intermittent mandatory ventilation

Correct answer: Volume-controlled pressure-variable ventilation

The most common mode of ventilation used on transport ventilators is volume-controlled pressure-variable ventilation. The tidal volume and minute volumes are preset and require the clinician to set the inspiratory flow, flow time, and inspiratory time. They are volume-targeted, pressure-limited, and time-cycled.

Continuous mandatory ventilation has a preset tidal volume and preset ventilatory rate. This mode of ventilation ignores the spontaneous respirations of the patient, and there is no possibility of patient triggering.

Pressure-regulated volume-controlled ventilation allows the operator to set the tidal volume and high-pressure limit. The ventilator will then adjust the inspiratory flow wave to deliver the set tidal volume within the set parameter.

Synchronized intermittent mandatory ventilation provides a set rate and a set tidal volume.

44.

You are dispatched to transport a ventilated ARDS patient from the local hospital to a higher level of care. During the nurse's hand-off report, you are provided with the newest set of arterial blood gases for the patient. You note the patient's pH is low at 7.14. Current ventilator settings are SIMV, Vt 400 mL, rate 20, PEEP 10, and FiO₂ 0.7.

What would be an appropriate step for the management of this patient?

Increase respiratory rate to 32

Increase tidal volume in 2 ml/kg increments

Decrease respiratory rate to 16

Increase PEEP to 12

Correct answer: Increase respiratory rate to 32

Patients with ARDS require low tidal volumes paired with high levels of PEEP and FiO₂ to stay properly oxygenated. Arterial blood gases will be the most accurate tool used when adjusting ventilator settings. An ARDS patient should have a target pH of 7.30-7.45, during mechanical ventilation. A patient with a pH under 7.15 requires an increase in ventilatory rate to a maximum of 35. If the pH remains under 7.15, tidal volume should be increased step-wise in 1 ml/kg increments. Sodium bicarbonate may also be considered.

Decreasing the respiratory rate would have the opposite necessary effect on the patient, and increasing PEEP would improve oxygenation but not pH.

45.

Extraglottic airways provide an excellent option for emergency airway management in pre-hospital care. These types of airways provide a universal feature that enables the extraglottic airway to serve as a means of indirect intubation. What is this feature?

A glottic opening

Blind insertion ability

Double-lumen

A Murphy Eye

Correct answer: A glottic opening

The universal feature of extraglottic airways is a glottic opening, which allows for a stylet or a bougie to be placed through the airway. The stylet or bougie is placed into the trachea and the extraglottic airway is removed. An EndoTracheal Tube (ETT) is now placed over the stylet or bougie for intubation.

All extraglottic airways allow for blind insertion, but this does not serve as a means of indirect intubation.

Most extraglottic airways are single lumen with only a few being double lumen.

A Murphy Eye is the small opening on the side of the tip of an ETT that allows for ventilation even if the ETT is clogged at the end.

46.

You are treating an adult male with respiratory distress due to COPD. Which form of NIPPV is most appropriate?

BiPap

CPAP

High-flow nasal cannula (HFNC)

Intubation

Correct answer: BiPAP

Non-Invasive Positive Pressure Ventilation, or NIPPV, is a form of ventilation without the use of an artificial airway. Techniques for NIPPV include Bilevel Positive Airway Pressure (BiPAP), Continuous Positive Airway Pressure (CPAP), and High-Flow Nasal Cannula (HFNC). BiPAP is most appropriate for patients with hypercarbic respiratory failure, such as those suffering from COPD or asthma exacerbation.

CPAP provides the same pressure during both inspiration and expiration and is more suited for patients with hypoxia due to increased work of breathing.

High-Flow Nasal Cannula (HFNC) provides humidified, oxygenated air through a nasal cannula and is most appropriate for patients with purely hypoxic respiratory failure.

Intubation and mechanical ventilation is a form of invasive ventilation, not NIPPV.

47.

Your adult patient has a history of Graves disease. The patient presents to the ED with agitation and tremors. Vital signs are BP 182/94, P 138, R 22, with a temperature of 102° F. You should suspect:

Thyrotoxicosis

Myxedema coma

Acute adrenal insufficiency

Diabetes insipidus

Correct answer: Thyrotoxicosis

Patients with Graves disease account for 60%-80% of all thyrotoxicosis patients, also known as thyroid storm. Thyroid Storm is caused by an excessive release of thyroid hormones. Common signs and symptoms of thyrotoxicosis are hyperthermia, agitation, tremors, tachydysrhythmias, and dehydration. It is important to be aggressive in your treatment of a thyroid storm.

Myxedema coma is a form of hypothyroidism and is commonly caused by Hashimoto's disease.

Acute adrenal insufficiency, also known as Addisonian crisis, is caused by a lack of glucocorticoids and mineralocorticoids.

Diabetes Insipidus (DI) is caused by inadequate ADH, and there are 4 types of DI.

48.

You are transporting a 45-year-old female patient with a high fever, difficulty swallowing, drooling, and a muffled voice. During transport, the patient becomes lethargic, with shallow respirations at 10 breaths/minute. You elect to perform rapid sequence intubation (RSI).

Which combination of medications is most appropriate for facilitating intubation in this patient?

Ketamine and succinylcholine

Versed and rocuronium

Etomidate and lidocaine

Lidocaine and succinylcholine

Correct answer: Ketamine and succinylcholine

The patient is exhibiting signs and symptoms of epiglottitis. Because of its nature, epiglottitis is a life-threatening emergency. To facilitate intubation in this patient, the best choice will be ketamine and succinylcholine. Ketamine is a dissociative anesthetic and provides analgesia and amnesia. It has a unique ability to preserve spontaneous ventilation and airway reflexes while providing adequate sedation. Succinylcholine is the paralytic of choice in rapid sequence intubation. Its rapid onset and short duration make it perfect for this patient.

Versed is a common benzodiazepine used in inducing sedation in the Rapid Sequence Intubation (RSI) sequence.

Rocuronium is not indicated as an induction medication. Rocuronium is a nondepolarizing neuromuscular blocker. It has an onset of one to two minutes and a duration of 20-40 minutes. It is not appropriate for induction.

Etomidate is a barbiturate-like derivative often used in RSI induction.

Lidocaine is only indicated in RSI of patients with increased intracranial pressure.

49.

You respond to a 22-year-old male, with a tracheostomy, in respiratory distress. When you arrive, you find the patient lying semi-fowlers in bed, with shallow respirations. You note mottling to the patient's extremities. The patient's mother states the home health nurse replaced the patient's tracheostomy tube about 30 minutes ago before she left their house.

You should do which of the following?

Ventilate the patient with a bag-mask device

Suction the tracheostomy

Contact the home health agency

Administer oxygen via a tracheostomy mask

Correct answer: Ventilate the patient with a bag-mask device

The patient is experiencing ventilatory failure. The first thing you must do is ventilate the patient with a bag-mask device. Shallow respirations and mottling are signs of respiratory failure.

The tracheostomy tube was just placed, and there is no mention of gurgling heard in the tracheostomy. Suctioning is not indicated.

Contacting the home health agency will not correct the problem at hand.

