BCEN CFRN & CTRN - Quiz Questions with Answers

1. General Principles of Transport Nursing Practice

1.

When communicating during patient transport, transport team members should not do which of the following?

- **Assume the intent, content, or meaning of the message if it is not clear**
- Assume positive intent for everyone involved
- Verify the information that has been transmitted by a Communication Center
- Ask for a repeat if the transmission is not clear

Correct answer: Assume the intent, content, or meaning of the message if it is not clear

High-quality communication is the responsibility of every individual involved with transport to ensure that their message is being conveyed clearly and concisely. Transport team members should assume positive intent for everyone involved in the communication process. However, communication should always be verified, and the intent and content of the message should be as clear as possible. If the transmission is unclear, ask for the message to be repeated.

2.

A medical air transport helicopter has been forced to make an emergency water landing. All of the following statements regarding how to escape in this scenario are false **except**:

Wait to attempt exit from the aircraft until it is upside down

Swim away from the helicopter

Begin escape procedures immediately upon impact with the water

Move away from the fuselage of the aircraft before it sinks

Correct answer: Wait to attempt exit from the aircraft until it is upside down

The type of aircraft involved in an emergency water landing or crash in water determines what steps the crew members should take in escape from the aircraft. Helicopters will almost always sink, or capsize, after impact with water; an emergency escape should not be attempted until crew members can see that the rotors have stopped spinning and the helicopter has turned completely upside down.

Escape attempt should not be made until the cabin of the aircraft has almost completely filled with water, at which time crew members should release their seat belt buckle. Once the buckle is released, crew members will float, and if unsure of their position in the water, should attempt to visualize released air bubbles in the water to help determine their way to the surface. No attempts to kick or swim away from the aircraft should be made, as this is more likely to result in a crew member becoming entangled within the aircraft or accidentally injuring another crew member.

3.

Which of the following is an example of passive-aggressive behavior?

Failing to follow through on agreements

Chronic tardiness

Not following safe transport monitoring practices

Not collaborating with other team members

Correct answer: Failing to follow through on agreements

Disrespectful behavior is a root cause of a healthcare culture that threatens both patient safety and organizational culture by impairing communication, preventing compliance with guidelines and safe practices, undermining teamwork, and alienating patients. To counter this, healthcare organizations must actively encourage a culture of respect.

Passive-aggressive behaviors are defined by negativism and intent to cause psychological harm, including refusing to do tasks or doing them in a way intended to annoy others. They can include failing to follow through on agreements and deliberate delays or omissions in returning needed communications.

Passive disrespect is a spectrum of uncooperative behaviors not rooted in malice yet still disrespectful to others and to the organization. Examples of passive disrespect include chronic tardiness, not following safe transport monitoring practices, and not collaborating with other team members.

4.

The communication center for a busy medical air transport program is in need of hiring a communications specialist (CS) for the site. According to the Commission on Accreditation of Medical Transport Systems (CAMTS) recommendations, which of the following statements is **most accurate** in regard to CS applicants?

CS applicants should be encouraged to obtain emergency medical technician (EMT) certification

CS applicants may not be related to other program employees

CS applicants must have medical field experience

CS applicants must have previous communications center experience

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Correct answer: CS applicants should be encouraged to obtain emergency medical technician (EMT) certification

While the CAMTS has established minimal educational requirements which must be met in order to be considered for application as a CS, there are no current CAMTS requirements in regard to the background and experience necessary for the CS. It is advisable that the CS applicant have both medical field experience and previous communications center experience, but this decision is ultimately left up to the individual transport program.

CAMTS does not prohibit the hiring of friends or relatives of current transport programs, but a CS applicant who is related to a current program employee should obviously not be in consideration for the position simply because of the relation. The CAMTS does recommend that the CS be encouraged to obtain certifications such as EMT, emergency medical dispatcher, or National Association of Air Medical Communication Specialists (NAACS); individual transport programs may consider these certifications as a necessity for CS applicants.

5.

You are participating in the medical air transport of a patient who was involved in a single-car accident in which the vehicle became airborne and struck a utility pole, throwing the victim from the vehicle. There are downed lines present, and you and your team members establish your staging site within the Cold Zone of the incident site. As you begin to move around within the Cold Zone, you experience a tingling sensation in your legs and lower torso.

What should be your **next** move in this scenario?

Bend one leg at the knee, and holding your foot in your hand, turn around and hop away

Radio the power company representative on site and request they assess for the presence of live lines

Slowly walk backward away from the direction you were heading when you experienced the tingling sensation

Slowly turn around keeping one foot in the air, and begin jumping forward (alternating the foot on which you land) following a zigzag pattern

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Correct answer: Bend one leg at the knee, and holding your foot in your hand, turn around and hop away

When responding to an incident scene in which there are downed utility lines, the medical air transport crew should always assume that any downed line they encounter is live until a representative from the power company has established that all lines are no longer energized. Live lines may appear "normal," that is, there may not be any evidence of burning or arcing of energy, and even lines that were previously determined to be de-energized may become energized minutes later in response to the automatic systems that are set in place to restore flow of energy.

If, while participating in the transport of a patient at an incident scene in which there are downed lines, you experience a tingling sensation in your legs and lower torso, stop moving forward. Lift one foot off the ground to "break" the circuit of energy flow which has occurred through your legs and torso, and holding your foot in your hand, turn slowly around and hop away to a safe place. In this scenario, current is flowing through the ground due to ground gradient. In ground gradient, current is transmitted from the grounded end of an energized object (the downed power line) through the surrounding media (in this case, the actual ground or dirt), with the current being

strongest the nearer it is to the actual energized object, and weakening the farther away one gets from it.

6.

Reducing noise in the transport environment can:

Improve ability to monitor equipment

Increase stress among team members

Degrade communication among team members

Induce fatigue

Correct answer: Improve ability to monitor equipment

Noise in the transport environment can result in degraded communications and the ability to maintain focus, as well as increased stress and fatigue for patient and transport team. Reducing ambient noise can improve your ability to monitor equipment and the patient during transport.

7.

You and your medical air rescue crew are en route to a wilderness location to aid in the rescue and transport of victims of an avalanche. Which of the following mnemonic devices should be considered as an aid to planning and safety when taking part in wilderness rescues?

TOMAS

ROMAN

THREAT

TAWS

Correct answer: TOMAS

At times, the medical air rescue crew may be called upon to aid in the rescue and transport of individuals involved in critical incidents in wilderness areas. The air medical rescue crew should have an already established safety plan for their role in assisting in wilderness incidents prior to acceptance of an assignment in wilderness transport. The mnemonic TOMAS can be utilized to help in preparation of the plan and ensuring of safety in wilderness locations.

T: Terrain (consider exposure to the elements, and the presence of cliffs, water, forest, vegetation, hiking terrain, possible presence of snow)

O: Obstacles (consider what may inhibit rescue/transport, including trees, loose rocks, debris, wires, daylight, rotor wash, and blade clearance issues)

M: Method (how will the air transport crew insert themselves into the location, possible landing zone sites, hover load)

A: Alternatives (wait for certified search and rescue (SAR) personnel or ferry SAR personnel, relocate the patient prior to attempting transport, abort the mission)

S: Safety (which should be first, last, and always)

The ROMAN mnemonic is used when determining if a patient potentially has a difficult airway.

The THREAT mnemonic is used for outlining the critical actions needed during an active shooter incident.

TAWS is an abbreviation which stands for "terrain awareness and warning systems."

8.

All the many operational stresses of transport may induce fatigue to some degree for a CFRN/CTRN. Which of the following is not a common symptom of acute fatigue related to transport?

Depression and/or anxiety

Lack of awareness

Loss of coordination

Lack of energy

Correct answer: Depression and/or anxiety

Fatigue is an inherent stress of transport duties and the end product of all the physiologic and psychological stresses of flight associated with exposure to altitude. Erratic schedules, hypoxic environments, noise and vibration, and imperfect environmental systems eventually take their toll; fatigue is always a potential threat to safety.

Signs and symptoms of acute fatigue include lack of awareness, loss of coordination, lack of energy, and increased risk of medical errors.

9.

While packaging a patient for medical air transport from the scene of crime during which the patient was shot in the head, you discover a handgun. What is the next **best** step in this scenario?

Leave the weapon where it is, notify law enforcement, and then transport the patient around the location of the weapon

Take a photo of the weapon in the location where it was found ensuring that reference points can be identified in the photo

Remove the ammunition from the weapon and ask a crew member to position the weapon in a neutral position for photographing

Notify law enforcement of the weapon, then pick up the weapon using the grips and move it into a neutral location so the patient can be safely transported

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Correct answer: Leave the weapon where it is, notify law enforcement, and then transport the patient around the location of the weapon

Members of medical air transport crews may at times encounter firearms (or other weapons) at the scene of the transport site. When at all possible, the weapon should be left in place and law enforcement should be notified.

The medical air transport crew should always assume firearms are loaded and able to operate correctly, even if the weapon appears to be damaged or is not fully intact. If the weapon needs to be relocated in order to provide medical care to the victim or in order to ensure safe transport of the victim, the weapon should be photographed in place, making sure to include as many of the details of the surrounding environment as possible. Do not attempt to remove ammunition from firearms, but a count of any ammunition visible in the cylinder chamber or the presence and location of any expended ammunition should be made. Only one individual should be responsible for the actual touching of the firearm, and should pick up the weapon using the grips held between the fingers, without concern of obscuring any possible fingerprints.

10.

Night-vision deterioration begins to occur at what altitude?

5,000 feet

10,000 feet

15,000 feet

4,000 feet

Correct answer: 5,000 feet

Vision is the first of the senses to be affected by a lack of oxygen. This is especially true of night vision, which begins to deteriorate at 5,000 feet of altitude. Color vision starts to deteriorate between 5,000 and 10,000 feet.

11.

Regarding the Commission on Accreditation of Medical Transport Systems (CAMTS) safety initiatives, which of the following statements is **most accurate**?

Medical air crew must perform adult, pediatric, and infant intubations on a quarterly basis to maintain competency

The provision of patient care is paramount during medical air transport missions

Crew members of medical air transport may remove seatbelts as needed to deliver patient care

Flight crew suits must be able to be pulled 1/8" away from the body

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Correct answer: Medical air crew must perform adult, pediatric, and infant intubations on a quarterly basis to maintain competency

The Commission on Accreditation of Medical Transport Systems (CAMTS) has established safety initiatives which must be adhered to by all members of the medical air transport crew in order to maintain accreditation. Of paramount importance is that safe aircraft operations must take precedence over the provision of patient care during medical air transport missions. All flight crew members are required to wear flight suits, which are flame retardant, and can be pulled away from the body by 1/4". The crew is expected to wear seatbelts at all times except when traveling at altitude during level flight, or if the pilot in command (PIC) requests that seatbelts be removed.

