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Radiology LSPR

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Question: 1

Which of the following incidents requires direct quotations of the reason a patient leaves the hospital prior to an official discharge by the physician?

- A. Observation
- B. Same day surgery
- C. Hospital based diagnostic x-ray
- D. Elopement

Answer: D

Explanation:

Patients who leave the hospital against medical leave or elopement may require specific documentation, depending on state laws and facility policies. For instance, a form maybe completed for a patient who leaves against medical advice.

The individual charting in the medical record may have to include information, such as:

- the name of anyone and the relationship of this person to the patient who heard or witnessed a conversation where the patient stated he or she is leaving the hospital before official discharge by the physician
- documentation in direct quotation of the patient's words detailing the reason the patient left the hospital against medical advice
- the risks and the benefits relating to the patient leaving against medical advice
- documentation associated with the discharge instructions or any follow up care for the patient, even though the patient left against medical advice

Further, the health care professional should not chart in the patient's medical record his or her opinions, judgmental statements or anything offensive about the patient.

Studies have identified that patients who experience chest pain, use drugs or have mental health conditions are more likely to leave the hospital against medical advice (AMA).

Elopement is when the patient also leaves the hospital, is not officially discharged by the attending physician, and is in danger of harm and may even result in death of the patient. Documentation for patient elopement should include the date, time, and the individual who reported the patient's elopement. The documentation should be factual and specify without drawing conclusions the reason the patient left the hospital.

Question: 2

The technologist should understand that an elderly patient's response level may be impacted by:

- A. Family involvement
- B. Polypharmacy
- C. Age

D. Social economic levels

Answer: B

Explanation:

The administration and consumption of several medications at the same time is referred to as polypharmacy. Some elderly patients are prescribed several different medications which may negatively affect their ability to respond or slow down their level of response. Although taking medication is not a normal sign of aging, certain medication or consuming multiple medications may contribute to the aging process.

Further, factors, such as lifestyle, culture and heredity, affect the human body. However, these factors may or may not be directly related to human aging. Therefore, a technologist should understand that physiological and anatomical changes to the body may happen during different stages of life and at different ages. Therefore, the technologist needs to identify normal signs of aging and distinguish between normal aging and changes that result from disease processes that impact aging.

Question: 3

Which of the following is calculated during a ventriculogram?

- A. Ejection fraction
- B. Cardiac catheterization
- C. Contrast media utilized
- D. Thoracic obliquity

Answer: A

Explanation:

Ejection fraction is one of the key parameters measured during a ventriculogram. A ventriculogram is a type of X-ray imaging test that uses contrast media to visualize the chambers of the heart, particularly focusing on the ventricles. The primary purpose of this diagnostic test is to assess the health and functionality of the heart's ventricles, especially the left ventricle, which is crucial for pumping blood throughout the body.

During the procedure, contrast dye is injected into the heart's ventricles via a catheter. This allows the ventricles to be clearly seen on the X-ray images. By capturing the movement of the ventricles as they contract and relax, healthcare providers can observe and measure the volume of blood ejected from the left ventricle with each heartbeat, compared to its total filled volume. This measurement is known as the ejection fraction.

The ejection fraction is expressed as a percentage, indicating the proportion of blood that is pumped out of the left ventricle during each contraction. For instance, an ejection fraction of 60% means that 60% of the total blood in the left ventricle is expelled with each heartbeat. The normal range for the ejection fraction is typically between 55% to 65%, although this can slightly vary depending on the medical guidelines and individual health factors.

A low ejection fraction, usually below 55%, can be an indicator of heart dysfunction, such as heart failure or cardiomyopathy. These conditions represent a reduced ability of the heart to pump blood effectively,

possibly leading to symptoms like shortness of breath, fatigue, and fluid retention. Conversely, a very high ejection fraction may indicate other cardiac issues, such as hypertrophic cardiomyopathy. In summary, during a ventriculogram, the ejection fraction is a crucial measurement calculated to evaluate the function of the heart's left ventricle. This is central to diagnosing and managing various cardiac conditions, guiding treatment decisions, and assessing the need for further interventions like medications or surgeries to support heart function.

Question: 4

One of the two aspects of moral judgment that impacts ethical decision making is:

- A. Judicial justice
- B. Professional principles
- C. Contractual ethics
- D. Nonmaleficence

Answer: D

Explanation:

One of the key aspects of moral judgment that impacts ethical decision-making is nonmaleficence. Nonmaleficence is a principle that requires individuals and professionals to refrain from causing harm to others. This concept is deeply embedded in the medical ethics principle of "do no harm" but applies broadly across various fields and everyday moral decisions.

Nonmaleficence, along with beneficence, forms the foundation of many ethical frameworks and decision-making processes. Beneficence involves actions that promote the well-being of others, aiming to do good and provide benefits. In contrast, nonmaleficence focuses specifically on the avoidance of harm. When faced with ethical dilemmas, individuals often weigh these two principles to determine the best course of action that minimizes harm while maximizing potential benefits.