Administering oxygen via a tracheostomy mask will aid in oxygenation but not correct the ventilatory failure.

50.

A 32-year-old male was thrown from his ATV when he drove into a wire fence with the wire hitting him across the throat. The patient was not wearing a helmet and was thrown several feet from the ATV. The patient is unresponsive with shallow respirations. You manually open the airway and begin manual ventilations but meet resistance with each breath. You perform direct laryngoscopy and are unable to recognize landmarks.

You should do which of the following?

Perform a surgical cricothyrotomy

Forcefully ventilate with the BVM

Place an iGel and ventilate

Place an NPA and ventilate

Correct answer: Perform a surgical cricothyrotomy

When a patient cannot be ventilated and oxygenated by other means, then surgical cricothyrotomy is indicated. Indications for a surgical cricothyrotomy are inability to ventilate or oxygenate by other means, unrecognizable airway anatomy landmarks due to trauma or anatomical obstruction, and inability to visualize the vocal cords and glottic opening.

It is not indicated to forcefully ventilate with the BVM. In the case of a laryngeal spasm, two to three forceful ventilations may be required initially to adequately ventilate the patient.

This patient is not exhibiting signs of a laryngeal spasm. An iGel is contraindicated because of the airway trauma noted in this patient.

Placing an NPA will not improve the ventilation of this patient, as the airway would still be blocked by the trauma.

51.

Your patient demonstrates a narrowing gradient between end-tidal carbon dioxide (ETCO₂) and arterial partial pressure of oxygen (PaO₂). What is the most appropriate management strategy for this patient?

Adjusting the ventilator tidal volume

Administering supplemental oxygen therapy

Increasing the respiratory rate

Assessing for pulmonary embolism

Correct answer: Adjusting the ventilator tidal volume

The gradient between ETCO₂ and arterial PaO₂ is an important indicator of ventilation-perfusion (V/Q) matching in the lungs. Adjusting the ventilator tidal volume is the most appropriate management strategy for a narrowing gradient between ETCO₂ and PaO₂. Increasing tidal volume can improve alveolar ventilation and help correct the V/Q mismatch.

Administering supplemental oxygen therapy may increase the PaO₂, but it would not necessarily address the underlying cause of the narrowing gradient between ETCO₂ and PaO₂.

Increasing the respiratory rate may improve ventilation and increase ETCO₂, but it may not necessarily correct the narrowing gradient between ETCO₂ and PaO₂.

Assessing for pulmonary embolism is important in patients with suspected gas exchange abnormalities, but it may not be the initial management strategy for a narrowing gradient between ETCO₂ and PaO₂.

52.

Which of the following medications used in medication-assisted airway management causes adrenocortical suppression?

Etomidate

Succinylcholine

Propofol

Ketamine

Correct answer: Etomidate

Etomidate is a hypnotic, non-barbiturate commonly used in medication-assisted airway management. It has a quick onset of action of 30 seconds. Etomidate decreases cerebral blood flow, metabolic oxygen demand, and intracranial pressure. The disadvantages of etomidate are involuntary skeletal muscle movements, pain with injection, and adrenocortical suppression. After the administration of etomidate, the adrenal cortex is unresponsive to the adrenocorticotrophic hormone, which could prove detrimental to patients on long-term steroid therapy.

Succinylcholine is a depolarizing neuromuscular blocker with a similar chemical makeup to acetylcholine. Succinylcholine stimulates receptors at the neuromuscular junction and cholinergic receptors. It does not stimulate or suppress the adrenal cortex.

Propofol is an intravenous anesthetic used as an induction agent in medication-assisted airway management. Propofol does not affect the adrenal cortex.

Ketamine is a dissociative anesthetic also used in airway management. Ketamine triggers the release of catecholamines and does not affect the adrenal cortex.

53.

You are transporting a 58-year-old male patient who is compliant and comfortable with his mechanical ventilation. This is the patient's current ventilator setting: SIMV mode, tidal volume of 515 mL, respiratory rate of 12 breaths/min, and FIO₂ of 40%. What is this patient's minute volume?

6,180 mL/min

5,855 mL/min

6,380 mL/min

5,925 mL/min

Correct answer: 6,180 mL/min

Minute volume is the volume of gas inhaled or exhaled from the patient's lungs in one minute. To calculate a patient's minute volume, you multiply the patient's tidal volume with the patient's respiratory rate: $515 \times 12 = 6,180$ mL/min. On the ventilator, the patient's minute volume is adjusted by increasing the rate or the tidal volume or both.

54.

A 64-year-old male is found unresponsive and not breathing in a remote area. After initial attempts at BVM ventilation are unsuccessful, you elect to use a retroglottic airway device.

Which of the following considerations is most critical when choosing and using a retroglottic airway device in the prehospital setting?

Ensuring the device size matches the patient's height

Selecting a device that does not require confirmation of placement

Preparing for potential aspiration due to lack of a cuff

Using a device that allows for high-pressure ventilation

Correct answer: Ensuring the device size matches the patient's height

Common devices include the LMA, King LT, and i-gel. These devices are placed above the glottis and create a seal around the laryngeal inlet. Proper sizing is crucial for effective ventilation and minimizing complications. Most retroglottic devices are sized based on the patient's weight or height. Using an incorrect size can lead to inadequate ventilation, increased risk of aspiration, or trauma to the airway structures.

All airway devices require confirmation of placement to ensure they are functioning correctly and providing adequate ventilation.

Many retroglottic devices, like the King LT, do have a cuff. Properly inflated cuffs can help reduce the risk of aspiration.

While the ability to ventilate at appropriate pressures is important, ensuring the correct size is more critical for effective ventilation and patient safety.

55.

EMS just arrived at your ED with a 17-year-old male patient. The paramedic states the patient began seizing while en route and was administered 4 mg midazolam. The patient is now unresponsive but breathing. Vital signs are BP 72/48, P 52 and weak, R 6 and shallow.

You should do which of the following?

Ventilate with a BVM

Administer flumazenil

Intubate the patient

Begin transcutaneous pacing

Correct answer: Ventilate with a BVM

The patient had a seizure, and the seizure was stopped with the administration of midazolam. However, the patient is now unresponsive, hypotensive, hypoxic, and in respiratory failure. The patient has insufficient ventilatory effort. The first step is to provide positive pressure ventilations with a BVM.

The patient is not suffering from benzodiazepine toxicity, so flumazenil is not indicated.

Intubation may be indicated in this patient, but the first step is to ventilate the patient with a BVM. The patient is bradycardia, but the bradycardia is secondary to respiratory failure and hypoxia.

Transcutaneous pacing is not recommended.

56.

You are treating an unconscious 32-year-old male who is cyanotic, with agonal respirations. He was found on the sidewalk, outside of his physician's office. A clinic nurse states he received an antibiotic shot while in the office. His lips and tongue are swollen. You meet resistance when attempting to ventilate with a bag-valve mask and note no visible chest rise.

What should you do?

