

Radiology RRA

ARRT Registered Radiologist Assistant (RRA)

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Question: 1

Which of the following is true according to respondeat superior?

- A. Employers are never liable for liable for the actions of the employee taken within the scope of employment.
- B. Employees are never liable for any actions done within or outside of the scope of employment.
- C. Employees and employers must take equal responsibility for any action taken within the scope of employment.
- D. Employers are liable for the actions of the employee taken within the scope of employment.

Answer: D

Explanation:

The correct answer to the question regarding the doctrine of respondeat superior is: "Employers are liable for the actions of the employee taken within the scope of employment."

The term "respondeat superior" is a Latin phrase that translates to "let the superior answer." This legal doctrine is a fundamental component of the law of agency, which is a branch of commercial law. Respondeat superior establishes a vicarious liability or indirect legal responsibility on the part of an employer or principal - not only for their own actions but also for the actions of their employees or agents, performed during the course of their employment.

Under this doctrine, if an employee commits a tort (a civil wrong, such as negligence) within the scope of his or her employment, the employer can be held legally liable alongside, or instead of, the employee. This means that if an employee, while performing duties assigned by the employer or while acting within the scope of employment, causes harm to another party, the employer may be held responsible for the damages or injuries caused by the employee's actions.

The rationale behind the doctrine of respondeat superior is based on several considerations: 1.

****Control:**** Employers have control over the actions and behavior of their employees while they are on the job. 2. ****Representation:**** Employees act as representatives of their employer, and their actions during work hours are often seen as an extension of the employer's business practices. 3. ****Economic Principle:**** Employers are generally in a better position to absorb the financial impact of liability through mechanisms such as insurance, which can be more challenging for individual employees.

It is important to note that respondeat superior applies only to actions taken within the scope of employment. This typically excludes acts that are illegal, outside the employee's job duties, or actions taken for purely personal reasons unrelated to the employment.

In summary, the doctrine of respondeat superior holds employers liable for the actions of their employees when these actions occur within the scope of employment. This principle ensures that victims of wrongful acts can seek compensation from entities that have the financial capacity to cover the damages, and it encourages employers to enforce policies and training that minimize the risk of harm or injury.

Question: 2

A technologist performing a chest x-ray should understand that the greatest expansion of the lungs happens:

- A. During expiration
- B. While inhalation occurs
- C. Before the first breath after the technologist counts to three
- D. After the second full inspiration

Answer: D

Explanation:

In medical imaging, particularly during a chest x-ray, it is crucial for technologists to capture the image at a moment when the lungs are most expanded. This ensures that the x-ray provides the clearest and most detailed view of the lungs, which is essential for accurate diagnosis and treatment planning.

The reason why the greatest expansion of the lungs occurs after the second full inspiration, rather than the first, involves both physiological and practical considerations. Physiologically, during the initial breath or inspiration, the lungs may not fully expand due to a variety of factors such as patient tension, shallow breathing, or an incomplete understanding of the breathing instructions. As the patient continues to breathe and becomes more accustomed to the deep breathing required for the x-ray, the second full inspiration typically results in a deeper and fuller lung expansion.

From a practical standpoint, instructing a patient to take a second full inspiration helps ensure consistency and reliability in the imaging process. This practice allows the technologist to synchronize the timing of the x-ray exposure with the peak of the lung expansion. The vertical expansion of the lungs at this point maximizes the lung volume and stretches the lung tissues, which minimizes overlapping of anatomical structures and improves the visibility of lung details in the x-ray image.

In the context of a chest x-ray procedure, the technologist typically guides the patient through the breathing process. They may instruct the patient to breathe in deeply and hold their breath at the end of the second full inspiration. Holding the breath at this point stabilizes the chest, reduces motion blur, and further enhances image clarity. This technique is particularly important in diagnosing conditions such as pneumonia, tuberculosis, lung cancer, and other pulmonary disorders.

Therefore, understanding the dynamics of lung expansion and the optimal timing for image capture is essential for technologists. This knowledge ensures that each chest x-ray provides the most informative view of the lung tissues, helping clinicians to make accurate diagnoses and plan effective treatments.