Medical air crew members are required to complete at least 5 endotracheal intubations prior to beginning flying missions; these may be performed live, on cadavers, or another high fidelity intubation (not simulation). Once approved for flying missions, current CAMTS safety initiatives requires that the air medical crew complete 9 intubations (3 infant, 3 pediatric, and 3 adult) each quarter.

12.

An adult patient is loaded head forward into the air medical transport aircraft in preparation for departure. According to patient transport standards established by the Commission for Accreditation of Medical Transport Systems (CAMTS), how must this patient be secured prior to liftoff?

With the use of 3 cross straps and a shoulder harness

With the use of 3 cross straps

With the use of a shoulder harness

With the use of pads inserted into the pad voids and 2 cross straps and a shoulder harness

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Correct answer: With the use of 3 cross straps and a shoulder harness

The Commission for Accreditation of Medical Transport Systems (CAMTS) is responsible for patient safety standards which must be maintained during medical air transport. Regardless of patient position in the aircraft, the patient must be secured by the use of 3 cross straps—positioned at the chest, hips, and knees. In addition, when patients are positioned head forward in the aircraft, a shoulder harness must also be fastened.

Pediatric patients will need to be secured using a specifically sized device used to secure smaller individuals and, if an infant is to be transported using a car seat, the seat must be one that is approved by the Federal Aviation Administration (FAA) and have an FAA approval sticker already in place.

13.

According to the National Fire Protection Agency, designated signage is used to identify types and severity of hazards at a site. The signage shown is used to identify a chemical which is:

Low-level flammable and water reactive risk

Slight health hazard and corrosive risk

Water-contact stable and slight health hazard risk

Unstable when heated

Correct answer: Low-level flammable and water reactive risk

The National Fire Protection Agency developed signage used today to aid in identifying the characteristics of potentially hazardous materials located at a site. The sign involves a diamond shape comprised of four different colored squares—red, yellow, white, and blue—and then further designation within each square with letter or number designations.

The red square represents any fire hazard presented by the substance, the yellow square represents the reactivity of the substance, the blue square represents any health hazards posed by the substance, and the white square represents any additional specific hazards presented by the substance. Risk of fire hazard is rated from 0 to 4, with 0 indicating the substance will not burn, and 4 indicating the substance is highly flammable and will burn below a level of 73 degrees Fahrenheit. Reactivity of the substance is also rated from 0 to 4, with a 0 rating indicating that the substance is stable, and 4 indicating the substance will detonate. A health hazard rating of 0 indicates that the substance is a normal substance and poses no health risk, while a rating of 4 indicates the substance is deadly to human health.

Finally, additional specific hazards which may be posed include radiation hazard, acid or alkaline designation, identification as an oxidizer or as a corrosive material, and as a substance which will react when in contact with water (indicated by the presence of a capital "W" with a strike through it).

14.

The expansion of gases at higher altitudes can be explained by:

Boyle’s Law

Henry’s Law

Charles’ Law

Dalton’s Law

Correct answer: Boyle’s Law

The equation for Boyle’s Law is $P_1V_1=P_2V_2$. If the pressure P_2 decreases, then the volume of the gas must increase. A helpful reminder is “Boyle’s Balloon.” Think of a balloon floating higher and higher. As it ascends, the volume of the gas inside expands, and the balloon pops.

15.

What are signs and symptoms of Type 1 Decompression Sickness?

Painful joints, mottled skin, pruritus (itching)

Altered mental status, ascending paralysis, visual disturbances

Hypertension, altered mental status, combative

Epistaxis, maxillary pain, renal failure

Correct answer: Painful joints, mottled skin, pruritus (itching)

Type 1 is classified as joint and skin symptoms; the key here is painful joints. Type 2 is classified by neuro changes.

16.

According to guidelines aimed at increasing survival during active shooter (AS) situations and established by the Hartford Consensus, which of the following activities should take place in the Warm Zone of the traditionally established Zones of Safety?

Control of hemorrhage

Assessment of patients

Transportation of patients

Threat suppression

Correct answer: Control of hemorrhage

The Hartford Consensus is a document which resulted from collaboration between the American College of Surgeons and the Federal Bureau of Investigation (FBI) in Hartford, Connecticut in response to poor survival during active shooter (AS) incidents. Victims of AS incidents typically succumb to their injuries as a result of hemorrhage, resulting in control of hemorrhage becoming the most critical point to be addressed by first responders.

According to the traditionally established Zones of Safety (Cold, Warm, Hot) which are designed to prevent or mitigate risk to responders to critical incidents in the field, the Hot Zone is considered to be the Danger Zone, the Warm Zone is considered to be a Not Secure Zone, and the Cold Zone is considered to be the Safe Zone. Despite the lack of true safety within the Warm Zone, the Hartford Consensus determined that additional loss of life due to hemorrhage during AS situations was critical enough to warrant that it be managed within the Warm Zone. Once hemorrhage has been adequately controlled, the patients should be quickly extricated and moved into the Cold Zone for further medical stabilization prior to transport.

17.

You are called to aid in the medical air transport of victims who were involved in a motor vehicle accident involving three cars in a rural area. According to Incident Command System guidelines, an incident such as the one described in this scenario is considered to be a(n):

Mass casualty incident

Interagency incident

Command function incident

Hazardous materials incident

Correct answer: Mass casualty incident

The management system responsible for the establishment of power of command at incident/accident scenes is referred to as the Incident Command System (ICS). This system functions through the use of a common set of terminology designed to improve communication, manages the emergency response during both major and minor incidents across their assigned geographical region(s), all of which facilitates seamless transition during incidents/accidents.

An example of the common language used by ICS is that of a "mass casualty incident." Neither the number of victims involved in an incident nor the actual size of the incident actually defines what makes an incident a "mass casualty incident," so much as does the actual location where the incident occurred, such as in a more rural area, and the associated resources available for response in that area.

The term "command function" refers to the need for one individual, or a group of individuals, to maintain authority during an incident.

18.

You are participating in a medical air transport mission and your patient experiences full cardiac arrest. The pilot of your aircraft may request priority landing in this situation by use of which of the following status codes?

Lifeguard status

Critical incident status

Code blue status

Expeditious landing status

Correct answer: Lifeguard status

Lifeguard status may be requested by medical air transport pilots in an attempt to obtain priority in landing due to critical or urgent medical incidents affecting their patients (or ill or injured crew members). The request to be granted lifeguard status should not be requested cavalierly, but should be requested only during urgent medical crises such as full cardiac arrest or a rapidly deteriorating condition. When lifeguard status is granted, all other aircraft are required to hold, delaying takeoff and landings at the cost of potentially thousands of dollars, in order to allow the aircraft which has received lifeguard status to expeditiously complete their urgent takeoff or landing.

19.

You are preparing to serve as a commercial medical escort for a stable patient who requires medical air transport. The patient requires oxygen. *Most* commercial airlines are able to provide oxygen delivered at a rate of:

2 to 4 L/min

Up to 10 L/min

2 to 8 L/min

Up to 15 L/min

Correct answer: 2 to 4 L/min

At times, members of the medical air transport crew may be called upon to aid in transporting a patient via a commercial airline carrier. This type of medical air transport is referred to as commercial medical escort and may involve one member of the medical air transport crew serving as escort to a medically stable patient, or it may involve the entire crew (or several members of the crew) stabilizing a critically ill patient and escorting them to their destination by use of a commercial airline. Commercial airlines are equipped to deliver oxygen to their passengers, most often at a rate of only 2 to 4 L/min.

If the patient requires oxygen at a higher flow rate, or requires the delivery of 100% oxygen, oxygen tanks should be obtained at least 24 hours in advance of the travel, and ideally, several days prior to the planned travel.

20.

What is the average time of useful consciousness (TUC) in a nonpressurized aircraft at 18,000 feet?

30 minutes

3-5 minutes

10 minutes

15 minutes

Correct answer: 30 minutes

TUC refers to the elapsed time from the point of exposure to an oxygen-deficient environment to the point at which deliberate function is lost. With the loss of effective flight performance, an individual can no longer take the proper corrective or protective action. Thus, for air medical personnel, the emphasis is on prevention. ***At an altitude of 18,000 feet (and lower), TUC is approximately 30 minutes.***

At an altitude of 25,000 feet in a nonpressurized aircraft, TUC is only 3-5 minutes.

21.

The essential components of the Emergency Medical Transport and Active Labor Transport Act (EMTALA) include all the following, except:

Facilities that provide higher levels of care must always accept a patient from a referring facility.

All patients who present to an ED must receive a nondiscriminatory medical screening.

A patient with a medical emergency must be stabilized within the capabilities of the transferring hospital.

If a patient is transferred for further care, the referring hospital must send all copies of medical records.

Correct answer: Facilities that provide higher levels of care must always accept a patient from a referring facility.

*EMTALA furnishes guidelines, regulations, and penalties that govern patient transfer and transport. It requires all patients who present to an ED to receive a nondiscriminatory medical screening to determine whether a medical emergency is present. The referring facilities must stabilize the patient before transport to the best of their ability, and receiving facilities must have an accepting physician and a place for the patient before transport (**they do not always have to accept the patient**).*

Qualified medical personnel must determine and document that the transfer and transport benefits outweigh the risks of transport, and copies of medical records, diagnostic studies, and informed consent documents must be sent to the transfer hospital.

22.

The medical air transport crew is traveling at altitude with a patient. All of the following statements about the risks associated with travel at altitude are true **except**:

Risk of injury due to weather is greatest when traveling at altitude

Your patient will be at increasing risk of hypothermia with increasing altitude until the tropopause is reached

Your patient will experience the greatest amount of pressure changes when the aircraft is closest to sea-level

Negative patient outcomes are greatest at cold, dry, high altitudes

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Correct answer: Risk of injury due to weather is greatest when traveling at altitude

Every member of the medical air transport team is at risk of negative effects when traveling at altitude, and these risks are greatest when the team travels at cold, dry, high altitudes. As the greatest amount of pressure changes take place closest to sea-level, your patient is at increased risk of barotrauma injuries when traveling at or through low altitude. The risk of experiencing negative outcomes due to temperature change increases with an increase in the aircraft altitude, as temperature drops by 2 degrees Celsius with each 1,000 foot increase in elevation. Once the tropopause has been reached, temperature-related risks cease to increase with altitude; the tropopause is the point where temperature has reached its lowest possible point and then remains fixed at that level.

Weather related concerns which can complicate air travel, posing risk of injury, occur at any altitude; crew members should always be prepared to encounter weather.

23.

What is considered to be the most dangerous component of a helicopter?