Perform a surgical cricothyrotomy

Administer two forceful ventilations with the bag-valve mask

Administer benadryl 50 mg IV

Administer epinephrine 0.5 mg IM

Correct answer: Perform a surgical cricothyrotomy

The patient is unable to be ventilated by standard methods of ventilation, so a surgical cricothyrotomy is recommended. The swelling of the lips and tongue and the inability to ventilate with a BVM indicate severe airway swelling or complete airway obstruction. Unresponsiveness and agonal respirations prove the patient has a failure to oxygenate and ventilate.

Forceful ventilations with the BVM are not indicated. This will not decrease swelling.

Benadryl is indicated in allergic reactions and anaphylaxis, but it is a second line drug. The airway must be addressed first.

Epinephrine is indicated in this patient, as the patient is suffering from anaphylaxis, but the airway must be treated first. The airway must be open and then the epinephrine can be administered.

57.

You are transferring a 65-year-old male with a history of a recent MI and stent placement. During transport, the patient experiences a sudden onset of severe shortness of breath. His respiratory rate is 60 and labored. You note that the patient's ETCO₂ capnography waveform has an extremely low amplitude waves and a numeric value of 12 mmHg.

What should you suspect?

Pulmonary embolism

Spontaneous pneumothorax

Anaphylaxis

Acute myocardial infarction

Correct answer: Pulmonary embolism

A pulmonary embolism causes a low ETCO₂ and low capnography waveform because the embolism causes a vascular obstruction, which reduces the elimination of carbon dioxide and increases dead space ventilation.

A spontaneous pneumothorax causes a high ETCO₂. Anaphylaxis causes a shark fin appearance to the ETCO₂ capnography waveform because of the bronchospasm. An acute myocardial infarction will not affect the ETCO₂ waveform in this way.

58.

You are transporting an intubated 58-year-old female on mechanical ventilation. During transport, your transport ventilator alerts due to an increased level of ETCO₂ to 62 mmHg. Which of the following is a patient-related cause of increased ETCO₂?

Patient rebreathing

Pulmonary embolism

Hypothermia

Hypovolemia

Correct answer: Patient rebreathing

Continuous End-Tidal CO₂ (ETCO₂) monitoring is required on all intubated patients to monitor the patient's ventilatory status. The increase and decrease of ETCO₂ can provide the clinician with real-time clues of the patient's status. Normal ETCO₂ is 35 mmHg - 45 mmHG.

Patient-related causes of increased ETCO₂ are the patient rebreathing against the machine, decreased respiratory rate, decreased tidal volume, hyperthermia, hypermetabolic state, acute respiratory failure, and hypertension.

Patient-related causes of decreased ETCO₂ are hypothermia, pulmonary embolism, hypovolemia, decreased cardiac output, increased respiratory rate, increased tidal volume, hyperventilation, and cardiac arrest.

59.

While completing a full airway assessment of your adult patient, you need to determine if your patient will be difficult to ventilate via bag-valve-mask. What is the mnemonic used for the prediction of bag-valve-mask ventilation difficulty?

ROMAN

SMART

RODS

LEMONS

Correct answer: ROMAN

Several mnemonics exist in medical education to remember various medical procedures and conditions. To better determine bag-valve-mask difficulty, the mnemonic ROMAN is used.

- *R - Radiation/restriction*
- *O - Obesity/obstruction/obstructive sleep apnea*
- *M - Mask seal/male sex/Mallampati*
- *A - Age*
- *N - No teeth*

The SMART mnemonic is used for difficult cricothyrotomy: S - Surgery, M - Mass, A - Access/anatomy, R - Radiation, T - Tumor.

RODS is used for difficult extraglottic devices: R - Restricted mouth opening, O - Obstruction/obesity, D - Disrupted/distorted airway, S - Stiff lungs.

LEMONS is the mnemonic for difficult direct laryngoscopy: L - Look externally, E - Evaluate the 3-3-2 rule, M - Mallampati, O - Obstruction, N - Neck mobility, S - Saturation.

60.

Factitious abnormal labs lead to inappropriate treatment. A common factitious lab is pseudohyponatremia. Which of the following is not a common cause of this condition?

Hypoglycemia

Hyperlipidemia

Hyperglycemia

Hyperproteinemia

Correct answer: Hypoglycemia

Pseudohyponatremia is commonly caused by hyperglycemia, hyperlipidemia, and hyperproteinemia. This is a serum sodium level of less than 135 mEq/l in the presence of a normal serum sodium level.

Hypoglycemia is not a cause of pseudohyponatremia.

61.

You are performing a surgical cricothyrotomy on your adult female patient utilizing the Seldinger Technique. After inserting a small locator needle into the cricothyroid membrane and confirming needle placement, what is your next step?

Pass a soft-tipped wire through the needle and into the trachea

Place an ET tube over the needle and confirm tube placement

Insert a Trousseau dilator to enlarge the cricoid space

Make a vertical incision 5-7 cm through the skin

Correct answer: Pass a soft-tipped wire through the needle and into the trachea

The Seldinger Technique is one of three techniques for performing a surgical cricothyrotomy. After inserting a locator needle into the cricothyroid membrane and confirming placement by aspiration, the next step is to pass a soft-tipped wire through the needle and into the trachea. After this is completed, an incision is made adjacent to the needle. Then place an airway tube with its internal dilator over the wire and into the trachea, then confirm placement.

An airway tube is not placed following the insertion of the locator needle.

A Trousseau dilator is only used in a classic surgical cricothyrotomy.

A 5-7 cm vertical incision is performed in a classic surgical cricothyrotomy and not the Seldinger Technique.

62.

A 46-year-old male is being transported on a ventilator and suddenly develops signs of hypoxia, including cyanosis and low pulse oximetry. Upon evaluation, you note a new onset of JVD. What should you do next?

Reconfirm lung sounds

Increase the FiO₂

Remove the vent and provide manual ventilation

Attempt endotracheal suctioning

Correct answer: Reconfirm lung sounds

The rapid decline of the patient, accompanied by the development of JVD, should provide a high index of suspicion for a tension pneumothorax. You should next reconfirm bilateral lung sounds.

Increasing the amount of oxygen would not likely improve this patient. You should not remove the tube unless you confirm that it has become displaced, and there is no indication for suctioning.

63.

You have just completed RSI on your 64-year-old female COPD exacerbation patient. Your patient's vital signs are BP 112/78, P 102, R 12 via manual ventilation, and SpO₂ 97%. Your patient weighs 64 kg. Which of the following post-intubation sedation and/or paralytic is appropriate for this patient?

Propofol infusion at 128 mg.

Succinylcholine 150 mg IVP

Etomidate 64 mg IVP and Versed 2 mg IVP

Vecuronium 16.6 mg IVP and Versed 2 mg IVP

Correct answer: Propofol infusion at 128 mg.

A combination of sedation and paralytic medications are used throughout the process of Rapid Sequence Intubation (RSI). Propofol is a hypnotic sedative used to maintain sedation in intubated patients. The dosage for Propofol is 2-2.5 mg/kg IV infusion. Propofol is rarely used in the induction phase of RSI but is widely used in post-intubation for continued sedation. The correct dose of Propofol for this patient is 128 mg.