Question: 3

What condition may require the technologist to increase technical factors for the radiographic procedure?

- A. Paget's disease
- B. Hydrothorax
- C. Abscess
- D. Osteomalacia

Answer: C

Explanation:

Conditions such as Paget's disease, abscess, hydrothorax, and osteomalacia commonly require radiologic technologists to adjust and often increase technical factors during radiographic procedures. Each of these conditions alters the normal composition or density of tissues, impacting the way X-rays pass through the body and influencing the image quality on radiographs.

Paget's disease, for example, is a chronic bone disorder that can cause bones to expand and become deformed or fragile. This disease leads to increased bone density in some areas and decreased density in others, creating a challenge to achieve uniform image quality. To penetrate these varied densities and obtain a clear image, technologists may need to increase the exposure factors such as voltage (kV) and current (mA).

Similarly, an abscess, which is a collection of pus that has built up within the tissue of the body, presents a challenge due to its varying consistency and density compared to surrounding tissues. The presence of dense, inflamed tissue surrounding an often-fluid-filled center requires adjustments in exposure to adequately visualize the extent of the infection and surrounding anatomical structures.

Hydrothorax, the accumulation of fluid in the pleural cavity around the lungs, also necessitates an increase in technical factors. The fluid significantly increases the density of the thoracic area, requiring higher radiation doses to ensure that lung structures are visible through the fluid.

Osteomalacia, a softening of the bones often due to a deficiency of vitamin D or calcium, affects bone density and can make bones appear less distinct on standard settings. Increased technical factors are essential to differentiate between soft bones and surrounding soft tissue.

In each case, the technologist's goal is to optimize the radiographic technique to produce the best possible diagnostic images while considering patient safety and minimizing radiation exposure. Adjusting technical factors appropriately in response to these conditions helps achieve diagnostic clarity that is crucial for effective treatment planning.

Question: 4

Under EPA, what level of exposure begins causing a person to hemorrhage?

- A. 75 rem.
- B. 90 rem.
- C. 100 rem.
- D. 400 rem.

Answer: C

Explanation:

The correct answer to the question regarding the level of radiation exposure that begins causing a person to hemorrhage under the guidelines set by the Environmental Protection Agency (EPA) is 100 rem.

According to the EPA's established radiation threshold exposure levels and their corresponding health effects, each level of exposure results in progressively severe health consequences. The sequence of symptoms following radiation exposure is critical for understanding the seriousness of each level.

Starting with lower exposure levels, at 5-10 rem, there are changes in blood chemistry, which may not immediately manifest in obvious physical symptoms but indicate alterations in bodily functions. As

exposure increases to 50 rem, nausea begins, followed by fatigue at 55 rem, indicating escalating physiological stress.

At 70 rem, the individual experiences vomiting, demonstrating a more severe reaction as the body attempts to rid itself of toxins. This is succeeded by hair loss at 75 rem, a more visible and distressing effect of radiation poisoning. The progression continues with diarrhea at 90 rem, another severe gastrointestinal response to high levels of radiation.

The critical threshold of 100 rem is where hemorrhage is noted as a specific health effect. Hemorrhage refers to excessive bleeding, which can occur internally or externally, and represents a significant breakdown in the body's ability to regulate blood vessels and clotting mechanisms, often due to the destruction of platelets or damage to the bone marrow. This level of exposure is considered very serious and requires immediate medical intervention.

Further increases in radiation exposure lead to even more dire health effects, with 400 rem causing possible death due to the extensive damage to bodily functions and organ systems. At 1,000 rem, the exposure is almost certainly lethal, causing internal bleeding, death, and destruction of the intestinal lining, among other critical conditions.

It is essential to understand these thresholds for safety and emergency response purposes, particularly in environments where radiation exposure is a risk. The EPA's guidelines help in planning and response efforts to minimize radiation harm and provide crucial information for medical and disaster response teams.

Question: 5

Metformin is a drug used to treat:

- A. Stress related secretions from the adrenal cortex
- B. Levothyroxine deficiency
- C. Type 2 diabetes
- D. Corticosteroid synthesis

Answer: C

Explanation:

Metformin is primarily used to treat Type 2 diabetes. This condition typically begins in adulthood and is characterized by insulin resistance, where the body's cells do not respond effectively to insulin.