These principles are part of a larger ethical framework known as principlism or principle-based ethics, which also includes autonomy and justice. Principlism serves as a practical approach for addressing ethical issues across various professions, especially in healthcare, where practitioners apply these principles to ensure patient welfare while respecting their rights and fairness.

The emphasis on nonmaleficence in ethical decision-making guides individuals to consider the consequences of their actions or inactions in terms of harm. This could include physical, psychological, or social harm. Ethical decision-making involves analyzing potential risks and benefits, understanding the context of the situation, and applying moral principles consistently to safeguard the well-being of all involved parties.

In summary, nonmaleficence is a fundamental aspect of moral judgment that is crucial for ethical decision-making. It compels individuals to consider carefully how their actions might negatively affect others and to strive to avoid such outcomes. This principle, alongside beneficence, helps individuals and professionals navigate complex moral landscapes, uphold ethical standards, and justify the decisions they make in challenging situations.

Question: 5

Which of the following is a type of procedure that is used to remove fluid from the pleural space?

- A. Thoracentesis.
- B. Defecography.
- C. Paracentesis.
- D. T-tube cholangiogram.

Answer: A

Explanation:

*Thoracentesis is the correct answer to the question of which procedure is used to remove fluid from the pleural space.

The pleural space is a thin cavity located between the lungs and the chest wall, and it normally contains a small amount of lubricating fluid. When excess fluid accumulates in this space, it can lead to pleural effusion, which causes difficulty in breathing and other respiratory symptoms.

Thoracentesis is a medical procedure that involves the insertion of a needle or a catheter through the chest wall into the pleural space to drain the excess fluid. This procedure not only helps in relieving the symptoms caused by the fluid buildup but also allows the collected fluid to be analyzed in a laboratory to diagnose the underlying cause of the effusion. Common causes of pleural effusion include infections, heart failure, liver disease, or malignancies.

The procedure is typically performed under local anesthesia and can be guided by ultrasound to ensure accurate placement of the needle and to avoid injury to surrounding structures. While generally safe, thoracentesis can have potential risks such as pneumothorax (air in the pleural space), infection, bleeding, and rarely, damage to nearby organs like the liver and spleen.

Other procedures listed, such as defecography, paracentesis, and T-tube cholangiogram, are used for different diagnostic or therapeutic purposes. Defecography is used to evaluate defecation, paracentesis is for removing fluid from the abdominal cavity, and a T-tube cholangiogram is used to visualize the bile ducts, none of which involve the pleural space. Hence, thoracentesis is specifically designated for interventions involving the pleural space.

Question: 6

Which of the following best represents the classification of anti-infective drugs?

- A. Mechanism of action
- B. Resistance to chemoprophylaxis
- C. Its host factor
- D. Direct pathway to allergic reactions

Answer: A

Explanation:

Anti-infective is a classification of drugs that treat pathogens, agents that cause disease. They may also be called antimicrobial or antibacterial drugs.

There are over 300 anti-infectives that can be prescribed and these drugs are grouped according to chemical structure (aminoglycoside, fluoroquinolone, and sulfonamide) and mechanism of action.

The mechanism of action is categorized as: (1) RNA synthesis inhibitors (example of drug – rifampin), (2) Protein synthesis inhibitors (example of drugs – clindamycin, macrolides), (3) Cell wall synthesis inhibitors (example of drugs – carbapenems, isoniazid, and penicillin), (4) DNA synthesis inhibitors (example of drug – fluoroquinolones) and (5) antimetabolites (example of drug – sulfonamides). These drugs work to help the body get rid of pathogens by killing the bacteria (bacteriocidal) or slow down the growth of the bacteria, rather than killing the bacteria (bacteriostatic).

Question: 7

Which of the following best represents the weight of the human liver?

- A. 3-4 pounds
- B. 1-2 pounds
- C. 6-10 pounds
- D. 5-8 pounds

Answer: A

Explanation:

The correct answer to the question of how much the human liver weighs is 3-4 pounds. This weight range is typical for a healthy adult liver. The liver's weight can vary with the individual's body size and health condition, but for most adults, it remains within this range.

The liver is not only notable for its weight but also for its size and critical functions. It is the largest solid organ in the human body, playing a vital role in numerous physiological processes. These processes include metabolism, detoxification of various metabolites, protein synthesis, and the production of biochemicals necessary for digestion.

Anatomically, the liver is positioned in the right upper quadrant of the abdominal cavity, just below the diaphragm. It features a unique structure divided into four lobes: two major ones (the right and left lobes) and two smaller ones (the caudate and the quadrate lobes). Each lobe is made up of thousands of lobules, which are the functional units of the liver.

Understanding the weight and structure of the liver is crucial, as it helps in assessing the organ's health and function. Abnormalities in its weight or size can be indicative of various medical conditions such as liver disease, fatty liver, or other hepatic challenges. Therefore, the liver's typical weight range of 3-4 pounds is an essential reference point for medical professionals when evaluating liver health.