Succinylcholine is used in the induction phase of RSI because of its rapid onset and short duration and is not recommended for use in the post-intubation phase. The dose of Succinylcholine is 1-1.5 mg/kg.

Etomidate is only recommended to be administered one time to a patient during rapid sequence intubation. If Etomidate is used in the induction phase, it is not used in the post-intubation phase. Its short duration of action makes it ineffective for use in post-intubation. The correct dose for Etomidate is 0.3 mg/kg.

The recommended dose of Vecuronium is 0.1 mg/kg, making 16.6 mg much too high of a dose for this patient. Versed is commonly used in post-intubation and the dosage is 0.5-2 mg SIVP over 2 minutes.

64.

You are preparing to intubate a 26-year-old, obese trauma patient. What mnemonic can help determine if video or direct laryngoscopy is the better choice for facilitating intubation in this patient?

HEAVEN

LEMON

DOPE

SOAP-ME

Correct answer: HEAVEN

The mnemonic HEAVEN is used to distinguish between video or direct laryngoscopy in patients requiring intubation:

- *H — Hypoxemia. DL is faster, but VL is faster with anatomic difficulties.*
- *E — Extremes of size. VL is slow and controlled toward the epiglottis, and DL is slow and controlled when moving away from the epiglottis to bring the airway into view.*
- *A — Anatomic disruption/obstruction. VL is out to in, and DL is in to out.*
- *V — Vomiting blood or fluid. DL for bloody or uncontrollable vomiting.*
- *E — Exsanguination. DL is faster, but VL for anatomical difficulty.*
- *N — Neck mobility. VL is gentler.*

LEMON is used to determine a difficult airway.

DOPE is used to determine the acute deterioration of the intubated patient.

SOAP-ME mnemonic helps clinicians to remember the equipment required for RSI.

65.

You are treating a 6-year-old male patient who was recently intubated with rapid sequence intubation. The patient is tachycardic and acidotic, has an increased temperature, and increased CO₂ production. Which of the following is indicated for this patient?

Dantrolene sodium 2.5 mg/kg IVP

Atropine 0.5 mg IVP

Sodium bicarbonate 0.75 mEq IVP

Calcium chloride 0.5 g IVP

Correct answer: Dantrolene sodium 2.5 mg/kg IVP

The patient is showing signs and symptoms of malignant hyperthermia. This is an adverse reaction to succinylcholine administration and is more common in children than adults. The first line treatment for malignant hyperthermia is dantrolene sodium 2.5 mg/kg IVP followed by additional doses up to 10 mg/kg. Additional treatment consists of oxygen, body cooling, and fluids.

Atropine, sodium bicarbonate, and calcium chloride are not recommended in this patient.

66.

You are preparing to perform a drug-assisted intubation on a 42-year-old male involved in a multi-vehicle MVC. Due to your assessment, you have determined that your patient will be a difficult airway patient. Which of the following findings would confirm a difficult intubation?

The 3-3-2 rule confirms the patient's mouth will open approximately 2 cm wide

The patient's Mallampati score is a Class I

The 3-3-2 rule confirms the patient length of the mandible is three fingerbreadths wide

The patient's Mallampati score is a Class II

Correct answer: The 3-3-2 rule confirms the patient's mouth will open approximately 2 cm wide

The mnemonic LEMONS is used to assess for a difficult airway in patients requiring advanced airway management:

- *L — Look externally*
- *E — Evaluate 3-3-2*
- *M — Mallampati*
- *O — Obstruction*
- *N — Neck mobility*
- *S — Saturation*

The 3-3-2 rule evaluates mouth opening, mandible length, and distance from hyoid bone to thyroid notch. When measuring mouth opening, a patient's mouth opening ideally opens at least three fingerbreadths, which is approximately 5 cm. If the 3-3-2 rule determines the mouth opening is approximately 2 cm. wide, then this would determine the patient to be a difficult airway patient.

A Mallampati score of Class I or Class II is ideal, with Class III and Class IV proving to be a difficult airway. The 3-3-2 rule evaluates the ideal mandible length as being 3 fingerbreadths wide.

67.

A 64-year-old female patient with COPD and acute respiratory failure is placed on mechanical ventilation in Synchronized Intermittent Mandatory Ventilation (SIMV) mode. The initial settings are SIMV rate of 12, tidal volume of 450 mL, 5 cm of PEEP, and FiO₂ 50%. She is breathing spontaneously between mandatory breaths. After two hours, her ABG shows pH 7.28, PaCO₂ 58 mmHg, PaO₂ 68 mmHg, and HCO₃⁻ 26 mEq/L.

Which of the following adjustments is most appropriate to improve her ventilation?

Increase the SIMV rate

Decrease the tidal volume

Increase the PEEP

Increase the FiO₂

Correct answer: Increase the SIMV rate

Synchronized Intermittent Mandatory Ventilation (SIMV) is a mode of mechanical ventilation that provides a set number of mandatory breaths per minute while allowing the patient to breathe spontaneously between these mandatory breaths. Increasing the rate of mandatory breaths per minute will provide more mechanical support, helping to reduce the elevated PaCO₂ by increasing minute ventilation. This is appropriate given the patient's hypercapnia and acidemia.

Reducing tidal volume would likely exacerbate hypercapnia, as it would decrease the amount of air exchanged per breath.

Increasing PEEP is typically used to improve oxygenation rather than ventilation. This patient's primary issue based on the ABG is hypercapnia, not hypoxemia.

Increasing FiO₂ would address hypoxemia, but her primary issue is hypercapnia. Current FiO₂ of 50% is reasonable, and increasing it without addressing ventilation may not improve overall respiratory status.

68.

A 72-year-old female with severe COVID-19 pneumonia is intubated and placed on mechanical ventilation. Despite appropriate sedation, her oxygenation remains poor, and she requires high levels of PEEP.

Which of the following strategies is most appropriate to minimize the risk of Ventilatory-Induced Lung Injury (VILI) in this patient?

Utilizing permissive hypercapnia by reducing tidal volume

Increasing the tidal volume to improve oxygenation

Reducing PEEP to minimize barotrauma

Increasing the respiratory rate to reduce carbon dioxide levels

Correct answer: Utilizing permissive hypercapnia by reducing tidal volume

Ventilatory-Induced Lung Injury (VILI) is a significant concern in mechanically ventilated patients, especially those with severe lung pathology such as COVID-19 pneumonia. VILI can result from various factors, including high tidal volumes, excessive pressures, and over-distension of alveoli. Allowing higher levels of carbon dioxide (hypercapnia) by reducing tidal volume is an accepted strategy to minimize lung injury. It avoids the detrimental effects of high tidal volumes and high pressures.

Increasing tidal volume can exacerbate VILI by causing volutrauma and should be avoided in ARDS and severe lung injury.

While excessively high PEEP can cause barotrauma, reducing PEEP too much can lead to alveolar collapse and atelectrauma. PEEP should be titrated to balance oxygenation and lung protection.

Increasing the respiratory rate can lead to air trapping and auto-PEEP, increasing the risk of VILI.

69.

You are treating a 56-year-old male with respiratory failure. You are preparing to perform delayed sequence intubation on the patient. You elect to apply a regular nasal cannula for passive oxygenation during the intubation procedure. How many liters per minute should you set the oxygen?

