

AANPCB® FNP - Quiz Questions with Answers

Immune

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1.

A 35-year-old female patient presents to the emergency department (ED) with facial swelling, hives, a generalized purple rash, and blisters on the mucous membranes of her mouth and nose. What additional information from the patient's recent medical history would be most significant?

The patient has been treated with TMP-SMX (Bactrim DS).

The patient has been treated with amoxicillin (Moxatag).

The patient has been treated with ceftriaxone (Rocephin).

The patient has been treated with azithromycin (Zithromax, AzaSite, Zmax).

Correct answer: The patient has been treated with TMP-SMX (Bactrim DS).

The symptoms described are characteristic of Stevens-Johnson syndrome, a severe immune-complex-mediated hypersensitivity reaction involving the skin and the mucous membranes that occurs as a delayed reaction to medications such as sulfonamides (including TMP-SMX), allopurinol, anticonvulsants, and oxicam NonSteroidal Anti-Inflammatory Drugs (NSAIDs).

Multiple lesions that appear like a target (or a "bull's eye") start erupting abruptly and can include hives, blisters (bullae), petechiae, purpura, and necrosis and sloughing of the epidermis. There is extensive mucosal surface involvement (eyes, nose, mouth, esophagus, and bronchial tree), and there could be a prodrome or fever with flu-like symptoms 1 to 3 days before the rashes appear.

Stevens-Johnson syndrome is not typically triggered by beta-lactams such as amoxicillin (Moxatag), cephalosporins such as ceftriaxone (Rocephin), or macrolides such as azithromycin (Zithromax, AzaSite, Zmax).

2.

A newly pregnant 29-year-old has not received the second dose of measles, mumps, rubella (MMR) vaccine that is recommended in childhood. You explain to her that she will need to receive the second dose:

After she has given birth to the baby

After she has given birth to the baby if she is not breastfeeding or after she has finished breastfeeding should she elect to breastfeed

After she has completed the first trimester but before the start of the third trimester

At any time before the pregnancy is completed

Correct answer: After she has given birth to the baby

The MMR vaccine contains live but weakened (attenuated) virus and requires two immunizations during childhood to provide immunity against the diseases. If an adult has not received the recommended vaccines during childhood, they should be completed during adulthood.

Pregnant women should not receive the MMR vaccine regardless of their vaccine status because of the theoretical but unproven risk of congenital rubella syndrome from the live virus contained in the vaccine. The MMR vaccine is safe to use during lactation and should be administered to the woman, regardless of her infant's feeding status, as soon after delivery as possible.

3.

During the completion of a clinical rotation experience, a Family Nurse Practitioner (FNP) student was required to participate in the evaluation of a three-year-old male patient who was suspected of having Chronic Granulomatous Disease (CGD) based on his clinical presentation. All of the following have a high association with CGD, except:

Bacteremia

Pneumonia

Liver abscess

Skin infection

Correct answer: Bacteremia

*Chronic Granulomatous Disease (CGD) is an X-linked or autosomal recessive (two modes of transmission) disorder that is characterized by recurrent infections and hypergammaglobulinemia. Infections occur as a result of a defect of the phagocyte in its production of superoxide, which is necessary for microbial eradication. X-linked CGD is more common in the US and has a more severe presentation than the autosomal recessive form of the disease which is more commonly diagnosed in individuals with consanguinity. Typically, CGD symptoms appear in the first few weeks or months after birth, with infants experiencing severe bacterial or fungal infections including fungal pneumonias, liver abscess (often due to *S. aureus* infection), perianal abscess, skin abscess, and osteomyelitis, as well as failure to thrive. If the affected individual possesses some residual superoxide production, the diagnosis of CGD may be delayed for several years, even into the school-age years, due both to the body's ability to better fight off opportunistic infection and today's modern healthcare system.*