The tail rotor

The main rotor blades

The landing skids

The rotor mast

Correct answer: The tail rotor

*The most obvious component of the helicopter that presents a risk is the rotor system, and the **tail rotor** is potentially the most hazardous component of the helicopter. It becomes nearly invisible when in motion, with speeds greater than 2000 rpm. A safety person should be designated at all unsecured landing sites to ensure that no one inadvertently walks near the tail rotor.*

All individuals who approach the helicopter must do so in full view of the pilot and should not proceed under the rotor disk without the pilot's permission. The safety approach zone for most helicopters is from the sides (at the 3 o'clock or 9 o'clock position).

24.

Which of the following breathing techniques **most accurately** describes the use of tactical breathing?

Inhaling for 4 seconds, holding the inhaled breath for 4 seconds, exhaling for 4 seconds, then holding the exhale for 4 seconds

Inhaling for 4 seconds, holding the inhaled breath for 7 seconds, then exhaling for 8 seconds

Breathe in slowly through the nose, then exhale slowly through pursed lips

Inhale slowly for a count of 15, then exhale slowly for a count of 30

Correct answer: Inhaling for 4 seconds, holding the inhaled breath for 4 seconds, exhaling for 4 seconds, then holding the exhale for 4 seconds

Tactical breathing is a breathing technique that was designed by the military for use in extremely stressful situations to try to help military personnel quickly de-escalate from their stress and be able to continue working within the stressful environment. This breathing technique aids in lowering heart rate and stress levels, and can help in moderating the surge in sympathetic nervous system activity in direct response to stress.

The technique of inhaling for 4 seconds, holding holding the inhaled breath for 7 seconds, then exhaling for 8 seconds, is referred to as "relaxing breath" or the "4-7-8 breathing technique" and is used to help in falling asleep or decreasing anxiety.

Pursed lip breathing is useful for improving shortness of breath.

25.

Health Insurance Portability and Accountability Act (HIPAA) is a federal law intended to protect patient health information (PHI) and simplify the means by which healthcare providers electronically file and transmit healthcare claims.

Implications of this law to transport teams include all the following, except:

Team members must obtain a signed Notice of Privacy from the patient and/or the family before transport.

Oral and written information about the patient must be protected and appropriately stored.

Team members must undergo mandatory HIPAA training on how to comply with HIPAA regulations.

Team members may share PHI about the patient with providers at a scene and at a referring hospital without the patient's consent.

Correct answer: Team members must obtain a signed Notice of Privacy from the patient and/or the family before transport.

Patients should receive a Notice of Privacy Practices. However, this notice is not given before/during the transport process but should be provided after the emergency has passed.

The other answer choices are correct.

26.

You are the CTRN/CFRN assigned to a transport team en route to the scene of a rollover motor vehicle accident (MVA) by rotor-wing aircraft. Prearrival considerations include all the following components, except:

Type of insurance victims have

Time of day

Number of victims

Weather conditions

Correct answer: Type of insurance victims have

Prearrival/en route considerations include communication through a communications center about the location, terrain, number of victims, weather conditions, and time of day, as well as information about any fire, spilled fuel, toxic chemicals, overturned or entangled vehicles, and downed electrical lines.

Collecting information about the type of insurance that the victims may have is not an important consideration at this point.

27.

A landing zone should generally be what size?

100 ft x 100 ft

25 ft x 25 ft

70 ft x 70 ft

60 ft x 60 ft

Correct answer: 100 ft x 100 ft

Generally 100 ft x 100 ft is a large enough landing zone. The other options are too small.

28.

Which of the following statements regarding emergency locator transmitters (ELT) on emergency medical services (EMS) aircraft is **most accurate**?

The ELT can be activated manually or automatically

The ELT is automatically activated in response to an impact of 3 Gs or less

The ELT transmission is broadcast on distress frequency 121.5 MHz which is monitored by the COSPAS-SARSAT search and rescue satellite system

The Federal Aviation Administration (FAA) requires that the ELT transmit its distress signal on frequency 405 MHz, which provides information about the aircraft's global positioning system (GPS) location

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Correct answer: The ELT can be activated manually or automatically

The Federal Aviation Administration (FAA) requires all EMS aircraft to have an emergency locator transmitter (ELT) on board in the incident of aircraft crash. Each crew member, including the members of the medical air transport crew, should know the position of the ELT(s) and should be instructed on how to activate the ELT manually if it is not automatically activated by the crash. ELTs should automatically activate in response to a crash that exceeds 4 G forces, but this should be confirmed by a crew member, not just assumed.

Distress signals are broadcast over frequencies 121.5 MHz and 406 MHz; distress frequency 121.5 MHz is no longer monitored by the COSPAS-SARSAT (an international humanitarian search and rescue organization) search and rescue satellite system.

29.

Considerations of the effects of noise on the transport environment include all the following, except:

The only requirement for airtight earplugs during flight operations is to ensure the plugs are in place during descent.

Transport team members should have hearing tests annually.

A headset or earmuffs should be placed on all patients in transport.

Noise can cause increased fatigue for both the transport team and the patient during the transport process.

Correct answer: The only requirement for airtight earplugs during flight operations is to ensure the plugs are in place during descent.

Earplugs must fit tightly to offer the maximum allowable attenuation; however, they must be removed before descent because pressure changes that result from decreased altitude tend to pull the plugs inward toward the tympanic membrane.

The other choices are accurate when considering the effects of noise on the transport environment.

30.

In a survival situation, transport team members should establish priorities by following the *rule of threes*. These rules state that the average person can survive under all the following conditions, except:

Three weeks without water

Three minutes without oxygen

Three hours without shelter in extreme conditions

Three weeks without food

Correct answer: Three weeks without water

The average person can survive 3 minutes without oxygen (unconsciousness) or in icy water, 3 hours in a harsh environment (extreme heat or cold), ***3 days without drinkable water****, and 3 weeks without food.*

Once safety and immediate medical concerns have been addressed, the rule of threes should guide priority setting. The immediate priorities should be finding or creating shelter, building a fire, taking steps to maintain hydration, and signaling by whatever means possible.

31.

The motion of objects relative to the patient during rotor-wing transport may contribute to:

Elevated respiration rate

Reduced muscular contraction

Decreased pain

Improved visual acuity

Correct answer: Elevated respiration rate

Both air and land vehicle transportation result in vibration (motion of object relative to the patient) during transport and contribute to that patient experiencing increased pain, muscular contraction and respiratory rate, as well as decreased visual acuity.

32.

You and your crew are flying back to base from a patient transfer. You begin to notice you can’t pronounce your words correctly and you feel drunk. Which hypoxic zone are you in?

Disturbance

Indifferent

Critical

Compensatory

Correct answer: Disturbance

The zone of disturbance is characterized by the feeling of being drunk, motor function impairment, and impaired judgement.

Indifferent is when the body is not experiencing any significant changes to oxygen levels. Critical is characterized by loss of consciousness and, eventually, death. Compensatory stage will show increased heart rate, increased respirations, and slower thinking.

33.

In the event of an open-water emergency landing in which the survivors are too far from shore to be able to reasonably swim, which of the following survival strategies may be the **next best** step?

Assume the HELP posture

Huddle together

Wear a flight helmet

Begin signaling for help

Correct answer: Assume the HELP posture

If involved in an open-water landing while part of a medical air transport mission, all survivors should attempt to reach the shore. If this is not possible due to extreme far distance from shore or in the case of injured parties whose injuries prevent them from attempting to swim to shore, the next best step is for survivors to assume the HELP position in an attempt to try to prevent the development of hypothermia. HELP stands for heat escape-lessening posture and involves placing oneself in the fetal position with knees tucked up against the chest and arms crossed over the chest. A flotation device must be worn when using the HELP position.

Flight helmets should be worn when in the water, as they provide a degree of insulation, and can aid in being spotted by rescuers. Survivors should then huddle together to, again, decrease development of hypothermia, and should signal to would-be rescuers. In addition, any life rafts should be carefully maintained.

34.

Which of the following statements regarding international medical air transport of injured or ill patients is **most accurate**?

International transport requires the use of redundant medical systems

International transport may occur through use of commercial airline aircraft

International transport occurs through collaboration between medical air transport services and commercial airlines

International transport operations is overseen by the patient's country of origin

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Correct answer: International transport requires the use of redundant medical systems

In years past, medical air transport was limited primarily to domestic transport only, but in recent years, the need for international medical air transport has grown, making the need to fully comprehend the logistics of international air transport important for the medical crew. Commercial airline aircraft may not be utilized for the transport of medical patients depending upon transport restrictions; consequently, many air transport programs have extended their services to now include international transport. Due to the potential limitations of medical equipment, staff, pharmaceuticals, and other supplies in other countries, it is necessary for international transport aircraft to utilize redundant medical systems and equipment to ensure safe transport of their patients.

35.

The pilot of a medical air transport en route in delivery of a patient has announced that the aircraft is experiencing significant engine problems and the flight should prepare for crash. All of the following procedures are standard as part of the pre-crash sequence **except**:

Assume the crash position with knees together, feet 6 feet apart, and placed under the seat

Turn off all oxygen in use, removing it from the patient

Assist in laying the patient flat on the floor and ask them to cross their arms across their chest if possible

Ensure helmets are strapped tightly with visor down

Correct answer: Assume the crash position with knees together, feet 6 feet apart, and placed under the seat

The design of all aircraft continues to evolve and change in an attempt to improve survival during aircraft crashes. Landing gear, fuel systems, and aircraft seat design are all aspects of the aircraft that have undergone significant improvements in recent years to ensure these systems specifically are more capable of withstanding the massive forces experienced during a crash. Aircraft seats are now designed to both absorb the energy of a crash and decrease the G forces experienced by the individuals occupying the seats. This being said, aircraft seats will break apart with a crash landing, and all passengers of the aircraft should ensure that when they assume the crash position, their legs are not positioned under the seats.

36.

Which act protects indigent uninsured patients from being denied access to emergency care by hospitals or from being transferred inappropriately between hospitals based on the patient's ability to pay?

COBRA

HIPAA

EMTALA

Affordable Care Act

Correct answer: COBRA

HIPAA was enacted to protect patient privacy. EMTALA is a law contained within the COBRA act. Affordable care act is the new health care insurance also known as Obamacare.

37.

Three medical transport helicopters are onsite during a trench cave-in rescue site. Which of the following statements **most accurately** reflects the expected professional behavior of each of the respective medical flight crew members in regard to interacting with the other flight crews onsite?

Medical flight crew members should remain in contact with their own pilot via radio contact

Flight crew members must never walk under another helicopter's rotor disk

Flight crew members should rely on their own pilot to provide direct radio communication to the other flight crews

Flight crew members may work together as teams in loading rescued patients into each medical transport helicopter

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Correct answer: Medical flight crew members should remain in contact with their own pilot via radio contact

During some instances of accident site rescue, multiple medical air transport aircraft may be present. The crews of each respective aircraft are expected to demonstrate professional behavior through strong communication and respect for each aircraft and crew member. Crew members must remain in contact with their own pilot through the use of radio communication, and should also be in contact with the pilot and/or crew of the other respective aircraft by relaying messages through their own pilot, by the use of hand signals, or by direct radio contact with the pilot or crew members of the other aircraft.