Although the pancreas still produces insulin, the inefficacy of the cellular response leads to inadequate activity of insulin, thereby necessitating medical intervention.

Metformin belongs to a class of drugs known as biguanides. Its primary function is to lower blood glucose levels. It achieves this by reducing the amount of glucose produced by the liver, enhancing the sensitivity of muscle cells to insulin, which improves glucose uptake and utilization, and slightly reducing the absorption of glucose from the intestines. Unlike some other diabetes medications, metformin does not promote insulin secretion from the pancreas. This is beneficial because it does not risk causing hypoglycemia, which is a common side effect of drugs that increase insulin production.

Common side effects associated with metformin include gastrointestinal symptoms such as diarrhea, nausea, abdominal pain, and anorexia. These side effects are often temporary and may decrease over time as the body adjusts to the medication. A more serious, but rare, side effect of metformin is lactic acidosis, a condition characterized by an accumulation of lactic acid in the body, which can be fatal if not

treated promptly. This risk is increased in patients with kidney or liver problems, which affect the medication's clearance from the body.

Metformin does not treat stress-related secretions from the adrenal cortex, nor does it directly deal with corticosteroid synthesis or levothyroxine deficiencies. Its therapeutic use is specifically targeted at managing blood glucose levels in the context of Type 2 diabetes. By improving insulin sensitivity and lowering glucose production, metformin helps manage the core issues of Type 2 diabetes, contributing to better overall blood sugar control.

Question: 6

On an AP proximal shoulder projection, what rotation shows the lesser tubercle in the profile image?

- A. Lateral rotation
- B. Neutral rotation
- C. Internal rotation
- D. External rotation

Answer: C

Explanation:

In radiographic imaging, particularly in shoulder projections, the positioning and rotation of the humerus play a critical role in the visibility of specific anatomical structures. For the AP (anteroposterior) proximal shoulder projection, internal rotation of the humerus is essential to visualize the lesser tubercle in profile.

Internal rotation of the humerus involves turning the arm so that the thumb points towards the body, and the back of the hand is facing outward. This maneuver positions the proximal humerus laterally, which means it is rotated such that the anterior aspect of the humerus is aligned more towards the side. When the humerus is internally rotated in this manner, the lesser tubercle, a small, rounded, anteriorly facing bony prominence on the proximal humerus, comes into profile view. This prominence is situated medially on the humerus and serves as an attachment site for the subscapularis muscle, one of the four rotator cuff muscles. The subscapularis muscle is responsible for medially rotating the arm, and its tendon inserts into the lesser tubercle.

In addition to visualizing the lesser tubercle, internal rotation also allows for the observation of the insertion site of the subscapular tendon. This is clinically significant as it helps in assessing the integrity of the subscapularis tendon, which can be involved in rotator cuff pathologies. Moreover, with internal rotation, there is a typical superimposition of the greater tubercle over the humeral head. The greater tubercle is another bony prominence of the humerus, located laterally, and serves as the attachment site for the other three rotator cuff muscles.

Thus, for a clear and detailed view of the lesser tubercle and the subscapular tendon insertion on an AP proximal shoulder projection, internal rotation of the humerus is the required positioning. This specific rotation aids in diagnostic imaging by providing clear visuals of these structures, which are essential for evaluating shoulder injuries and conditions.

Question: 7

A type of wheelchair transfer a radiologic technologist may use is:

- A. Peripheral assist
- B. Sheet assist
- C. Cart assist
- D. Standby assist

Answer: D

Explanation:

The correct answer to the question "A type of wheelchair transfer a radiologic technologist may use is:" is "Standby assist." This technique is one of the four primary methods employed by radiologic technologists to aid patients in transferring from a wheelchair, especially in a clinical or hospital setting where safety and patient stability are crucial.