15 lpm

10 lpm

6 lpm

Nasal cannula does not provide passive oxygenation

Correct answer: 15 lpm

Passive oxygenation is utilized during delayed sequence intubation to lengthen the safe apnea period. It can also help post-intubation with maintaining oxygenation status. Passive oxygenation is performed using a regular nasal cannula flowing at least 15 lpm.

Oxygen flow of 6-10 lpm will not provide enough oxygen for passive oxygenation.

A nasal cannula or non-rebreather are both considered appropriate for passive oxygenation during delayed sequence intubation.

70.

You are transporting a 76-year-old male with a history of pneumonia and ARDS. The patient is intubated and on a ventilator. Ventilator settings are tidal volume 400mL, rate 12, FiO₂ of 0.50, and PEEP of 5 cm H₂O. You note that the patient's SpO₂ is 84%. How should you address the patient's low pulse oximetry?

Increase FiO₂ and PEEP

Increase tidal volume and rate

Decrease FiO₂ and increase PEEP

Increase FiO₂ and decrease PEEP

Correct answer: Increase FiO₂ and PEEP

The most appropriate action is to increase FiO₂ and increase PEEP. In patients with pneumonia or ARDS, hypoxic respiratory failure can occur. This is because the patient has a decreased ability to diffuse oxygen due to atelectasis of the alveoli. The treatment of increasing FiO₂ and PEEP allows more oxygen and keeps the alveoli open.

Increasing tidal volume and rate may have a negative impact on the patient's ETCO₂. Decreasing FiO₂ or PEEP would not improve the patient's condition.

71.

You are transporting a 26-year-old male with facial trauma following an ATV accident. The patient is being transferred to a long-term care facility due to having a tracheostomy placed. During transport, the ventilator begins to alert with a low-pressure alarm. Your patient appears air-hungry, and you note subcutaneous emphysema upon palpation of the upper chest and neck.

What has likely occurred?

False passage

Mucus plug

Pneumothorax

Improper ventilator settings

Correct answer: False passage

The patient is exhibiting signs and symptoms of false passage. When moving patients with a tracheostomy device, extreme care must be taken to ensure the device is properly secured to prevent dislodgement or false passage. Signs and symptoms of a false passage include the patient appearing air hungry, the ventilator showing a high or low-pressure alarm, and subcutaneous emphysema or crepitus in the upper chest and neck.

A mucus plug will not cause subcutaneous emphysema, and pneumothorax will result in a high-pressure alarm, not low pressure.

Improper ventilator settings may cause the patient to be air-hungry but will not cause subcutaneous emphysema.

72.

A 22-year-old female who was hit by a vehicle while crossing the street was brought to the ED by ambulance. The patient is unresponsive with shallow respirations. You attempted to intubate the patient but were unsuccessful due to the numerous facial fractures and lack of recognizable landmarks. You inserted a needle through the cricothyroid membrane and now wish to ventilate.

Which of the following methods would be most appropriate?

A jet insufflator device

Oxygen tubing with a one-way valve

Forceful ventilations with a bag-mask device through an ET tube connector

ET tube connector attached to a mechanical ventilator

Correct answer: A jet insufflator device

To ventilate through a needle cricothyrotomy, you must use a jet insufflator device. You must monitor for increased intrathoracic pressure.

Oxygen tubing may work but would need to be connected to a delivery system. Forceful ventilations with a bag-mask device or utilization of a transport ventilator may cause more damage.

73.

According to Fick's law of diffusion, the diffusion rate of a gas across the semipermeable membrane is directly proportional to the available:

Surface area

Ambient temperature

Solubility

Volume

Correct answer: Surface area

Fick's Law of diffusion states that the rate of diffusion is proportional to the partial pressure and surface area of a membrane. Fick's Law is used in ventilator management in relation to oxygenation. Adding PiO_2 and PEEP will cause an increase in surface area and partial pressure. The thickness of the alveolar-capillary membrane will be decreased.

Ambient temperature, solubility, and volume are not associated with Fick's Law.

74.

You are treating an 82-year-old male with a history of COPD. The patient states that he had a sudden onset of difficulty breathing and sharp chest pains. Upon assessment, you note the patient is breathing shallowly at 14/min and coughing up blood. Auscultation reveals absent lung sounds on the right side.

You should suspect which of the following?

Spontaneous pneumothorax

Pulmonary embolism

Cardiac tamponade

Tuberculosis

Correct answer: Spontaneous pneumothorax

All the choices are possible, but the major defining symptom is the absent breath sounds. A spontaneous pneumothorax is the only one to cause absent or diminished breath sounds. Patients with COPD are prone to spontaneous pneumothoraces.

Pulmonary embolism presents with a sudden onset of difficulty breathing but does not present with fever or absent breath sounds.

Cardiac tamponade has muffled heart sounds and chest pain but does not cause absent breath sounds or a fever.

Tuberculosis presents with coughing up blood, fever, and possible chest pain but no absent breath sounds.

75.

You are transporting a 42-year-old female patient weighing 65 kg. She is post-CABG surgery and being transported to a specialty resource center by helicopter. Her ABGs are pH 7.42, PaCO₂ 38, PaO₂ 52, HCO₃ 25. Vent settings Vt 600, R 12, PEEP 5, FiO₂ 0.6.

Which of the following adjustments should be made to the ventilator?

Increase FiO₂ to 0.8

Increase PEEP to 10

Decrease Vt to 500

Decrease FiO₂ to 0.2

Correct answer: Increase FiO₂ to 0.8

This patient's ABGs reflect hypoxia so adjustments need to be made. Hypoxic patients require an increase in PEEP or FiO₂.

There are no conditions that suggest increased dead space, so increasing PEEP would not be of benefit to this patient.

Decreasing the Vt is not recommended in this patient. Increasing Vt would be indicated if this patient had an increased PaCO₂.

Decreasing FiO₂ would cause the patient more complications.

76.

A 73-year-old patient with severe ARDS secondary to pneumonia is not responding adequately to conventional mechanical ventilation. The decision is made to initiate High-Frequency Jet Ventilation (HFJV).

Which of the following is the most appropriate consideration when managing this patient with HFJV?

Monitoring for auto-PEEP and barotrauma

Increasing the tidal volume to enhance oxygenation

Utilizing high respiratory rates to maximize carbon dioxide removal

Reducing inspiratory time to minimize airway pressure

Correct answer: Monitoring for auto-PEEP and barotrauma

High-Frequency Jet Ventilation (HFJV) is a type of mechanical ventilation that delivers very small tidal volumes at rapid rates, typically between 100-600 breaths per minute. It is used in specific situations where conventional ventilation fails, such as in severe ARDS. HFJV can improve oxygenation and ventilation while potentially reducing the risk of ventilator-induced lung injury. The high respiratory rates and short exhalation times can lead to incomplete exhalation, causing air trapping and auto-PEEP. This can increase the risk of barotrauma and hemodynamic compromise.

HFJV works by delivering very small tidal volumes, and increasing them can negate the benefits of this ventilation mode by increasing the risk of volutrauma.