Medical flight crew members may only approach or pass under the rotor disk of another aircraft after they have obtained permission from that pilot. Medical flight crew members typically work together in loading rescued patients into their own aircraft.

38.

On the descent from altitude, pressure in the middle ear from the eustachian tube remaining closed can cause ear pain. Equalization of this pressure and a resolution of pain can be accomplished by performing all the following techniques, except:

Gum chewing

Valsalva's maneuver

Yawning

Topical administration of vasoconstrictors

Correct answer: Gum chewing

During flight ascent, air in the middle ear cavity expands but normally vents into the throat through the eustachian tube when a pressure differential of approximately 15 mm Hg has been reached. A mild fullness may be felt but resolves as equalization occurs.

On a descent, however, the eustachian tube remains closed unless actively opened by muscle action or high positive pressure in the nasopharynx. If the tube does not open regularly during descent, a pressure differential may develop, causing pain and requiring equalization of pressure in the middle ear. This can be accomplished through the following techniques:

- *Valsalva's maneuver*
- *Yawning*
- *Swallowing*
- *Moving the lower jaw*
- *Topical administration of vasoconstrictors*
- *Use of a bag-valve mask*

*Gum chewing is **not recommended** because it causes swallowing of air, leading to gastric distention and discomfort.*

39.

Steps to ensure an effective message is conveyed from one transport team member to another include all the following, except:

Stating no more than two ideas at a time

Stating things simply to describe a current problem

Encouraging feedback

Repeating and explaining as required

Correct answer: Stating no more than two ideas at a time

Each team member must have the skills and sensitivity to transmit information in an increasingly clear, bold, and concise manner as the team faces challenges and hazards. Steps to ensure an effective message include the following:

- ***Stating one idea at a time***
- *Stating things simply*
- *Encourage feedback*
- *Repeat and explain as required*

40.

The crew of a medical air transport aircraft has been involved in an emergency landing situation in wilderness terrain. All of the following are considered to be acceptable sources of water for hydration **except**:

Snow

Dew

Puddles

Condensation on the aircraft windshield

Correct answer: Snow

In the event of an emergency landing or crash of a medical air transport aircraft in a wilderness location, after assessing survivors for injuries and providing for medical stabilization, priority should be placed on obtaining water for drinking. Acceptable sources of water include dew found on plant leaves or other surfaces, running water sources such as streams or rivers, standing surface water such as puddles, or condensation that collects on surfaces such as the aircraft windshield. All water should be purified prior to drinking either by the use of purification tablets included in survival kits or by boiling or filtering of the water.

Snow should not be ingested to provide water, as this can cause heat loss and contribute to hypothermia; instead, it should be melted over fire or in the sun to bring the water temperature up to a more temperate level.

41.

In an emergency survival situation, what should be the first choice for an emergency shelter?

The crashed aircraft or vehicle

A natural shelter such as a cave

A shelter constructed from natural materials such as trees, branches, brush, logs, and rocks

A tent constructed with the emergency Mylar plastic space blanket

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Correct answer: The crashed aircraft or vehicle

All medical transport crew members need to be prepared to face the possibility of a survival situation. An emergency shelter should be as simple to construct as possible and provide protection from wind, rain, snow, sun, extremes in temperatures, and animals. The aircraft or vehicle should be the first choice for an emergency shelter.

If the downed aircraft or damaged vehicle is not available or safe to use as shelter, a shelter must be located or constructed and can be natural (a cave, rock overhang, or large trees). If a shelter needs to be constructed, a variety of materials may be used, such as trees, branches, brush, logs, and rocks. Mylar plastic space blankets are not conducive to creating a shelter, as they tear easily; however, they are effective at reflecting heat.

42.

Which of the following statements **best** describes how the process of stress inoculation protects the members of the medical air transport team against the effects of stress?

During stress inoculation, the individual is repeatedly exposed to a potentially stressful situation through simulation exercises

During stress inoculation, the individual rehearses how she will work through a potentially stressful situation

During stress inoculation, the individual role plays with other individuals through a potentially stressful situation

During stress inoculation, the individual discusses plans and strategies on how to manage a potentially stressful situation with the team

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Correct answer: During stress inoculation, the individual is repeatedly exposed to a potentially stressful situation through simulation exercises

Stress inoculation is a therapeutic technique which was designed to help individuals to prepare for exposure to stressful situations. As its name suggests, the individual (or team) is repeatedly exposed to the stressful situation through the use of high-fidelity simulation exercises in hopes of allowing the individual to gain "immunity" to the stressful environment through the repeated exposures. In addition, the hope is for the individual to learn successful coping techniques to employ during the simulation exercises, so that when the individual is faced with the actual stressful event, not only will they naturally not respond to the stressor in a heightened manner, but they also will have already established familiar coping techniques which they can rely upon.

43.

Which of the following basic models of air medical programs in the United States is the oldest?

Traditional model

Community-based model

Hybrid model

Government-operated model

Correct answer: Traditional model

The oldest air medical program model is the so-called "traditional model," in which hospitals or other healthcare agencies contract a third-party operator to provide aircraft, pilots, and maintenance while providing medical personnel and management themselves. These models have declined recently as other air medical program models have emerged and hospitals look to cut costs.

A "community-based model" involves a company that manages the helicopters, personnel, and support separate from a specific local hospital/health care agency. An "alternative delivery model" or "hybrid model" is one of the newest models and involves a mix of traditional and community-based models. A partnership exists between a healthcare agency and a private company in this model, allowing both to contribute something to the program. In a "government-operated" model, the government takes direct responsibility for providing air ambulance operations in specific regions (the least common model).

44.

You are part of a medical air transport crew who has been asked to provide international transport of a patient who fell ill while on a cruise in international waters. Regarding the transport of medications during international medical air transport:

Special medication permits allowing transport may be required

Medical crew members may be asked to transport patient medications in their luggage

Patient medications may be transported in the patient's luggage

The referring hospital may provide patient-specific medications in some instances

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Correct answer: Special medication permits allowing transport may be required

Many logistical details must be attended to when planning for the medical air transport of patients to or from other countries. It is not uncommon for countries to have policies in place requiring the medical air transport crew to obtain special permits for the transport of specific medications, or to have specific requirements in place, such as following certain packaging guidelines, when certain medications are needed for transport. Failure to comply with these requirements or failure to identify country-specific requirements may result in delay of the transport flight or even confiscation of needed medications.

All medications should be appropriately packaged in clearly labeled medication kits or other medical packs, and should not ever be carried in the personal luggage of either the patient or any crew members.

45.

Vibrations during both ground and air medical transport can contribute to all the following reactions in a patient, except:

A decrease in pain from injuries

An increase in respiratory rate

An increase in muscle activity

A decrease in visual acuity

Correct answer: A decrease in pain from injuries

When a human body is in direct contact with a source of whole-body vibration (e.g., with helicopters, fixed-wing aircraft, and ground transport vehicles), the body's response is:

- *an increase in muscle activity to maintain posture*
- *an increase in metabolic rate*
- *an increase in respiration to achieve the necessary increase in the elimination of carbon dioxide (CO_2)*
- *an **increase in pain** from injuries such as fractures or disease states*
- *a decrease in visual acuity*

To minimize reactions to vibrations during patient transport, crew members should properly secure patients, encourage and assist them with position changes, and provide adequate padding and skin care.

46.

Studies with a true experimental design contain all the following elements, except:

Validity

Manipulation

Randomization

Control

Correct answer: Validity

Experimental study design elements include manipulation, randomization, and control. Manipulation is evidenced in interventional studies in which one group receives an intervention, whereas a control group does not. Randomization ensures that all subjects have an equal chance of assignment to either the control or the experimental group. Control refers to the researcher's ability to limit the influence of confounding or extraneous variables. Most clinical studies are not true experiments and are classified as quasi-experimental studies because one or more of these three key elements is missing.

Validity asks how well tools measure what they are supposed to measure. Validity should always be considered for any type of research study.

47.

In the event of an emergency landing of medical air transport aircraft, the need for food is considered to be:

Low priority

Medium priority

High priority

Critical priority

Correct answer: Low priority

Unless the survivors of a medical air transport crew are expected to survive for longer than 4 to 5 days, the need for food is considered to be of low priority.

Once the need for long term survival (greater than 4 to 5 days) has been determined, food then becomes a higher priority as decreased ability to reason/think, possibility of hypothermia, and depression may all begin to occur as a result of depleted calorie stores.

48.

What are the signs and symptoms of a person in the compensatory phase of hypoxia?

Increased heart rate, increased respirations, slowed thinking

Slurred speech, cyanosis, sleepiness, decreased muscle coordination

Mental confusion followed by unconsciousness

Person will not exhibit signs

Correct answer: Increased heart rate, increased respirations, slowed thinking

Compensatory hypoxia occurs between 10,000 and 15,000 ft altitude. Here, the body begins to compensate for decreased amounts of oxygen by increasing heart and respiratory rates to continue to supply tissues with oxygen. Thinking begins to become a little harder.

Slurred speech, cyanosis, and decreased muscle coordination occur in the disturbance stage of hypoxia which occurs at 15-20,000 ft. Here, the person may feel and act drunk. At altitudes greater than 20,000 feet, the critical stage of hypoxia occurs, and the person will have mental confusion, possible euphoria, and eventually will lose consciousness and die if supplemental oxygen is not applied or the flight crew descends immediately. A person will not exhibit any signs when they are in the physiologic zone that ranges from sea level to 10,000 feet; this stage is known as the indifferent stage.

49.

A patient with a tension pneumothorax would experience which type of hypoxia?

Stagnant hypoxia

Histotoxic hypoxia

Hypoxic hypoxia

Hypemic hypoxia

Correct answer: Stagnant hypoxia

A tension pneumothorax compresses the mediastinum and vena cava, thus restricting the flow of blood, which is the definition of stagnant hypoxia.

Histotoxic hypoxia is caused by toxins preventing the uptake of oxygen at the cellular level. Hypoxic hypoxia occurs when there is not enough oxygen in the air. Hypemic hypoxia results when patients have had a loss of blood or reduced number of red blood cells able to to carry oxygen to the tissues.

50.

The use of which of the following translation or interpretation options is considered **best** practice when providing international transport of ill or injured patients?

Phone line medical professional translator

Family members

Insurance company provided translator

Air services program translator

Correct answer: Phone line medical professional translator

For the medical air transport crew members who participate in international transport services, encountering language barriers will be commonplace. Best practice recommends use of a translator trained in and familiar with the translation and interpretation of language specific to medical care, but in less than ideal situations when this is not available, the medical flight crew may need to rely on the translation services of individuals available through insurance companies, travel assistance programs, or the coordination teams for international medical air transport.