Question: 8

EPA states that at what rem level will one begin vomiting, due to radiation?

- A. 5-10 rem.
- B. 50 rem.
- C. 55 rem.
- D. 70. Rem.

Answer: D

Explanation:

The correct answer to the question about the radiation level at which one begins vomiting, according to the EPA, is 70 rem.

Radiation safety is a critical component of public health, especially in contexts involving exposure to ionizing radiation, which can have severe biological effects. The Environmental Protection Agency (EPA) in the United States provides guidelines and sets threshold levels for exposure to radiation and the associated health effects. These guidelines are essential for ensuring safety in environments where radiation exposure might occur, such as in medical facilities, industries using radioactive materials, and nuclear power operations.

According to the EPA, the progression of symptoms resulting from increasing levels of radiation exposure is well-documented. At lower levels of exposure, the effects are generally less severe but can still indicate significant radiation poisoning. For instance, an exposure of 5-10 rem can lead to changes in blood chemistry, which might not immediately manifest as symptoms but can be detected through medical testing. As the exposure increases to 50 rem, more noticeable symptoms such as nausea can occur.

Once the exposure level reaches 55 rem, additional symptoms such as fatigue begin to set in, indicating more serious radiation poisoning. At 70 rem, the exposure is severe enough to cause vomiting, which is a direct response by the body to remove ingested toxins and is a clear signal of acute radiation syndrome. Further exposure only increases the severity of the symptoms: at 75 rem, hair loss can occur; at 90 rem, diarrhea; at 100 rem, hemorrhage; and at higher levels such as 400 rem, the exposure could potentially be fatal. Extremely high exposure levels, around 1,000 rem, lead to catastrophic health outcomes, including internal bleeding, death, and the destruction of the intestinal lining.

Understanding these exposure levels and associated health impacts is crucial for managing and responding to radiation emergencies. It helps in setting safety standards, planning protective measures, and conducting appropriate medical interventions when necessary. The EPA's guidelines serve not only as a standard for safety protocols but also for educational purposes, helping individuals and professionals recognize the risks and necessary precautions related to radiation exposure.

Question: 9

The ability to take electrons away from the atom through natural or human-made sources is called:

- A. electrostatics
- B. circuitry routing
- C. ionization
- D. fusion

Answer: C

Explanation:

Ionization is a process that happens when the electrons are removed from an atom. This ionization process involves the use of two sources to produce this type of ionization radiation – background or natural radiation and human-made radiation. With background radiation, the radiation occurs in nature and is unplanned but this radiation may still impact humans. A good example of background radiation is the radiation that comes from the sun or radiation that is produced from substances, radium or uranium, that are found on the earth, for instance. Humans may gain exposure from uranium or radium

by inhaling the substances through the air or ingesting the substances when eating foods or drinking water.

Human-made ionization radiation is emitted through x-rays, radiation produced from nuclear power plants, or radionuclides such as smoke detectors and radiopharmaceutical materials.

Question: 10

The part of the x-ray tube made out of Pyrex glass or metal is called:

- A. Envelope
- B. Rotor
- C. Autotransformer
- D. Generator

Answer: A

Explanation:

The correct answer to the question regarding the part of the x-ray tube made out of Pyrex glass or metal is the "Envelope." This component plays a crucial role in the structure and functionality of the x-ray tube.

The envelope is essentially the housing that contains the x-ray tube's critical components, including the anode assembly and the cathode. These elements are integral to the generation of x-rays. The anode assembly typically consists of a metal disc, often made of tungsten, which serves as the target for electrons emitted by the cathode. The cathode, on the other hand, is a filament that when heated, emits electrons towards the anode due to thermionic emission.

Materials used for the envelope include metal and Pyrex glass. These materials are chosen for their ability to withstand high temperatures and their properties of electrical insulation. Pyrex glass, in particular, is advantageous because it allows for visual inspection of internal components and is less prone to outgassing compared to other types of glass.

The dimensions of the envelope can vary but commonly, it might be around 10 inches in length and 6 inches in central diameter, with a peripheral diameter of about 2 inches. The size and shape of the envelope are designed to optimize the internal arrangement of components and ensure efficient operation of the tube.

Moreover, the envelope is sealed to create a vacuum environment inside the x-ray tube. This vacuum is critical as it allows electrons to travel from the cathode to the anode without interference from air molecules, which could scatter the electrons and reduce the efficiency of x-ray production. The removal of air is achieved with the help of a vacuum pump, ensuring that any air inside the envelope is evacuated.

In summary, the envelope is a fundamental component of the x-ray tube, providing structural integrity, electrical insulation, and a vacuum environment that facilitates the efficient generation of x-rays. This explanation gives a comprehensive understanding of the role and importance of the envelope in the operation of an x-ray tube.

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