While HFJV uses high rates, simply increasing rates without monitoring can exacerbate auto-PEEP and barotrauma.

HFJV already uses a shorter inspiratory time, but managing inspiratory and expiratory times must be balanced to avoid air trapping and ensure adequate gas exchange.

3. General Medical Patient

3. General Medical Patient

77.

Which type of diabetes insipidus is caused by an increase in the breakdown of ADH and is common in pregnant women with eclampsia and preeclampsia?

Gestagenic DI

Neurogenic DI

Nephrogenic DI

Dipsogenic DI

Correct answer: Gestagenic DI

There are four types of diabetes insipidus. Gestagenic DI occurs in pregnant women with eclampsia, preeclampsia, multiple gestation, or liver complications. There is a decrease in ADH and an increase in vasopressinase, which is unresponsive to vasopressin.

Neurogenic DI is caused by a decrease in ADH from the posterior pituitary gland. It is caused by bacterial meningitis, head trauma, chemical toxins, and autoimmune disease.

Nephrogenic DI occurs when the kidneys are unable to concentrate the urine.

Dipsogenic DI is caused by polydipsia. It is commonly called psychogenic polydipsia.

78.

A 16-year-old male was thrown from his ATV and now has paralysis in his lower extremities. Assessment reveals a lack of sensory and motor function below the neckline. Vital signs are P 48, R 16, and BP 76/34. Of the following, what should you administer first?

Levophed

Mannitol

Dexamethasone

Atropine

Correct answer: Levophed

With bradycardia, hypotension, and paralysis, the patient is exhibiting symptoms of neurogenic shock. A vasopressor is indicated to correct the hypotension. In neurogenic shock, the MAP should be maintained between 85-90 mmHg. The first step would be to administer a fluid bolus and then administer a vasopressor, such as Levophed. Other vasopressor choices are dopamine and phenylephrine.

Mannitol is a diuretic and is not indicated for neurogenic shock.

Dexamethasone is a corticosteroid and not a first-line medication in neurogenic shock.

Atropine is indicated in bradycardia, but this patient's bradycardia is not cardiac-related.

79.

A 42-year-old female complains of dizziness and palpitations. She informs you she is two months post liver transplant. Vital signs are P 123, R 26, BP 86/44, and SpO₂ is 97%. Her blood glucose level is 396 mg/dL, and her temperature is 101.7° F. Which of the following is most likely?

Sepsis

Gestagenic diabetes insipidus

Post-transplant liver failure

Diabetic ketoacidosis

Correct answer: Sepsis

Transplant patients are at an extremely high risk for infection, leading to sepsis. The risk is increased because of their immunosuppressant medications. Signs and symptoms of sepsis are tachycardia, hypotension, high blood sugar, and fever.

Gestagenic diabetes insipidus is an increase in ADH breakdown, which develops in pregnant women. Patients present with polyuria and polydipsia.

Post-transport liver failure is a possibility, but less likely. The most likely cause of the patient's symptoms is sepsis.

Diabetic ketoacidosis will have a higher blood sugar than this patient's blood sugar.

80.

Your patient is a 76-year-old female who needs a gastric lavage due to an accidental overdose of her prescription medications. Intermittent suction through the gastric tube is required because continuous suctioning can lead to hypokalemia and also cause:

Metabolic alkalosis

Respiratory alkalosis

Metabolic acidosis

Hypercalcemia

Correct answer: Metabolic alkalosis

Continuous suctioning of a gastric tube, for lavage, can cause metabolic alkalosis. This can occur because of the removal of hydrochloric acid. Other complications are hypokalemia, gastric lining irritation, and hypoxia.

Respiratory alkalosis will not occur, as this is primarily caused by hyperventilation. Metabolic acidosis and hypercalcemia are not adverse effects of gastric lavage.

81.

Your adult patient has a balloon tamponade tube placed for the treatment of esophageal varices. Which statement below is true about a balloon tamponade tube?

Balloon tamponade tubes may be used for 24-48 hours

The esophageal balloon is inflated first after insertion

Balloon tamponade tubes may be used for up to five days

The balloon tamponade tubes have either four or five lumens

Correct answer: Balloon tamponade tubes may be used for 24-48 hours

Balloon tamponade tubes are indicated in the treatment of esophageal varices when medication treatments have failed. The two most common types of tubes are the Sengstaken-Blakemore tube and the Minnesota tube. Balloon tamponade tubes may only be used up to 24-48 hours.

Immediately following the insertion of the balloon tamponade tube, the gastric balloon is inflated first and then the esophageal balloon. Balloon tamponade tubes have either three or four lumens.

82.

You are treating a 63-year-old female with known liver failure. The patient has an increased PA pressure and a wedge pressure of 10. Her BUN and creatinine are elevated, and the patient's urinary output is 0.30 ml/kg/hr. Which of the following should you suspect?

Hepatopulmonary syndrome

Cardiogenic shock

Pancreatitis

Cholecystitis

Correct answer: Hepatopulmonary syndrome

Hepatopulmonary syndrome is caused by renal failure and portal hypertension that leads to breathing difficulty and right-sided heart failure symptoms. With the syndrome, the patient will have a normal wedge pressure and an increased PA pressure.

In cardiogenic shock, the patient will typically have an increased wedge pressure and no elevation in BUN and creatinine.

Pancreatitis will cause elevation in BUN and creatinine but may possibly cause an increased wedge pressure.

Elevated BUN and creatinine are not associated with cholecystitis but will elevate if there is renal failure secondary to cholecystitis.

83.

Your adult patient presents to the ED with hypoglycemia. IV attempts are unsuccessful, which means you are unable to administer dextrose. You administer glucagon 1 mg IM to treat the hypoglycemia. How does glucagon reverse the hypoglycemia?

Signals the liver to release its stores of glycogen

Causes an increase of glucose in the bloodstream

Signals the pancreas to release glucose

Converts angiotensin I to angiotensin II

Correct answer: Signals the liver to release its stores of glycogen

Glucagon is a synthetic hormone. It can mirror the sympathetic nervous system by signaling the liver to release its glycogen stores. This causes the reversal of hypoglycemia.

Glucagon is unable to release more glucose into the bloodstream. Glucagon does not communicate with the pancreas. Glucagon does not convert angiotensin, as that is the job of Renin.

84.

You are treating a 23-year-old female complaining of blurriness, dizziness, a racing heart, and palpitations. The patient states she took a large handful of amitriptyline approximately one hour ago. Vital signs are BP 98/64, P 89, R 16, and SpO2 97%. You should:

Administer sodium bicarbonate

Administer diphenhydramine

Administer dopamine infusion

Administer glucagon

Correct answer: Administer sodium bicarbonate

TriCyclic Antidepressants (TCAs), and other sodium-channel blocker medications, are responsible for phase 0 of the cardiac action potential. The patient is exhibiting signs and symptoms of a TCA overdose. The medication of choice for TCA toxicity is sodium bicarbonate.

Diphenhydramine is used in allergic reactions and is not indicated for TCA toxicity.

A dopamine infusion may be indicated in the event the patient's blood pressure drops any lower, but it is not indicated at this time.