Family members should be utilized for translation and interpretation only as a last resort when no other options exist. In addition, medical crew members should attempt to learn basic words in the patient's native language which can aid in providing care, such as words on how to describe chest pain or the need to use the restroom.

51.

Which law describes the total pressure is the sum of all partial pressures?

Dalton’s Law

Boyle’s Law

Henry’s Law

Fick’s Law

Correct answer: Dalton’s Law

Dalton’s Equation is Total Pressure = P_1+P_2+P_3. As altitude increases, the partial pressure of oxygen decreases, thus increasing the need for supplemental oxygen. Remember “Dalton’s Gang.“ The total pressure is a sum of partial pressures, like a gang is a sum of its members.

Boyle’s law deals with expansion of gas at changing pressures. Henry’s law defines the ability of a gas to go into or out of a solution. Fick’s law describes how a gas moves across a membrane based upon its thickness.

52.

When a nurse is developing a checklist to be used for transport, which of the following should be considered?

The length should be one page or shorter.

Five items or fewer should be listed in each workflow section.

Checklists should be printed on brightly colored paper for attention.

Checklists should not be modified once they are implemented.

Correct answer: Length should be one page or shorter

A checklist is not a teaching tool or algorithm but a performance aid. Some traits of a well-written transport checklist include the following:

- *Each workflow section should not contain more than 10 items.*
- *Checklists on colored paper may not be clearly copied, so minimal colors or basic colors should be utilized (if any).*
- *Checklists are more useful on **single pages** and should be modified as needed.*
- *The font should be easily readable.*

53.

The pilot of a medical air transport flight instructs the crew to prepare for an emergency landing on water due to engine fire. The crew members should take all of the following steps prior to impact with the water **except**:

Jettison the aircraft doors

Plan their escape path

Place one hand on their seat belt buckle

Place one hand on a known reference point within the aircraft

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Correct answer: Jettison the aircraft doors

In the event of a planned emergency ditching, the crew of a medical air transport aircraft should take several steps in an attempt to improve survivability. Crew members should assume the crash position, making sure their legs/knees are not placed under any of the aircraft seats, and should then begin planning how they will escape from the aircraft after impact. They should know exactly where the nearest door is in relation to their crash position, and keep one hand placed on a known point of reference within the aircraft to help prevent disorientation after the crash. One hand should be left on the seat belt buckle so that it can be easily released after impact in the water. Each crew member should also disconnect their ICS (Incident Command System) cable.

Doors should only be opened or jettisoned at the direction of the pilot; otherwise, doors should be left closed and intact.

54.

As a member of the medical air transport crew you are required to be knowledgeable in the use of fire extinguishers located on the medical air transport aircraft in the event of fire on the aircraft. **Most** aircraft fire extinguishers are filled with:

Halon

Carbon dioxide

Foam

Monoammonium phosphate

Correct answer: Halon

Engine fires and cabin fires are the two comprehensive classifications of fires which may occur during medical air transport; all aircraft are required to carry fire extinguishers for this possibility. All members of the medical air transport crew are required to be trained in and familiar with the use of aircraft fire extinguishers, as well as trained in the other steps of managing an aircraft fire. Most aircraft fire extinguishers are filled with halon gas, which is an eco-friendly, non-conductive gas which leaves no residue when discharged and is safe to be used with people present. The gas works by reducing oxygen levels, posing risk of asphyxiation if used in an enclosed area (such as an aircraft); if necessary, the aircraft should be ventilated by opening windows or doors if no other means of ventilation is available.

55.

The medical air transport crew has responded to the scene of a hazardous materials (hazmat) incident. In which of the zones of operation established by the Hazmat Crew are the medical air transport crew members required to stage?

The Cold Zone

The Warm Zone

The Hot Zone

The Temperate Zone

Correct answer: The Cold Zone

Hazardous Material (Hazmat) crews are responsible for the establishment of zones of operation (Cold, Warm, and Hot), in which the various first responder and rescue personnel must work in order to minimize and prevent risk to these personnel. The members of the medical air transport crew are required to stage within the Cold Zone, the area farthest away from the actual incident site. This distance from the incident site is established to prevent contamination of the of the medical transport aircraft, as well as to prevent injury to those parties involved in the rescue and transport of already injured victims.

Responders who are specially trained in operations levels work and stage within the Warm Zone, and only responders trained as hazmat technicians may operate within the Hot Zone.

56.

Which of the following is true regarding a PAIP (post-accident incident plan)?

The PAIP should indicate which administrative personnel should be notified for each specific set of circumstances.

The PAIP is for accidents and injuries, loss of communication with the aircraft, and overdue aircraft incidents.

The PAIP must include monthly drills, both during daytime and nighttime operations.

The PAIP should not involve the families of those who may be injured or killed during an accident or incident.

Correct answer: The PAIP should indicate which administrative personnel should be notified for each specific set of circumstances.

Every transport team must have a written plan in the event of an incident such as a vehicle accident. Each program should identify which incidents trigger this plan. This is referred to as a PAIP and must be easily identifiable, readily available, and understood by all of the transport team members. The PAIP should indicate which administrative personnel should be notified for each specific set of circumstances. In the event of an aircraft crash or another significant event, an administrative crisis team should be assembled. The members of this team and their duties should be clearly described in the PAIP.

*For some programs, the PAIP is limited to accidents and injuries, loss of communications with the aircraft, and overdue aircraft incidents. Other programs use the PAIP as a notification system for a wider variety of situations. The PAIP must include **twice yearly** (not monthly) drills, one during daytime and one during nighttime operations. The PAIP **should involve** follow-through with the family and others who may have been involved in the event.*

57.

A patient with a suspected pneumothorax is being transported by rotor-wing aircraft at an altitude of 10,000 feet. The patient begins to complain of feeling cold and requests extra blankets for warmth. Which of the following gas laws may explain this symptom the patient is experiencing?

Gay-Lussac's law

Boyle's law

Dalton's law

Charles' law

Correct answer: Gay-Lussac's law

This law states that at higher altitudes, pressure will decrease, and thus it will be cooler. As the transport team ascends into the atmosphere, the team members are subjected to less pressure; therefore, as altitude increases, pressure and temperature decrease.

Ultimately, as passengers and equipment travel higher in an unpressurized aircraft, they will experience colder temperatures. Because of this, passengers may need more warmth.

58.

The pilot of a fixed-wing aircraft who is providing medical air transport is being guided during her flight by air traffic control. This manner of flight is referred to as:

Instrument flight

Air traffic control systems flight

Inadvertent instrument meteorological flight

Visual flight

Correct answer: Instrument flight

Instrument flight rules (IFR) govern flight operations when conditions necessitate flying solely by instrument guidance, versus allowing the pilot to use visual flight rules (VFR) to govern the flight. Flying under IFR is common when traveling in a fixed-wing aircraft, but is less commonly used when piloting helicopters. IFR is utilized most commonly when weather conditions do not permit safe flight by use of VFR, and during use of IFR, air traffic control surveils the aircraft's position on radar, providing detailed instructions to keep the aircraft on a safe flight path.

VFR apply solely when weather and terrain conditions permit the pilot to operate the aircraft using visual surveillance, and instruments are not utilized during VFR flights.

Inadvertent instrument meteorological flight conditions (IIMC) indicate that when the flight was initiated, weather conditions and the surrounding terrain permitted flight by VFR but, once flying, the pilot encountered unexpected weather that necessitated flying by IFR.

59.

Which law describes that lower molecular weight molecules move with higher diffusion rates through a membrane?

Graham's Law

Boyle's Law

Dalton's Law

Henry's Law

Correct answer: Graham's Law

Graham's Law states that the rate of diffusion of a gas through a liquid medium is directly related to the solubility of the gas and inversely proportional to the square root of its density.

Boyle's Law relates gas pressure to volume. Dalton's law tells us the pressure of a gas is the sum total of all partial pressures. Henry's Law describes gas diffusion into a liquid.

60.

According to the Air and Surface Transport Nurses Association (ASTNA) recommended measures on the transport of combative patients via medical air transport, which of the following statements is **most accurate**?

Medical air transport programs must draft protocols for transporting combative or potentially combative patients

Combative or potentially combative patients may not be transported via medical air transport

The use of pharmacological restraints (versus physical restraints) is preferred when transporting combative or potentially combative patients

Physical restraints may not be utilized when transporting combative or potentially combative patients

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Correct answer: Medical air transport programs must draft protocols for transporting combative or potentially combative patients

The Air and Surface Transport Nurses Association (ASTNA) has published several position papers on their recommendations for improving the safety of flight nurses while on duty. A recommendation addressing the transport of combative or potentially combative patients by air medical transport states that each air medical transport program should draft their own protocols and/or policies detailing the need to use restraints, pharmacological or physical, when transporting these patients.

61.

Which of the following statements regarding the effects of noise on work performance is **most accurate?**

Exposure to continuous noise has little effect on work performance

Exposure to intermittent noise has little effect on work performance

When attempting to complete complex tasks, exposure to any noise increases errors

When attempting to complete any task, exposure to new noise causes significant interruption in task completion

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Correct answer: Exposure to continuous noise has little effect on work performance

Noise exposure is considered a stressor which may have significant effect on work completion, performance, and efficiency. Exposure to continuous noise, such as aircraft engine noise, appears to have little effect on work performance, particularly if the tasks being completed are simple in nature and familiar.

If the complexity of the task increases, then exposure to continuous loud noise (above 95 decibels) can contribute to an increase in the number of errors and decrease efficiency. Intermittent noises actually cause more disruption in work performance than continuous noise, especially if the noise occurs unpredictably, is new, or is very loud. Exposure to new noises is most likely to significantly impact performance only if the task is very complex or unfamiliar, and typically the individual's performance will improve as he becomes accustomed to the noise and his familiarity with the task increases.

62.

The medical air flight crew is transporting a patient from the scene of a night time multi-vehicle accident which took place on a major interstate to the trauma center, when a member of the medical flight crew begins to experience motion sickness and is no longer able to provide care to the patient. This member of the flight crew is **most likely** experiencing motion sickness as a result of which of the following?

Spatial disorientation

Flicker vertigo

Fuel vapors

Hypoxia

Correct answer: Spatial disorientation

During air travel, individuals may experience the effects of spatial disorientation which results from the individual's inability to accurately perceive their own position and/or motion in relation to the earth. Flight crew members may experience deficits in equilibrium, resulting in visual, vestibular, and proprioceptive changes. Vision is most significantly affected by equilibrium deficits, and may result in a crew member becoming motion sick during night flights as a result of staring at bright lights at night (as those which may be encountered on a major roadway). Flight crew members may also visualize cloud formations which they misidentify as being the horizon or even the ground, visual landmarks may appear to be farther away than they actually are, and the pilot may become confused during night transports and believe that other traveling aircraft are moving away from him when in actuality it is moving closer. Ensuring the flight crew members are adequately rested, hydrated, and appropriately fed, as well as the avoidance of staring at lights, can help to prevent spatial disorientation during night flights.