Liver abscess and its related complications, including portal hypertension, can result in significant morbidity and mortality, as can the surgical treatment methods that have been typically used to treat this infection. Newer methods of treating liver abscesses rely more heavily on the use of antibiotics and steroids to provide resolution of the abscess versus the traditional surgical management of liver abscess, which included percutaneous or open drainage of the abscess. Pulmonary infection with Aspergillosis species is common in patients with CGD, with some species being readily treated with the administration of antifungal agents such as itraconazole and other species being a major source of morbidity and mortality and requiring surgical resection to fully resolve. Patients with Aspergillosis infection rarely present with other signs of infection, including fever and leukocytosis. Older children and adults may be more likely to present with symptoms of "mulch pneumonitis," a diffuse pulmonary infection

caused by the inhalation of fungal spores disturbed during raking, playing in leaves, or gardening. Fever, hypoxia, and diffuse pulmonary infiltrates characterize this infection, which frequently serves as the initial presenting infection in the older pediatric age group and adults affected with CGD.

4.

Which of the following statements regarding primary Raynaud's Phenomenon (RP) is *most accurate*?

Individuals diagnosed with primary RP should receive treatment based on an individualized treatment plan.

Primary RP is most frequently associated with an underlying diagnosis of Systemic Lupus Erythematosus (SLE).

Primary RP is most commonly diagnosed in women over the age of 35 years.

Individuals diagnosed with primary RP are at risk of experiencing systemic vascular damage as well as peripheral vascular damage.

Correct answer: Individuals diagnosed with primary RP should receive treatment based on an individualized treatment plan.

Raynaud's Phenomenon (RP), also referred to as Raynaud's disease, is a painful vasospastic disorder that affects the fingers and toes (primarily). The disorder may be autoimmune and associated with underlying autoimmune conditions such as Systemic Lupus Erythematosus (SLE) or Systemic Sclerosis (SSc) (also referred to as scleroderma) or may be diagnosed as a stand-alone disorder. Individuals with RP typically present with symptoms of spasm-like pain to the fingertips and/or toes (also nose, and nipples in breastfeeding women) associated with pallor of the skin that is followed by cyanosis (caused by venous pooling) and then rubor (due to rebounding blood flow). Ninety percent of individuals who present with symptoms consistent with Raynaud's will ultimately receive a diagnosis of primary disease, with the other 10% going on to be diagnosed with associated/underlying autoimmune disorders. Females are affected more frequently than males, with the age range of diagnosis between 15 to 30 years of age. Individuals diagnosed with primary RP should receive an individualized treatment plan based on the severity of their presenting symptoms. Since RP episodes tend to be triggered by cold exposure, initial treatment should be aimed at managing the patient's exposure to cold, including the use of heated vests and hats, gloves, socks, and layering of clothing. Lifestyle methods of decreasing the sympathetic tone (which is increased in response to stress) include teaching the use of deep sigh breathing techniques and mild exercise coupled with meditative-like practices (prayer, etc.). Some individuals may require medication to improve circulation to the periphery and prevent damage to the tissues.

Secondary RP is most frequently identified with a diagnosis of Systemic Sclerosis (SSc)/scleroderma, and is in fact, considered a hallmark sign of SSc. It may also be associated with Systemic Lupus Erythematosus (SLE). These individuals are at risk

of experiencing systemic vascular damage as well as peripheral vascular damage due to RP.

5.

All of the following disorders are most likely to contribute to the development of secondary (AA) amyloidosis, except:

Schnitzler Syndrome (SS)

Familial Mediterranean Fever (FMF)

Tumor Necrosis Factor Receptor-Associated Periodic Syndrome (TRAPS)

Cryopyrin-Associated Periodic Syndrome (CAPS)

Correct answer: Schnitzler Syndrome (SS)

All individuals with autoinflammatory disorders (problems with innate immunity) are at risk of developing sarcoidosis due to deposits of inflammatory proteins in the organ tissues. While the protein deposits may occur in any organ, the kidneys are most commonly affected, ultimately resulting in kidney failure. Individuals with FMF are at the highest risk of developing amyloidosis, with over 75% of affected individuals developing amyloidosis before colchicine was utilized to treat FMF. Individuals with FMF who do go on to develop amyloidosis benefit from hemodialysis; peritoneal dialysis can worsen peritoneal attacks of the disease. TRAPS results in amyloidosis in up to 25% of affected individuals, with a strong family preference for amyloidosis being noted, and as many as 33% of individuals with CAPS will ultimately develop amyloidosis if not treated or treated inadequately. It is unclear why certain patients will progress to the development of amyloidosis, as individuals with the same (or similar) level and chronicity of inflammation do not all go on to develop amyloidosis.