Glucagon is the antidote for beta blocker and calcium channel blocker overdose.

85.

You are treating an adult female patient for severe abdominal pain. The patient's lab results are the following:

- Ammonia - 61 mcg/dl
- Hemoglobin - 7 g/dl
- Hematocrit - 33%
- Lactate - 245 units/L
- PTT - 53 sec.
- PT - 18.2 sec
- Gamma - 32 units/L

What should you suspect?

Liver disease

Heart failure

Renal failure

Pancreatitis

Correct answer: Liver disease

Liver disease is indicated by increased ammonia, decreased hemoglobin, increased lactate, increased PTT and PT, and increased gamma. These lab tests are typical for patients with gastrointestinal complications.

Heart failure is not measured specifically by these lab tests. The blood test ordered for heart failure patients is a BNP.

Renal failure would cause a decrease in hemoglobin and an increase in lactate but would also require a serum creatinine blood test, urea, and BUN.

Pancreatitis can cause increased lactate, but the primary blood test to evaluate pancreatitis is a serum lipase test.

86.

Kussmaul respirations are directly related to diabetic ketoacidosis. What is the physiology of Kussmaul respirations?

Eliminating carbon dioxide to increase the body's pH

Eliminating carbon dioxide to decrease the body's pH

Retaining carbon dioxide to increase the body's pH

To increase oxygen carried on the red blood cells

Correct answer: Eliminating carbon dioxide to increase the body's pH

Decreasing CO₂ to combine with water causes the body's production to decrease in carbonic acid. The decrease in carbonic acid will increase the body's pH. So, Kussmaul respirations are the body's mechanism to decrease CO₂ to increase the pH.

Eliminating carbon dioxide or retaining carbon dioxide will not decrease the body's pH.

Kussmaul respirations do not increase oxygen carried by the red blood cells.

87.

You are transporting a 58-year-old female eight hours post hepatectomy. During the transfer flight, the patient becomes lethargic and confused. Vital signs are BP 94/62, P 122, R 12, SpO₂ 88%, BGL 118 mg/dl. The patient's abdomen appears distended, and the patient's IAP is 23 mmHg. You should suspect:

Abdominal compartment syndrome

Septic shock

Abdominal aortic aneurysm

Hepatic failure

Correct answer: Abdominal compartment syndrome

The patient is suffering from abdominal compartment syndrome. Complications from abdominal surgery are a common cause of the syndrome. Common signs and symptoms are early signs of shock, such as altered mental status, hypoxia, decreased urinary output, and CO₂ retention. Normal IAP is 0-5 mmHg, and with abdominal compartment syndrome, the IAP can exceed 20 mmHg.

Septic shock can occur after surgery, but the patient is not exhibiting signs and symptoms of septic shock. The patient is only slightly hypotensive and no mention of fever. Also, this was a sudden onset, and septic shock happens over a longer period of time.

An abdominal aortic aneurysm presents with severe, tearing abdominal pain radiating to the back, hypotension, and tachycardia. This patient is not complaining of abdominal pain.

Hepatic failure is not a sudden onset and does not present in this manner.

88.

Your 68-year-old male patient complains of shortness of breath. He advises he's had a cold for the past week and is coughing up green phlegm. Auscultation reveals rhonchi in his left lower chest. Vital signs are P 108, R 14, BP 132/72, and SpO₂ is 96%. What should you suspect?

Pseudomonas aeruginosa

Pleural effusion

COPD exacerbation

Staphylococcus aureus

Correct answer: Pseudomonas aeruginosa

The patient is exhibiting signs and symptoms of Pseudomonas aeruginosa. It is the second most common nosocomial. Common signs and symptoms are dyspnea, chest pain, fever, fatigue, green sputum, productive cough, and rhonchi.

A pleural effusion presents with sudden, sharp chest pains and a non-productive cough. COPD exacerbation does not cause a productive cough. Staphylococcus aureus occurs from aspiration during an upper respiratory infection and presents with fever, chills, dyspnea, and a cough with yellow sputum.

89.

You are treating a 74 year-old-female who is complaining of fatigue, blurred vision, and seeing a yellow-green halo in her vision. Vital signs are BP 90/46, P 42, R 14, SpO2 94%. The ECG reveals a sinus bradycardia. Which medication is likely the cause of the patient's symptoms?

Digoxin

Metoprolol

Doxepin

Midazolam

Correct answer: Digoxin

Digoxin is prescribed for the treatment of heart failure and atrial arrhythmias. Toxicity presents with cardiac or noncardiac symptoms. Cardiac symptoms include bradycardias and hyperkalemia. Noncardiac symptoms include nausea, vomiting, fatigue, anorexia, insomnia, drowsiness, hallucinations, and yellow-green halos in the visual fields. Treatment includes digoxin-specific antibody fragments, supportive care, and correction of hyperkalemia.

The most likely signs and symptoms to be expected with metoprolol overdose are respiratory distress, bradycardia, and hypotension.

Signs and symptoms of doxepin overdose include abnormally low blood pressure, confusion, convulsions, dilated pupils and other eye problems, disturbed concentration, drowsiness, hallucinations, impaired heart function, rapid or irregular heartbeat, reduced body temperature, stupor, unresponsiveness or coma.

Midazolam overdose causes drowsiness, coma, and other nonspecific symptoms in an overdose.

90.

You are treating a 32-year-old female who was involved in a multi-vehicle MVC. Your patient is complaining of lower back pain and severe abdominal pain. Upon examination of the abdomen, you note abdominal tenderness, guarding, and bruising around the umbilical area. What is the term for this bruising?

Cullen's sign

Grey Turner's sign

Murphy's sign

Dunphy's sign

Correct answer: Cullen's sign

The patient is showing signs and symptoms of intraperitoneal hemorrhage. The bruising around the umbilicus is known as Cullen's sign and is indicative of an abdominal bleed.

Grey Turner's sign is also a sign of intraperitoneal bleeding and is described as bruising or discoloration of the flank area.

Murphy's sign is related to cholecystitis. A patient is said to have a positive Murphy sign if there is pain on palpation of the right upper quadrant while the patient inhales a deep breath.

Dunphy's sign is a pain in the right lower quadrant when coughing and is a sign of peritonitis.

91.

Your patient is a 65-year-old male with a history of end-stage renal disease (ESRD) on hemodialysis who presents with shortness of breath, generalized weakness, and altered mental status. The patient's family states the patient is confused and he experienced a syncopal episode earlier in the day. The patient's vital signs are BP 80/50 mmHg, P 114, R 24, and SpO₂ 88%. His BGL is 118 mg/dl, and his skin is pale and diaphoretic.

Which of the following actions should be included in the management of this patient?

Initiate fluid resuscitation to improve intravascular volume

Perform a focused detailed physical examination

Request a chest X-ray to evaluate for pulmonary edema or pneumonia

Initiate empiric antibiotic therapy for potential sepsis

Correct answer: Initiate fluid resuscitation to improve intravascular volume

The patient's presentation with hypotension, tachypnea, altered mental status, and hypoxemia suggests a state of shock, which could be due to hypovolemia, sepsis, or cardiogenic causes. Given the patient's history of end-stage renal disease and hemodialysis, the most likely etiology is hypovolemic shock. Therefore, the initial intervention should focus on fluid resuscitation to improve intravascular volume and perfusion.