63.

Documentation by the transport team should reflect all the following components, except:

Preapproved check-off sheets related to all the treatments received during transport

Reason for patient transfer

Interventions performed before, during, and after transport

Response to interventions

Correct answer: Preapproved check-off sheets related to all the treatments received during transport

Specific documentation is required to maintain compliance with state EMS regulations, standards set by accrediting bodies, and sponsoring hospital requirements. The reason the patient was transported, all interventions, and patient responses should be documented on the patient record.

***Checklists should be avoided** because they do not allow for documentation of critical thinking that should be used when making decisions about patient care (e.g., documenting why intubation was chosen to manage a patient's airway). This prevents other interpretations of why care was given.*

64.

Which of the following is not a cause of hypoxia?

A low PaO_2

Pathologic condition of the lung

High altitude

Hypoventilation

Correct answer: A low PaO_2

Hypoxia is a general term that describes the state of oxygen deficiency in the tissues. It refers to a decrease in tissue oxygen or an oxygen supply inadequate to meet tissue needs. Hypoxia disrupts the intracellular oxidative process and impairs cellular function. Hypoxia has the three following causes:

1. *High altitude*
2. *Hypoventilation*
3. *Pathologic condition of the lung*

A low PaO_2 (or oxygen in the arterial blood) may not necessarily indicate inadequate tissue oxygenation (i.e., tissue hypoxia). In some instances, a low PaO_2 may be clinically acceptable.

65.

Which of the following components of a medical air transport helicopter is considered to be the **most** hazardous?

The tail rotor

The main overhead rotor

The fenestrated tail rotor

The engine exhaust port

Correct answer: The tail rotor

Multiple hazards are presented when working around the medical air transport helicopter, the most obvious of which is the main overhead rotor system. During startup or shutdown of the helicopter, the main overhead rotor blades spin at lower speeds, which allow the blades of the rotor to drop down below shoulder height of those working around the aircraft. That being said, the most hazardous component of a helicopter is its tail rotor, which spins at speeds greater than 2000 rpm, making it nearly invisible to the eye.

Measures have been taken to try to reduce risk from the tail rotor, improving safety, by the development of a fenestrated tail rotor system in which the tail rotor is enclosed within a housing system, and a tail-less rotor system. The engine exhaust port dispels exhaust which may be heated as high as 400 degrees Celsius, posing risk of burns.

66.

The crew of a medical air transport aircraft are meeting to discuss the potential transport of a bariatric patient. Prior to the takeoff of this medical transport, the pilot is responsible for completing all of the following calculations **except**:

Net weight of the aircraft

The patient's weight

The crew members combined weight

Weight of the fuel load

Correct answer: Net weight of the aircraft

The responsibility for calculating and managing all the weights associated with the aircraft falls to the pilot of the aircraft. Safe, optimal aircraft performance is predicated upon careful management of both weight and balance of the aircraft, and the pilot is responsible for daily management of the daily operational weight. The gross weight of an aircraft is not arbitrary, but is instead predetermined by the flight manual.

The pilot must request information regarding patient weight, particularly if the patient is a bariatric patient, total crew weight, weight of the fuel load and all equipment, and the weights of any additional passengers, such as family members of the patient, in determining whether it is safe to undertake the mission. The pilot may be required to eliminate weight from the aircraft, including refusing to allow family members to travel or leaving behind any unnecessary crew members or equipment, prior to takeoff.

67.

Which of the following statements **most accurately** defines the fixed-wing medical air transport method referred to as "swoop and scoop"?

Transfer of the patient on the tarmac

Removal of the patient from wilderness terrain incidents

Transport of the patient from hazardous materials (hazmat) incidents

Loading of the patient while the helicopter rotors are still in motion

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Correct answer: Transfer of the patient on the tarmac

Under most conditions, a thorough evaluation and assessment of the patient can be completed prior to packaging a patient for transport. In addition, typically, the patient is also stabilized prior to loading into the aircraft. In urgent situations, such as when a patient's condition is rapidly deteriorating or there is the potential for deterioration over the duration of the medical air transport, or when the patient is transferred on the tarmac, a method referred to as "swoop and scoop" may be employed. During a "swoop and scoop" transport situation, patient assessment and/or stabilization prior to packaging and loading may be omitted in favor of speeding up the transfer and transport time of the patient.

68.

Three crew members of a medical air transport mission have survived an emergency open-water landing, during which the pilot and 2 other crew members were killed. Which of the following factors poses the **greatest** threat to the ongoing survival of the crew?

Panic

Hypothermia

Contaminated water source

Injuries

Correct answer: Panic

All members of all medical air transport programs need to be highly trained in survival skills for emergency situations, such as during forced landings due to aircraft mechanical problems or dangerous weather situations or unforeseen changes to the mission preventing the crew from resuming transport. There are many factors that place the crew at risk of perishing in emergency situations like these, but the greatest of all the threats to crew survival is panic. Even the most highly trained crew member can become overwhelmed and paralyzed by fear or anxiety that leads to panic, which ultimately can cause the crew member to make rash decisions or to give up hope. Keeping a positive mental outlook and maintaining confidence in one's own ability to survive in an emergency situation does more to improve likelihood of survival than any other factor.

69.

At the scene of an accident, the risk of a secondary incident involving property damage or personal injury to responding transport team members is real. Factors associated with secondary incidents include all the following, except:

Establishing a traffic control zone

Lack of training

Lack of situational awareness

Inappropriate use of scene lighting

Correct answer: Establishing a traffic control zone

Landing zones should be secured by law enforcement or fire departments; it is important to establish a traffic control zone once a transport has landed. The landing area may be of sufficient distance from the incident that it requires a second traffic control zone to be established. If this is the case, the transport team should consider themselves as part of two separate incidents, with a need to operate safely in both and to plan the transit between scenes carefully.

Lack of training, lack of situational awareness, and inappropriate use of scene lighting are all factors associated with secondary incidents at the scene of an accident.

70.

During a night medical air transport mission, an experienced member of the medical crew becomes concerned that the (new) pilot is not flying at correct altitude for the mission route. All of the following actual statements of communicating concern in this scenario are correct and appropriate **except**:

"Hey, Buddy, we need to get this flight turned around or get to a higher altitude or we're all going to die tonight."

"Captain McDonald, I'm concerned that we are flying at too low of an altitude."

"Hey, Captain McDonald, there's a mountain ridge over there that we're going to slam into if you don't bring us up to a higher altitude."

"Captain McDonald, if you are unfamiliar with this flight path, I am asking you to abort the mission and turn back to avert a disaster."

Correct answer: "Hey, Buddy, we need to get this flight turned around or get to a higher altitude or we're all going to die tonight."

All members of the medical air transport mission need to be assertive enough to speak up and state their concerns in a situation, even when other or more senior team members do not agree with the position of concern. Assertiveness involves the need to maintain the opposing viewpoint either until they are persuaded to change their position based on the presentation of hard facts, or until the rest of the crew is compelled to change their stance due to a non-unanimous "vote."

When practicing assertiveness in potentially dangerous situations, there are several key components to appropriate communication.

First, show respect by using the individual's appropriate name, title, and/or rank when communicating. Denigrating the communication through the use of nicknames or other derogatory-type names that can be construed as disrespectful ("Hey, Buddy") is unacceptable and will not lend itself to clear and open communication.

Second, the concern needs to be stated clearly ("Captain McDonald, I'm concerned that we are flying at too low of an altitude."). Making a statement such as "Captain McDonald, don't you think our altitude is too low?" is a weak statement and leaves too much room for the pilot to ignore the experienced flight member's legitimate concern.

Third, the crew members needs to clearly state what they believe will be the negative outcome if immediate action is not taken ("Hey, Captain McDonald, there's a mountain ridge over there that we're going to slam into if you don't bring us up to a

higher altitude."). This statement should be made so that there is no question as to what potential negative outcome may occur if change is not brought about.

And, finally, the crew member needs to clearly state a solution for the problem ("Captain McDonald, if you are unfamiliar with this flight path, I am asking you to abort the mission and turn back to avert a disaster.").

71.

You are flying at 30,000 feet altitude and begin to notice cooler cabin temperatures and fogging on the inside of the windows. What is your time of useful consciousness?

90 seconds

45 seconds

5 minutes

10 minutes

Correct answer: 90 seconds

At an altitude of 30,000 feet, you have approximately 90 seconds of useful consciousness. In the given scenario, you are told that the cabin is becoming colder and fogging is occurring on the inside of the windows. This indicates a slow decompression. However, if there was a rapid loss of cabin pressure, your time of useful consciousness is cut in half at that altitude.

72.

While transporting a patient via fixed-wing aircraft, you evaluate the patient and identify signs and symptoms of hypoxia. Which of the following stages of hypoxia is considered to be the **most important** stage?

The Indifferent stage

The Critical stage

The Compensatory stage

The Disturbance stage

Correct answer: The Indifferent stage

When an individual begins to experience the effects of hypoxia during air transport, he will progress through 4 stages of hypoxia (if he continues to ascend in altitude): the Indifferent stage, the Compensatory stage, the Disturbance stage, and finally the Critical stage. The first stage of hypoxia, the Indifferent stage, is the most important of the stages because it is only during this stage that the individual his retains full ability to reason and think.

During air transport, the individual experiences the Indifferent stage when traveling at altitudes between sea level and 10,000 feet. Oxygen is not as readily available between these levels, and individuals may notice an increase in both heart rate and breathing as their body attempts to correct early hypoxia. Once an altitude of 5,000 feet is reached, typically the individual begins to notice a decrease in their night vision. If the hypoxia is not corrected with the application of oxygen and the aircraft continues to ascend, the individual will continue to progress through the next 3 stages of hypoxia, during all of which judgment, memory, and reasoning become increasingly impaired. It is of the utmost importance that the air transport crew take measures to prevent the development of early hypoxia, not just in the individuals they are transporting, but also within the crew members themselves.

73.

A patient with chronic obstructive pulmonary disease (COPD) is being driven via ambulance to the local hospital for an exacerbation of the disease. Which of the following findings has been determined to be an unreliable sign of hypoxia?

Cyanosis

Dyspnea

Hypertension

Tachycardia

Correct answer: Cyanosis

If a problem exists in ventilation, respiration, or perfusion, hypoxia may occur. Hypoxia is a condition in which an inadequate amount of oxygen is available to cells. The most common signs of hypoxia are dyspnea, elevated blood pressure, increased respiratory and pulse rates, pallor, and confusion. The treatment for hypoxia is 100% supplemental oxygen.