Schnitzler syndrome carries a very low risk of amyloidosis.

6.

A 14-year-old male of Armenian ethnicity presented to the clinic for follow-up and to establish care after being released from the children's hospital. The boy's father stated his son had been hospitalized ten days ago after experiencing a sudden high fever accompanied by severe abdominal pain which was believed to be acute appendicitis. The boy had undergone an exploratory laparotomy during which appendicitis was ruled out and abdominal adhesions were identified. The hospital clinicians were suspicious of Familial Mediterranean Fever (FMF) based on the boy's presentation and country of origin and decided to employ a medication trial to confirm their suspicions. Which of the following medications is most likely to be utilized in an attempt to confirm a diagnosis of FMF by providing a positive effect on relieving symptoms?

Colchicine

Prednisone

Diclofenac

Interferon-alpha

Correct answer: Colchicine

A diagnosis of Familial Mediterranean Fever (FMF) is a clinical diagnosis that is arrived at by the use of a validation tool referred to as the Tel Hashomer Criteria for the Diagnosis of FMF. Patients who are suspected of experiencing symptoms as a result of FMF must possess at least one major criterion—three attacks with fever >38 Celsius coupled with abdominal symptoms OR pleural symptoms OR monoarthritis OR a single symptom of fever >38 Celsius—and at least two (or more) minor criteria—leg pain with exertion, a history of an incomplete attack with monoarthritis, or a favorable response to colchicine. Colchicine was first used for the treatment of FMF in the 1970s, and it continues to be the first-line treatment for FMF today. Despite 50 years of use in treating FMF, it is unclear how colchicine works to prevent an FMF attack and prevent the development of amyloidosis. All patients with an FMF diagnosis should be treated with colchicine regardless of the severity of their disease or frequency of FMF attacks due to its effectiveness against the development of potentially fatal amyloidosis. Patients typically are prescribed 1.0 to 1.5 mg/day, up to 3 mg/day if tolerated (and needed to produce a response). Patients who are unresponsive to colchicine should continue to receive colchicine treatment with the addition of anti-interleukin-1 treatment, such as interferon-alpha.

Prednisone may be warranted to treat severe, persistent myalgia with fever.

NSAIDs such as diclofenac may be prescribed to manage spondyloarthritis.

7.

A patient has presented to the emergency department with generalized itching and flushed skin following a bee sting. Which additional finding(s) would be of primary importance?

Dizziness and syncope

Headache

Urticaria

Nausea

Correct answer: Dizziness and syncope

Dizziness and syncope are signs of respiratory compromise and pending cardiovascular collapse, which are the most frequent causes of death from anaphylaxis.

Anaphylactic shock begins with generalized itching followed by a urticarial-type (hives) rash, which gradually extends over the entire body. Next, angioedema affecting deeper tissues develops quickly, leading to shortness of breath related to narrowing airways. Nausea and abdominal pain generally follow the previous symptoms. Within a few minutes, the arterial blood pressure falls, the heart rate accelerates, and syncope can occur. The allergens usually responsible for an anaphylactic reaction are food, medicines, anesthetics, latex, and wasp or bee stings.

While headache, nausea, or urticaria can occur during allergic reactions, they are not life-threatening complications.

8.

A 33-year-old female with a diagnosis of Familial Mediterranean Fever (FMF) presented to the clinic with complaints of an increase in the frequency of FMF attacks of peritonitis in the last several months. The patient, who was four months pregnant, stated that she had lost her grandmother to cancer in the last two months and that she and her husband had received notice that he was being laid off from work before the end of the month. She stated that she had recently had symptoms of a cold and that last week she had traveled out of state to be with her mother-in-law after her father-in-law suffered a severe heart attack. Using the information provided in the scenario and your knowledge of FMF, which of the following most likely contributed to the patient's increase in FMF attacks?