Performing a detailed physical examination is important but should not delay initial interventions.

Requesting a chest X-ray may be indicated later in the assessment but is not the most immediate intervention in the management of shock.

Initiating empiric antibiotic therapy should be considered if there is evidence of infection or sepsis but is not the first step in this patient.

92.

A 63-year-old female presents to the ED with complaints of weakness, fatigue, increased thirst and urination, and increased weight gain. The patient has a history of HTN and NIDDM and takes prednisone and loproressor. Vital signs are BP 148/90, P 88, and R 16. You should suspect:

Cushing syndrome

Graves disease

Diabetes insipidus

Addisonian crisis

Correct answer: Cushing Syndrome

Cushing Syndrome is caused by an overproduction of cortisol and/or overexposure to cortisol. Signs and symptoms are darkening and thinning of the skin, weakness, fatigue, polyuria, polydipsia, weight gain, moon face, buffalo hump, depression, and mood swings.

Graves disease is a form of hyperthyroidism. Patients present with tachycardia, weight loss, increased appetite, and diarrhea.

Diabetes insipidus consists of polyuria, polydipsia, and dehydration.

Addisonian crisis occurs from adrenal insufficiency, and patients present with weakness, altered mental status, hyperthermia, and dehydration.

93.

You are working the night shift at the ED when an 82-year-old female arrives with complaints of abdominal cramping, nausea, and diarrhea. She has a history of renal failure and NIDDM. The patient's serum potassium level is 6.3 mEq/L. During your physical assessment of this patient, which of the following would be expected?

Palpitations

Increased deep tendon reflexes

Anxiety

Dehydration

Correct answer: Palpitations

Serum potassium (K⁺) impacts normal neuromuscular and cardiac function. Hyperkalemia is diagnosed with serum K levels > 5.5 mEq/L (normal values range from 3.5-5.5 mEq/L). You would expect this patient to have chest pain, palpitations, dyspnea, vague muscle weakness, mental confusion, nausea, diarrhea, cramping, flaccid paralysis, and decreased (not increased) deep tendon reflexes. The muscle weakness would most likely originate in the legs and travel to the trunk. Other cardiac abnormalities include bradycardia, tall/peaked T waves, a shortened QT interval, slowed intraventricular conduction, and a widened QRS complex.

Anxiety and dehydration are not associated with hyperkalemia.

94.

What is the most common cause of intrarenal Acute Kidney Injury (AKI)?

Acute tubular necrosis

Contrast-induced nephropathy

Acute pancreatitis

Interstitial nephritis

Correct answer: Acute tubular necrosis

Intrarenal failure is a disease of the kidney itself: the nephron, glomeruli, tubules, interstitium, or vasculature within the cortex or medulla. Acute tubular necrosis is the result of renal ischemia and is the most common cause of Acute Kidney Injury (AKI).

Contrast-Induced Nephropathy (CIN) is seen in approximately 10% of patients receiving contrast media, and the idea is that the contrast media causes renal vasoconstriction. It is defined as a 25% increase in creatinine or an absolute increase of 0.5 mg/dL. At-risk patients include diabetics, the elderly, or those with underlying renal insufficiency.

Pancreatitis and interstitial nephritis are both causes of Acute Tubular Necrosis (ATN).

95.

You are transferring a 32-year-old male currently being treated for an acetaminophen overdose. The patient took a large, unknown amount of Tylenol 3 days ago and is now diagnosed with hepatic encephalopathy. Which stage of acetaminophen-induced liver injury is this patient exhibiting?

Stage 3

Stage 1

Stage 2

Stage 4

Correct answer: Stage 3

Stage 3 occurs three to four days after ingestion. The patient may experience hepatic encephalopathy, coagulopathy, metabolic acidosis, and cerebral edema.

Liver injury caused by acetaminophen intoxication occurs in four stages.

- Stage 1 — Termed pre-liver injury and occurs in the first 24 hours following ingestion. Common signs and symptoms are nausea, vomiting, and malaise. Some patients may not experience any symptoms. Most symptoms occur in the first eight hours and then subside.*
 - Stage 2 — Known as liver injury. Stage 2 occurs 12-24 hours after ingestion, and the patient presents with right, upper quadrant pain, nausea, and vomiting.*
 - Stage 3 — This is known as maximum liver injury and occurs three to four days after ingestion. The patient may experience hepatic encephalopathy, coagulopathy, metabolic acidosis, and cerebral edema.*
 - Stage 4 — This is the possible recovery period. Liver enzymes commonly return to baseline five to seven days after ingestion, but cell recovery may take several months.*
-

96.

Tricyclic antidepressants block the sodium channels in which phase of the cardiac action potential?

Phase 0

Phase 2

Phase 3

Phase 4

Correct answer: Phase 0

The cardiac action potential is a representation of the change in voltage across the cardiac myocytes. Antiarrhythmic medications affect the varying phases of the action potential. Tricyclic Antidepressant Agents (TCA), along with other sodium channel blocker medications, block the sodium channels in Phase 0.

Calcium channel blockers block the calcium channels in Phase 2. Potassium channel blockers affect Phase 3, and Phase 4 is affected by beta blockers.

97.

You are treating a 74-year-old male for severe abdominal pain and nausea. The patient states that his indigestion has been worse over the past two days, and he has major bloating. His abdomen is tender to the touch. Which of the following lab values would indicate the patient is suffering from pancreatitis?

Lipase

Trypsin

Amylase

Bilirubin

Correct answer: Lipase

Trypsin, amylase, and lipase are all enzymes secreted by the pancreas and are considered exocrine secretions. In diagnosing acute pancreatitis, serum amylase or serum lipase values three times the normal range is a criterion. Serum lipase is considered to be more sensitive than serum amylase in the diagnosis of acute pancreatitis.

The enzyme bilirubin is secreted by the liver. It is produced in bone marrow cells and in the liver as the end product of red-blood-cell (hemoglobin) breakdown.

98.

You are transferring a 58-year-old male patient diagnosed with esophageal varices. While en route, the patient complains of lightheadedness and begins vomiting small amounts of blood. Which medication should you administer to stop the bleeding?

Octreotide

Norepinephrine

Tranexamic acid

Pitocin

Correct answer: Octreotide

Once esophageal varices rupture, this quickly becomes a life-threatening situation and requires quick action to stop the bleeding. A vasoconstrictor, such as vasopressin or octreotide, is recommended. Octreotide is preferred over vasopressin because it has less systemic effects on the body and stops the bleeding in 85% of ruptured esophageal varices patients.

Norepinephrine is a potent vasoconstrictor but would not stop the bleeding in esophageal varices.

Tranexamic Acid (TXA) helps blood clot and is used for heavy nosebleeds, menstrual bleeding, and traumatic internal bleeding. There are no current recommendations for using TXA for upper GI bleeding.

Pitocin is primarily used for the induction of child labor.