The "Standby assist" method is particularly useful for patients who have a certain level of mobility but still require a minimal amount of support or supervision to ensure safety during the transfer. This might involve the technologist being physically present to offer a helping hand or to provide guidance and reassurance as the patient moves from the wheelchair to another surface, such as an examination table. Aside from "Standby assist," the other three techniques for wheelchair transfers that a radiologic technologist might use include "Assisted standing pivot," "Hydraulic lift," and "Two-person lift." Each technique caters to different levels of patient mobility and health conditions: 1. **Assisted standing pivot** - Utilized for patients who can stand but need support to pivot and sit on another surface. 2. **Hydraulic lift** - Ideal for patients who cannot support their weight or are unable to stand; this method uses a mechanical device to lift and move the patient safely. 3. **Two-person lift** - Employed for patients needing considerable assistance, where two caregivers work together to lift and transfer the patient manually.

Determining the appropriate type of transfer technique involves a preliminary assessment of the patient's physical abilities and medical conditions. The technologist can review the patient's medical chart for any transfer notations or specific instructions from physicians regarding mobility restrictions or recommendations. Moreover, patients suffering from conditions like generalized weakness, arthritis, or other mobility-impairing conditions often require more support during transfers.

In summary, "Standby assist" is a fundamental and frequently used technique among radiologic technologists to facilitate safe and effective patient transfers in medical settings. Understanding and choosing the right type of transfer method is critical in providing care that is both supportive and respectful of the patient's medical needs and dignity.

Question: 8

Which of the following is associated with irritation, inflammation, and erosion of the stomach's lining?

- A. Anemia.
- B. Septicemia.
- C. Gastritis.
- D. Lupus.

Answer: C

Explanation:

The correct answer to the question of which condition is associated with irritation, inflammation, and erosion of the stomach's lining is Gastritis. Gastritis refers to a group of conditions that cause inflammation of the stomach lining. This condition can manifest in either acute or chronic forms. Acute gastritis occurs suddenly and typically has more severe symptoms, while chronic gastritis develops slowly over time, potentially causing long-term complications.

The causes of gastritis are varied, but they include excessive alcohol consumption, chronic stress, prolonged use of certain medications like nonsteroidal anti-inflammatory drugs (NSAIDs), and persistent vomiting. Additionally, infections with *Helicobacter pylori* (a type of bacteria specifically linked to stomach ulcers and chronic gastritis), pernicious anemia (a condition where the stomach lacks a naturally occurring substance needed to properly absorb and digest B12), bile reflux, and other infections can also lead to the development of gastritis.

Symptoms of gastritis can vary but often include nausea, abdominal bloating, abdominal pain, vomiting, indigestion, and hiccups. More severe cases might involve black stools (due to bleeding in the stomach) and a significant loss of appetite. These symptoms can be distressing and may significantly impact the quality of life.

Diagnosis of gastritis typically involves an upper endoscopy, which allows doctors to view the stomach lining directly and take biopsies if necessary. Blood tests can help identify anemia, infections, and other related conditions, while stool tests might be used to detect bleeding or infections.

Treatment for gastritis generally includes the use of antacids to reduce stomach acid and alleviate pain. Dietary changes, such as avoiding alcohol and spicy foods, can help manage and prevent symptoms. In cases where gastritis is caused by *Helicobacter pylori* infection, antibiotics may be necessary.

Additionally, for those with pernicious anemia, vitamin B12 shots may be required.

The prognosis for gastritis depends on the underlying cause and the promptness of treatment. With appropriate medical intervention and lifestyle adjustments, most people see a quick improvement in their symptoms. However, ongoing monitoring and management might be necessary to prevent recurrence, especially in chronic cases.

Question: 9

Individuals diagnosed with type 1 diabetes mellitus requires the replacement of:

- A. Cholestyramine
- B. Insulin
- C. Serum based thyroid hormones
- D. Granulocytes

Answer: B

Explanation:

Individuals diagnosed with type 1 diabetes mellitus require the replacement of insulin. This necessity arises because in type 1 diabetes, the body's immune system mistakenly attacks and destroys the insulin-producing beta cells in the islets of Langerhans of the pancreas. As a result, the pancreas produces little to no insulin, a hormone essential for allowing glucose to enter cells and generate energy.