Cyanosis is an unreliable sign of hypoxia because the oxygen saturation must be below 75% for patients with normal hemoglobin levels before it is detectable.

74.

You are a medical air transport crew members participating in a mission involving a ground incident and are required to ride in a a ground transport vehicle. Which of the following statements regarding traveling as a crew member in a ground transport vehicle is **most accurate**?

All crew members are required to be trained in response to ground vehicle accidents

All crew members are required to wear a seat belt at all times

Only the patient is required to remain seat belted at all times in ground transport vehicles

Training for response to ground vehicle accidents is not required for medical air transport crew

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Correct answer: All crew members are required to be trained in response to ground vehicle accidents

All medical air transport crew members should be trained in response to ground vehicle accidents in the event that they are required to participate in a ground vehicle mission.

Both the patient and all crew members riding in the front of the ground transport vehicle are required to remain buckled in their seat belts at all times while the vehicle is in motion. If possible, crew members in the patient compartment should also remain buckled in their seat belts, but may need to remove their seat belts and move around the compartment in the provision of patient care.

75.

The pilot of a helicopter medical transport flight is preparing to make a night landing for pick-up of a critically ill patient. **Ideally**, the landing zone (LZ) dimensions for accommodation of nighttime helicopter landings is:

125 x 125 feet

100 x 100 feet

75 x 75 feet

150 x 150 feet

Correct answer: 125 x 125 feet

The landing zone (LZ) for helicopter landings must be adequate in dimension to support, a). daytime use, and b). nighttime use. In the ideal scenario, the LZ for nighttime helicopter landings should measure approximately 125 x 125 feet. Helicopter LZ pads acceptable for daytime landings should measure at least 75 x 75 feet. Obviously, a larger helipad LZ is more desirable than a smaller one.

A helicopter LZ which measures 100 x 100 feet is considered acceptable for both daytime and nighttime landings.

76.

Which type of hypoxia is described by a reduction in the amount of oxygen that is able to be inspired?

Hypoxic hypoxia

Hypemic hypoxia

Histotoxic hypoxia

Stagnant hypoxia

Correct answer: Hypoxic hypoxia

When the partial pressure of oxygen is too little, the result is hypoxic hypoxia.

Hypemic hypoxia is when there is not enough red blood cells to carry the oxygen. Histotoxic hypoxia is when a toxin prevents cellular use of oxygen. Stagnant hypoxia occurs when blood flow is restricted, as in cardiogenic shock or pulmonary embolism.

77.

Where can first responders quickly locate general information about hazardous materials when responding to an incident in the field?

In the first response vehicle

At Incident Command

At the Department of Transportation

In the possession of the operations manager

Correct answer: In the first response vehicle

In each first response vehicle, including medical air transport aircraft, is kept the Emergency Response Guidebook (ERG), in which is contained general information about hazardous material. This emergency text is divided into six sections, each section of which deals with a different component of response to a hazardous materials (hazmat) incident. The ERG should only be used for reference during the initial stage of response to a hazmat incident in an attempt to keep both the general public and first responders safe.

78.

Which of the following statements regarding sensitive radio traffic is **most accurate**?

News media may intercept patient information communication being transmitted by the communications specialist (CS) to a receiving hospital

Radio transmission of sensitive patient information is completed through the use of secured channels

Medical air transport crews are required to use pre-established patient aliases when communicating via radio to the communications specialist (CS)

Medical air transport crews are prohibited from sharing any sensitive patient information via radio

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Correct answer: News media may intercept patient information communication being transmitted by the communications specialist (CS) to a receiving hospital

Effective communication is at the heart of a good medical air transport program, and radio is the heart of all communication entering and exiting a transport program. It is inevitable that members of the air transport team will need to relay sensitive patient information either to a receiving hospital or through the CS, and this sharing of information will all take place using radio communication. These radio channels are often monitored by extraneous, outside individuals who know specific radio channel access codes and have access to a radio, making it also inevitable that outsiders, who do not need to know, will be informed of patient information transmitted to and from the medical air transport team.

News media may also actively scan radio frequencies in hopes of learning the details of specific local incidents to feed to their news stations. As a general rule of thumb, sensitive patient identifiers, such as name, address, specific patient descriptors, or any information considered to be protected as part of HIPAA should not be used when communicating by radio. In addition, any information delivered via radio should be done so in a non-emotional, straightforward manner, to prevent the escalation of emotion in any unauthorized, but listening, parties, who could potentially disseminate sensitive information.

79.

The management of gastric distention in a patient who is to be transported via helicopter emergency medical services (HEMS) may include all the following methods, except:

Insert a gastric tube and clamp it to prevent aspiration of stomach contents

Fly at a lower altitude

Insert a gastric tube for drainage or low suction

Loosen safety belts to prevent pressure on the abdomen

Correct answer: Insert a gastric tube and clamp it to prevent aspiration of stomach contents

On ascending to high altitudes (above 10,000 feet), the gases in the GI tract expand; unless expelled by belching or the passing of flatus, they may produce pain and discomfort, make breathing more difficult, and possibly lead to hyperventilation or syncope.

*Patients with ileus (bowel obstruction) or recent abdominal surgery should have a gastric tube placed before transport. The gastric tube should **not be clamped** but should be vented for ambient air or low intermittent suction during transport. Flying at lower altitudes may help with abdominal distention, and loosening safety belts will prevent extra abdominal pressure.*

80.

According to the Occupational Safety and Health Administration (OSHA) regulations requirements regarding the use of hearing protection for members of air medical transport crews, all of the following items are considered **best** for use in protecting hearing **except**:

Earplugs

The flight helmet

Earmuffs

Noise canceling circuitry added to the flight helmet

Correct answer: Earplugs

OSHA provides requirements on the use of hearing protection for all medical air transport crew members who are routinely exposed to noise levels ≥ 85 decibels (dB). A running helicopter produces noise in the decibel level of 90 to 100 dB. Equipment considered best for use in protecting hearing include the flight helmet, ear muffs, and custom-fitted earplugs. Noise-reduction or noise-canceling circuitry or communications earplugs which are added to the flight helmet are also considered best for hearing protection.

Off-the-shelf or non-custom fitted earplugs, while considered adequate for providing some hearing protection, are not considered the best of the hearing protection equipment.

81.

The driver of a ground ambulance transport has turned on the ambulance siren as it begins to enter the highway in transport of a patient from an accident scene to the trauma center. Which of the following statements about ground ambulance sirens is **most accurate**?

Traveling at highway speeds makes it likely that the ambulance will outrun its siren

Vehicles traveling on the highway will be able to hear the ambulance siren from a distance of approximately 250 feet

63% of fatalities in accidents involving ground ambulances were due to failure to use the ambulance siren

Due to intrinsic design of the ambulance siren, audibility remains the same during both normal conditions and conditions of increased noise

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Correct answer: Traveling at highway speeds makes it likely that the ambulance will outrun its siren

Ground ambulance transport is equipped with both flashing (or strobe) lights and sirens in an attempt to improve safety as the ambulance transports patients from the accident scene. Ambulance sirens are designed to be audible, under normal circumstances, from a distance of 500 feet or greater. However, when traveling at highway speeds (too fast), the ambulance can outrun their own siren, jeopardizing the safety of both the general public and the passengers of the ambulance.

82.

Which of the following gas laws explains that at a constant temperature, gas volume is inversely proportional to its pressure?

Boyle's Law

Dalton's Law

Graham's Law

Fick's Law

Correct answer: Boyle's Law

Knowledge of the gas laws is important for the CFRN/CTRN as the patient's condition is affected by the effects of the gas laws, and the CFRN/CTRN needs to make adjustments to their care of the patient to account for these affects. Boyle's Law is a law of gas pressure, and states that at a constant temperature, gas volume is inversely proportional to its pressure. In practical terms, the CFRN/CTRN will observe the effects of this law with the use of certain lifesaving devices such as endotracheal tube (ETT) cuffs/balloons or MAST trousers (both of which may rupture); intravenous (IV) fluid administration (the preset drip rate will increase in response to the effects of Boyle's Law); and specific emergency patient conditions may worsen in response to the principle of Boyle's Law (pneumothorax may worsen/increase, pressure of a pneumocephalus will increase). Because of this, the patient should be transported by air at the lowest possible altitude to prevent these potential complicating factors.

Dalton's Law is another of the gas pressure laws and states that the total pressure of a gas mixture is equal to the sum of the partial pressures of each gas contained in the mixture.

Both Graham's Law and Fick's Law describe the principles of gas diffusion.

83.

An effective comprehensive safety management system (SMS) should be a major part of all transport programs. All the following are components of an SMS, except:

A system defect allowing operating errors to exist

A system to track and document root cause analysis

A system to audit and review policy and procedures

A designated safety committee

Correct answer: A system defect allowing operating errors to exist

*A system defect that allows operating errors to exist is innate to the structure of any system. This is **not** a designed component of an SMS.*

The Accreditation Standards published by the Commission on Accreditation of Medical Transport Systems (CAMTS) list the components of an SMS, which include a system to track and document root cause analysis, a system to audit and review policy and processes, and a designated safety committee, among others.

84.

Which of the following associations was responsible for the establishment of Vision Zero, which focuses on safety in the transport environment?

The Association of Air Medical Services (AAMS)

Air Medical Physician Association (AMPA)

International Association of Flight and Critical Care Paramedics (IAFCCP)

National Flight Nurses Association (NFNA)

Correct answer: The Association of Air Medical Services (AAMS)

In 2005, the AAMS helped launch the Vision Zero initiative "to reduce and eliminate errors of consequence—those events within the transport medicine environment that result in serious injury or fatality" by 80% in 10 years. This initiative is intended to foster communication and cooperation between all aspects of the medical transport industry to develop voluntary and regulatory measures to achieve these goals.

85.

What is an Incident Command System (ICS)?

A management method designed to clarify command relationships and facilitate communication during an emergency

A department responsible for planning and coordinating emergency transportation incidents

A program designed to coordinate requests for aircraft and ground responses

A dedicated facility wherein all tactical operational decisions are made

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Correct answer: A management method designed to clarify command relationships and facilitate communication during an emergency

The ICS is a management method designed to clarify command relationships at incidents, foster interagency cooperation, and offer maximum flexibility for achieving strategic goals. The functional areas of the ICS include command, operations, planning, logistics, and finance/administration. Field personnel such as transport team members are usually considered part of the operations.

The Department of Transportation (DOT) is responsible for planning and coordinating emergency transportation incidents. A communications specialist (CS) is designed to coordinate requests for aircraft and ground responses; it is a title assigned to a person. An Operations Control Center (OCC) is a facility wherein all tactical operational decisions are made.

86.

You are the CFRN/CTRN caring for a patient. You are briefing the patient about barotitis. Which of the following should be included in the briefing?