Stress

Illness

Pregnancy

Travel

Correct answer: Stress

While there are no consistent triggers that have been identified as being responsible for Familial Mediterranean Fever (FMF) attacks, many patients are ultimately able to identify specific causes for their attacks. Emotional stress and menstruation are but two of the known triggers for an FMF attack characterized by the acute onset of high fever and associated severe chest or abdominal pain. Other causes include strenuous exercise, trauma, cold exposure, and infection. Certain medications have also been implicated as triggering an FMF attack. While the majority of individuals affected with FMF experience brief, episodic attacks lasting for one to three days, a small percentage of patients experience chronic, painful inflammation and amyloidosis, which may ultimately cause death due to organ destruction. Up to 90% of patients with FMF are diagnosed by the time they are 20, with the remainder receiving a diagnosis before the age of 30 years. Most patients experience fewer than one FMF attack per year.

9.

You are providing care for an 18-year-old female patient diagnosed with infectious mononucleosis. The treatment plan includes rest, fluids, and over-the-counter pain and fever-reducing medicines to relieve symptoms.

What changes to the patient's laboratory values, that are classic to infectious mononucleosis, might you expect to see within the first month of the illness?

An elevation in hepatic enzymes

Leukocytosis with lymphocytosis

The presence of atypical lymphocytes

Positive heterophile antibody

Correct answer: An elevation in hepatic enzymes

Within the first 2-3 weeks of illness, 85% of patients develop a two-to-threefold elevation in hepatic enzymes (aspartate and alanine aminotransferase).

*Infected individuals also may develop **leukopenia** (not leucocytosis), with lymphocytosis. Atypical lymphocytes may be present in individuals with infectious mononucleosis, but are not unique to the illness, being a common finding in many systemic viral illnesses. Heterophile antibody cross-reactivity, as well as infectious mononucleosis false-positive results, may be found in individuals with cytomegalovirus, one of the adenoviruses, *Toxoplasma gondii*, and HIV, among other illnesses, making this test less specific for infectious mononucleosis.*

10.

A patient who received a first dose of antibiotics in the primary care office experienced an anaphylactic reaction to the antibiotic. The clinic staff administered epinephrine via Intramuscular (IM) route, administered oxygen via a face mask, started a peripheral Intravenous (IV) line, and activated Emergency Medical Services (EMS). While waiting for EMS to arrive, the patient showed no improvement in his symptoms and was noted to be deteriorating; a second injection of epinephrine was administered, a dose of IV diphenhydramine was administered, and albuterol was administered via nebulizer. Before the arrival of EMS, the patient required the placement of a supraglottic airway due to his continued physical decline. Which of the following patients who experience anaphylaxis is *most likely* to remain refractory to treatment using epinephrine and experience continued cardiopulmonary collapse?

A patient who is taking atenolol

A patient who is known to have experienced anaphylaxis previously due to food allergy

A patient who is immunocompromised

A patient who is taking metformin

Correct answer: A patient who is taking atenolol

Anaphylaxis is a life-threatening IgE-immune-mediated reaction, most commonly to food or medication. Anaphylaxis may also occur in response to a sting or bite from an insect. While the general public often believes that anaphylaxis occurs almost instantly in response to exposure to the triggering agent, anaphylaxis may not occur until several hours after the exposure. As a general rule, the more quickly an individual experiences anaphylaxis following exposure, the more severe and life-threatening the event. The primary treatment for anaphylaxis is the administration of epinephrine via IM route using the vastus lateralis muscle. Some patients may require repeated dosing of epinephrine anywhere from five to 15 minutes after the first dose is given due to an incomplete response to the first dose. Some individuals may show a good response to the first dose of epinephrine but may experience a second anaphylactic reaction several hours (up to ten hours) after the initial reaction. Patients taking beta-blocker drugs such as atenolol are likely to experience a refractory response to the administration of epinephrine, likely due to the blocking of beta-2 adrenergic receptors in the smooth muscles of the bronchi. These patients should be treated with a slowly-administered bolus of glucagon (1 mg to 5 mg) over five minutes in an attempt to reverse the refractory bronchospasm and hypotension resulting from anaphylaxis.