The absence of insulin leads to increased blood and urine glucose levels, a condition known as hyperglycemia. Without insulin therapy, individuals with type 1 diabetes would experience severe

metabolic complications. Insulin therapy replaces the missing hormone and is therefore critical in managing the condition. The types of insulin used can vary and include rapid-acting, short-acting, intermediate-acting, and long-acting forms, each tailored to manage blood glucose levels at different times throughout the day and night.

Type 1 diabetes, also referred to as insulin-dependent diabetes mellitus, is predominantly diagnosed in children and adolescents, hence it was historically termed juvenile diabetes. The key symptoms of this disorder include frequent urination (polyuria), increased thirst (polydipsia), increased hunger (polyphagia), fatigue, and weight loss despite normal or increased eating habits. These symptoms arise because the body is unable to utilize glucose effectively due to the lack of insulin, leading it to break down fats as an alternative source of energy, which can result in weight loss.

The management of type 1 diabetes is not limited to insulin replacement alone. It also includes careful diet management, physical activity, regular blood sugar monitoring, and education to handle the day-to-day aspects of the disease. The goal of treatment is to maintain blood glucose levels within a normal range as much as possible, thus minimizing the risk of diabetes-related complications over time, such as cardiovascular disease, nerve damage, kidney damage, and eye damage.

In contrast, other options listed like cholestyramine, serum-based thyroid hormones, and granulocytes are not treatments for type 1 diabetes. Cholestyramine is primarily used to lower cholesterol levels and manage itching caused by liver disease, serum-based thyroid hormones are used in the treatment of thyroid disorders, and granulocytes (a type of white blood cell) are not a treatment modality but can be part of the discussion in conditions involving the immune system or infections. Therefore, none of these are relevant to the replacement therapy required for managing type 1 diabetes mellitus.

Question: 10

Thrombocytosis is a blood platelet count of what?

- A. 400,000 platelets/mCL or more.
- B. 300,000 to 350,000 platelets/mCL.
- C. 200,000 to 250,000 platelets/mCL.
- D. 150,000 platelets/mCL or less.

Answer: A

Explanation:

Thrombocytosis is defined as an elevated platelet count in the blood, specifically when the count exceeds 400,000 platelets per microliter (mCL) of blood. Platelets, also known as thrombocytes, are small, colorless cell fragments in our blood that are essential for normal blood clotting. They are produced in the bone marrow and are crucial for wound healing and stopping bleeding by forming clots. A normal platelet count ranges from about 150,000 to 350,000 platelets per microliter of blood. Counts above this range suggest thrombocytosis. This condition can be either primary, stemming from a disorder of the bone marrow known as a myeloproliferative disorder, or secondary, which can be a reaction to another disease or condition, such as inflammation, infection, or cancer.

Common causes of secondary thrombocytosis include acute infections, chronic inflammatory conditions such as rheumatoid arthritis or inflammatory bowel disease, cancer, particularly hematologic cancers like lymphoma or certain solid tumors, and the aftermath of spleen removal (splenectomy). The spleen normally helps regulate the number of blood cells, including platelets, and its removal can temporarily increase platelet counts.

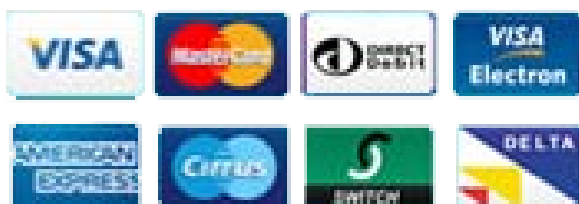
In the case of primary thrombocytosis, one common cause is polycythemia vera, a condition in which the bone marrow produces too many blood cells, including platelets. Other myeloproliferative disorders that can cause high platelet counts include essential thrombocythemia and myelofibrosis. It is important to diagnose the underlying cause of thrombocytosis to manage and treat it appropriately. While a high platelet count itself may not cause symptoms, it can increase the risk of thrombosis, leading to potentially serious complications such as strokes or heart attacks if not properly managed. Therefore, individuals diagnosed with thrombocytosis often undergo further testing and monitoring to address any associated risks or underlying conditions.

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