You should perform the Valsalva maneuver, yawn, or move your jaw during descent if you begin to experience ear pain

You should chew gum to equalize pressure in your ears

If ear pain begins upon ascent, perform Valsalva maneuver

Tell the air crew you are experiencing ear pain and we will land as soon as possible

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Correct answer: You should perform the Valsalva maneuver, yawn, or move your jaw during descent if you begin to experience ear pain

Barotitis is caused by negative pressure forming a vacuum in the middle ear during descent due to blockage of the eustachian tubes. A proper method to clear this is by the Valsalva maneuver or by moving the jaw or yawning.

It is not recommended to chew gum as this causes the patient to swallow air. Pain rarely occurs upon ascending, but if it does, do not perform Valsalva as this will make the problem worse. Finally, the correct action to take is to reascend if possible and try to equalize pressure in the ears, not land as soon as possible.

87.

You are a transport team member en route with a patient when the helicopter is forced to make a water landing due to an engine fire. What should you do?

Wait until the rotors of the aircraft stop moving before proceeding to an exit.

Ensure your life vest is inflated and on properly prior to the helicopter striking the water.

Remove the helmet so the weight does not interfere with evacuation from the aircraft.

Exit the cabin as soon as the helicopter strikes the water.

Correct answer: Wait until the rotors of the aircraft stop moving before proceeding to an exit.

Transport team members should wait until the parts of the aircraft stop moving to prevent injury and then proceed to an exit. Helicopters almost always capsize after striking the water; do not attempt to exit the cabin until the aircraft is upside down.

*A flotation device and/or life vest should **not be inflated** until the team member has egressed from the aircraft (outside and away from the aircraft). Any activity that can cause heat loss and exhaustion should be carefully planned. A helmet may help preserve body heat and serve as a method of being found, so it should **not be removed**.*

88.

Equipment to aid in the loading of a patient into a medical air transport aircraft may be obtained from which of the following sources?

Equipment manufacturers

Air ambulance manufacturers

The Federal Aviation Administration (FAA)

The National Transportation Safety Board (NTSB)

Correct answer: Equipment manufacturers

After the patient has been packaged for medical air transport, the next step is the loading of the patient into the aircraft. The patient must be packaged in such a manner as to render the overall package as slight as possible in order to be able to actually insert the patient through the narrow aircraft door(s). The narrow character of the aircraft door(s) can pose an impediment to expeditious loading of the patient; with the increase of medical air transport, the development of specific equipment to facilitate in these situations has also increased. There are many manufacturers of specific equipment for loading of medical air transport which may be used to obtain the necessary equipment for this task.

89.

Which of the following statements regarding the involvement of medical air transport in a crash is **most accurate**?

Helicopters almost always sink after impact with water

Helicopters almost always float for a few minutes after impact with water

Fixed-wing aircraft almost always maintain float after impact with water

Fixed-wing aircraft almost always sink after impact with water

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Correct answer: Helicopters almost always sink after impact with water

Medical air transport programs that routinely or frequently complete missions over large bodies of water should train all crew members in emergency preparations in event of crash or landing in water. Emergency egress varies for each type of aircraft due to the unique propensity for floating or capsizing during water landings. Upon impact with water, helicopters will almost always sink, or capsize, while fixed-wing aircraft will almost always float for a few minutes prior to capsizing.

90.

At what altitude does your night vision begin to decrease?

5000 ft

10,000 ft

1000 ft

50,000 ft

Correct answer: 5000 ft

At this altitude, night vision begins to be impaired.

At 1000 ft, there are no physiological changes noted.

91.

Spatial disorientation during medical air transport places a CFRN at risk for which condition?

Motion sickness

Flicker vertigo

Seizures

Tinnitus

Correct answer: Motion sickness

During flight, several systems are involved in the maintenance of equilibrium: visual, vestibular, and proprioceptive. These systems work synergistically to allow the appropriate interpretation of input. When an individual inaccurately perceives the position, attitude, and motion in relation to the center of the Earth, spatial disorientation occurs.

Visual illusions caused by spatial disorientation can lead to significant motion sickness and can render pilots or transport team members incapable of performing their duties or providing patient care. To prevent this from occurring, team members should use proper scanning techniques, never stare at lights, get adequate rest and nutrition, and provide conscious patients with a tactile reference during transport.

92.

The medical crew of an air transport mission have successfully resuscitated their patient who experienced cardiac arrest after a difficult resuscitation attempt. Several minutes after stabilizing the patient, the crew begins to crack jokes about the situation. The crew in this scenario are **most likely** experiencing:

The effects of parasympathetic surge

The effects of stress inoculation

The effects of chronic stress exposure

The effects of fatigue

Correct answer: The effects of parasympathetic surge

It is normal for the medical crew members of an air transport program to experience repeated exposure to acute stress. Acute stress causes expected physiological changes, including elevations in heart rate and blood pressure, tensing of the muscles, and release of adrenalin from the adrenal glands. After the acute stress event is over, the body works to re-establish the norms through use of the parasympathetic nervous system. This parasympathetic surge results in feelings of giddiness or a significant release of tension which is often displayed by telling jokes or laughing or smiling at a time when an outsider may feel is inappropriate.

Stress inoculation is a training technique designed to help mitigate the effects of stress on performance.

93.

Which of the following gas laws can be used to explain the development of decompression sickness in scuba divers?

Henry's Law

Fick's Law

Charles' Law

Gay-Lussac's Law

Correct answer: Henry's Law

Scuba divers who ascend to the surface at a rapid or faster rate may experience symptoms of decompression sickness, which can be explained by Henry's Law dealing with the solubility of gas within a liquid. Henry's Law states: "The quantity of gas dissolved in 1 cm^2 of a liquid is proportional to the partial pressure of the gas in contact with the liquid." This law is most commonly observed in the physiology of the human body, again, when a scuba diver ascends too rapidly and, in day-to-day life, this principle can be observed when a soda can is opened and the rapid rising of carbon dioxide gas bubbles out of the liquid solution is seen as the pressure is released with opening of the can.

Fick's Law is a law of gas diffusion, and can be observed in the human body with the diffusion of gas across the alveoli in the lungs.

Charles' Law is another of the laws relating to the pressure of a gas in relation to temperature; this gas law does not typically affect the human body.

The effects of Gay-Lussac's Law, which explains gas pressure and temperature, can be observed when transporting patients by air and their temperature drops in response to higher altitudes, requiring the CFRN/CTRN to ensure the patient is adequately covered to prevent dangerous heat loss.

94.

A patient with a suspected pneumothorax is being transported by a rotary-wing aircraft at an altitude of 10,000 feet. The patient's O_2 saturation begins to drop, requiring you to increase the supplemental oxygen the patient is receiving. Which gas law explains the patient's dropping oxygen levels and need for an increase in supplemental oxygen?

Dalton's law

Charles' law

Gay-Lussac's law

Boyle's law

Correct answer: Dalton's law

Dalton's law describes that when altitude increases, the partial pressure decreases. Therefore, supplemental O_2 is needed at higher altitudes, and the patient's O_2 saturation may fall, requiring higher doses of supplemental oxygen.

Charles' law states that with increased temperatures (as the air heats up), volume increases (air expands) and therefore is less dense. Colder air is therefore more dense. This allows a wing to create more lift, so the aircraft can pick up heavier patients or cargo. Boyles's Law describes that when a gas is at a constant temperature, the volume of a gas is inversely proportional to the pressure. So, when the aircraft ascends to a higher altitude, the gas in an enclosed space such as the chest wall will expand (pneumothoraces get bigger, ETT cuffs can expand and rupture, and free air in the stomach can expand and prevent adequate ventilation). Gay-Lussac's law relates pressure and temperature: at higher altitudes, pressure will decrease and yield cooler temperatures; as a result, clinicians and patients may need more warmth, and oxygen tank pressure may change between takeoff and at altitude.

95.

A patient you are caring for while in flight begins to complain of severe pain to the face during descent. You identify the problem as sinus block. What should you as the CFRN/CTRN do to treat this patient?

Ask the pilot to reascend to equalize pressure, administer vasoconstrictors to reduce swelling, descend gradually

Continue to descend, sinus block is not an emergency

Sinus block is an emergent condition and the patient needs to be on the ground immediately. Tell the pilot to land as soon as possible.

Administer narcotics for pain relief

Correct answer: Ask the pilot to reascend to equalize pressure, administer vasoconstrictors to reduce swelling, descend gradually

Sinus block (barosinusitis), can range from a mild discomfort to a debilitating pain. The flight medic should treat sinus block due to the risk of epistaxis. Treatment includes reascending, giving vasoconstrictors, and a slow gradual descent to allow pressure equalization.

Sinus block can be very painful, even debilitating. It is the responsibility of the provider to not inflict pain when it is preventable. While narcotics do relieve pain, the definitive treatment is to reascend and equalize pressure and slowly descend after giving intranasal vasoconstrictors.

96.

Which of the following has been recognized as the most common recurrent factor in helicopter emergency medical services (HEMS) accidents?

Poor weather conditions

Less stringent requirements for EMS operations conducted without patients on board

Inadequate mission planning before air medical transport occurs

A lack of aviation flight risk-evaluation programs for EMS operations

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Correct answer: Poor weather conditions

In 2006, the National Transportation Safety Board (NTSB) reported the lack of reliable information regarding weather conditions in many areas in which HEMS programs operate, which greatly increases the risk of an incident and/or accident. Accidents that occur in bad weather conditions or at night or that result in a post-impact fire have a higher risk of being fatal. The most common recurrent factor in HEMS accidents is bad weather conditions.

The other choices are recurrent safety issues but not as common as poor/bad weather conditions.

97.

The pilot of the rotary-wing aircraft and the clinical crew members sit down to discuss the mission plan after receiving notification that they are required to transport a 10-year-old male who was severely burned in a house fire. Which of the following terms **most accurately** describes the practice that the pilot and clinical crew members are participating in within this scenario?

Air Medical Resource Management (AMRM)

Crew Resource Management (CRM)

Operational Risk Assessment (ORA)

Mission Planning Initiative (MPI)

Correct answer: Air Medical Resource Management (AMRM)

Within both commercial aviation and military aviation (specifically U.S. Air Force), a process referred to as Crew Resource Management (CRM) exists to reduce the risk of aviation error and stress by involving all members of the flight crew in mission planning and safety, and decision making regarding the proposed flight. Within medical air transport, an identical process has been adopted and is referred to as Air Medical Resource Management (AMRM). All members of the air transport crew, including the pilot and the clinical team members, meet to discuss all potential assignments, and all members have an equal say in accepting or declining an assignment based on the available information. This process was adopted after several severe accidents occurred during which solely the pilot was allowed to decide on whether or not to proceed with the assignment. The AMRM requires the entire crew to use good communication and problem solving skills, as well as teamwork, when evaluating all the components of potential assignments.