EMS should always be activated for a patient who experiences anaphylaxis.

11.

A patient has been diagnosed with acute bacterial rhinosinusitis (ABRS), and the patient's medical record indicates a penicillin allergy. Which of the following medications would you eliminate as an option for treatment when developing a plan of care for this patient?

Cephalexin (Keflex)

Cefdinir (Omnicef)

Cefpodoxime (Vantin)

Cefprozil (Cefzil)

Correct answer: Cephalexin (Keflex)

The greatest risk of cross-reactivity to the penicillins appears to arise from the use of the first-generation cephalosporins, including cephalexin (Keflex) and cefadroxil (Duricef). In patients with a penicillin allergy, these should be eliminated.

*Cefdinir (Omnicef), cefprozil (Cefzil), and Cefpodoxime (Vantin) are **not** first-generation cephalosporins. The second-, third-, and fourth-generation cephalosporins appear to result in lower allergic risk than first-generation cephalosporins. These would be acceptable treatment options in the patient with a penicillin allergy.*

12.

An 18-year-old female patient diagnosed with infectious mononucleosis has returned to the clinic for follow-up care. Which of the following signs and symptoms would indicate that the patient may be experiencing a dangerous complication related to this disease?

Abdominal pain located on the left side, under the rib cage, radiating to the left shoulder

Discomfort in upper right abdomen, brownish urine

Weakness, pallor, persistent fatigue

Nausea, malaise, hepatomegaly

Correct answer: Abdominal pain located on the left side, under the rib cage, radiating to the left shoulder

These signs are characteristic of a ruptured spleen and may occur in individuals who participate in contact/collision sports activities. The enlargement of the spleen that occurs with mono makes traumatic rupture of the spleen a potential complication. This is a medical emergency, and the patient should immediately be referred for emergency care.

Discomfort in the upper right abdomen and brownish urine may be associated with mild hepatitis, which can occur as a complication. However, this will resolve without treatment. Mild anemia may cause weakness, pallor, and fatigue, but this should also resolve spontaneously. Symptoms such as nausea, malaise, and hepatomegaly may occur as side effects of corticosteroid therapy if this was prescribed.

13.

You are providing follow-up care for a 5-year-old male with spina bifida who was seen and treated in the ED two days ago for an anaphylactic reaction to a latex product.

You review patient instructions with his mother and identify that further teaching is needed when she states:

"I'm so glad he doesn't have any food allergies."

"I need to make sure to keep his epinephrine injector with him at all times, including when he's at school."

"The best treatment for anaphylaxis is prevention."

"Foods are the most common cause of immunoglobulin-mediated allergic reactions."

Correct answer: "I'm so glad he doesn't have any food allergies."

Latex-induced anaphylaxis is most often found in children with spina bifida and genitourinary abnormalities, in healthcare workers, and in workers who have occupational exposure to latex. Individuals with latex allergy may also experience cross-sensitivity to certain food proteins, including bananas, avocados, kiwi, melons, or chestnuts. These patients should be instructed to avoid these products.

Individuals with anaphylaxis should be instructed to avoid possible allergens (as prevention is the best "treatment" for anaphylaxis), to keep their prescribed epinephrine auto-injector with them at all times (including at school or work), and to wear some type of identification that describes their allergies.

14.

An individual who is experiencing symptoms as a result of early Systemic Sclerosis (SSc) is most likely to present with all of the following symptoms, except:

Loss of body hair

Gastroesophageal reflux and heartburn

Edema of the fingers and toes

Dilated nailfold capillaries

Correct answer: Loss of body hair

The early symptoms of Systemic Sclerosis (SSc) tend to be vague and non-specific, with patients typically presenting with symptoms of Raynaud's Phenomenon (RP), and only later recognizing that they had also been experiencing symptoms that included fatigue, muscle stiffness and pain, and feeling ill. Patients also often report gastroesophageal reflux with heartburn, edema of the hands, fingers, face, and feet, changes to the nailfold capillaries (dilation), and hypo- or hyperpigmentation changes of the skin. As the disease progresses and the inflammatory phase quiets and the fibrotic phase takes precedence, patients then begin to experience the loss of body hair, a reduction in the body's production of skin oils, and a decrease in sweating as the skin structures hypertrophy and thickening of the skin begins. Over time, the disease affects the subcutaneous tissues, including the fat, fascia, and muscles, as well as the organ structures. Patients with systemic disease are likely to experience Gastrointestinal (GI) issues, pulmonary complications, renal complications, a progressive type of heart disease, and recurrent ulcers of the fingers and toes.

15.

During a continuing education lecture on the topic of autoimmune disorders, the speaker discussed the variations of Systemic Sclerosis (SSc) and the treatment approach for the management of the disease. All of the following points are included in the treatment management plan for SSc, except:

Treatment of renal disease

Nonselective immunotherapy

Treatment of fibrosis

Treatment of vascular disease

Correct answer: Treatment of renal disease

The focus of treatment for Systemic Sclerosis (SSc)/scleroderma is on using immunotherapy to control active disease, treating fibrosis, and treating the vascular complications of the disease. Non-specific immunotherapy drugs such as methotrexate, cyclophosphamide, and mycophenolate are prescribed to aid in controlling skin thickening, interstitial lung disease, and the inflammation of the muscles or joints that are experienced by sufferers of SSc. A stem cell transplant may be a viable option for some patients. Several agents are currently being tested for treating the fibrosis associated with SSc. Antifibrotic agents that act on a variety of pathways believed to be responsible for the skin thickening seen in SSc continue to be used in clinical trials with good results thus far and more research is necessary before the drugs can be approved for treatment. Phototherapy may be used to aid in softening specific skin lesions with good effects. The vascular complications seen in SSc, including Raynaud's Phenomenon (RP) and pulmonary hypertension, are treated through the use of endothelin receptor antagonists, prostaglandin therapy, inhibition of platelet activation, statins, and immunotherapy.

Renal, gastrointestinal, pulmonary, musculoskeletal, and emotional complications are all associated with SSc but are not the primary focus of treatment.

16.

A three-year-old male who was diagnosed with Chronic Granulomatous Disease (CGD) was seen in follow-up at the clinic after being discharged from the hospital following admission for a liver abscess. With which of the following microorganisms is a patient with CGD most likely to become infected?

Staphylococcus aureus

Aspergillus fumigatus

Burkholderia cepacia

Serratia marcescens

Correct answer: *Staphylococcus aureus*

Individuals with Chronic Granulomatous Disease (CGD) are typically diagnosed in infancy, with the average age of diagnosis being 2.5 years of age. Because one variant of CGD is X-linked, males comprise 80% of individuals diagnosed with CGD. The condition is characterized by recurrent infections, most frequently of the liver, lungs, skin, bones, and perianal area, and the formation of inflammatory granulomas in whatever site the body has tried to eradicate bacteria or fungi. Granulomata frequently form obstructions of the stomach, bladder, and ureters and also may contribute to the development of Gastrointestinal (GI) symptoms that mimic those of Crohn's disease.

CGD most commonly causes infections such as *Aspergillus pneumonia* (fungal), lymphadenitis, liver and skin abscesses, abscesses of the perianal area, and osteomyelitis. Many patients with CGD succumb to pulmonary aspergillosis caused by what are typically non-pathogenic *Aspergillus* species when encountered by healthy individuals. Bacterial sources of infection are also common, with *Staphylococcus aureus* being the most common microorganism implicated in CGD infection. *Burkholderia cepacia*, *Serratia marcescens*, and several *Nocardia* species are also common pathogenic microorganisms frequently identified in patients with CGD. Prophylactic antibiotic treatment using trimethoprim-sulfamethoxazole and antifungal treatment using itraconazole is indicated to prevent *S. aureus* and *Aspergillus* infection in these patients.

17.

A patient who received a first dose of antibiotics in the family care office experienced an almost immediate anaphylactic reaction to the drug. With which of the following symptoms of anaphylaxis is a patient most likely to initially present?

Urticaria and angioedema

Dyspnea and urticaria

Vomiting and dyspnea

Angioedema and rhinitis

Correct answer: Urticaria and angioedema

Patients who experience an anaphylactic reaction may present with a variety of symptoms, but most (85% to 90%) present with symptoms of urticaria and angioedema (subcutaneous swelling that is similar to hives). Patients may present with other cutaneous symptoms such as flushing (45% to 55%) and pruritus without a rash (2% to 5%). Of greatest concern are respiratory symptoms—dyspnea and wheezing, which is experienced by 45% to 50% of patients; swelling of the upper airway (50% to 60%); rhinitis (15% to 20%). Cardiovascular complications including dizziness, syncope, and hypotension affect 30% to 35% of patients experiencing anaphylaxis, also posing a serious risk of death to the patient. Gastrointestinal (GI) symptoms including nausea, vomiting, diarrhea, and abdominal cramping affect 25% to 35% of patients during an anaphylactic reaction.

18.

The Nurse Practitioner (NP) evaluated a patient who presented to the clinic with sick symptoms and determined that the patient needed to be prescribed a new medication. The patient believed they had experienced a reaction to the medication in the past when it had been prescribed previously. The NP discussed the possibility of prescribing premedication with the patient. Which of the following statements *most accurately* describes the appropriate use of premedication for patients who have experienced a drug reaction in the past?

The patient should undergo desensitization to the medication in question, prior to which they should receive premedication that includes antihistamines and systemic steroids.

The patient should undergo a drug challenge to the medication in question, prior to which they should receive premedication that includes antihistamines and systemic steroids.

Premedication that includes antihistamines and systemic steroids is a safe method of preventing a subsequent reaction in a patient who has experienced a medication reaction in the past.

Premedication that includes antihistamines and systemic steroids is most useful for patients who have experienced a type I reaction to a medication in the past.

Correct answer: The patient should undergo desensitization to the medication in question, prior to which they should receive premedication that includes antihistamines and systemic steroids.

There are times when a patient will require the prescription of a medication to which they have previously experienced a hypersensitivity reaction. Some patients will have experienced an immediate reaction (types I, II, and III) to the medication within the first 24 hours of taking the medication, while others will have experienced a delayed reaction, days or even longer than a week after exposure to the medication. Other patients will have experienced pseudoallergic reactions such as Red Man Syndrome (in response to vancomycin), while still others will mistakenly identify expected adverse effects of a medication, such as diarrhea or gastric upset, as a hypersensitivity reaction. When at all possible, medication to which a patient has experienced a hypersensitivity reaction should not be prescribed to the patient. The NP should attempt to identify an acceptable alternative medication, ideally one that is not within the same medication class as the drug that caused the hypersensitivity reaction due to concern of a cross-reaction. While choosing an alternate medication from a different drug class is safest for the patient, the use of a second-line treatment

agent may not be as effective as using a first-line agent or may place the patient at risk of developing a drug-resistant microorganism. In these instances, it may be worth considering utilizing premedication to prevent the development of a hypersensitivity reaction.

Patients who have experienced documented anaphylaxis to a medication in the past should not subsequently receive the offending drug again, nor should they receive premedication in an attempt to "prevent" the development of a subsequent anaphylactic response. Premedication, in these cases, simply masks symptoms of anaphylaxis, delaying prompt identification of an anaphylactic reaction and the patient's access to potentially life-saving treatment. This premise holds for a patient who has experienced any type of hypersensitivity reaction to a medication in the past. Premedicating without taking steps to determine if the patient does, indeed, have some type of immune response to the medication in question is a dangerous practice and should never be undertaken. The "gold standard" of determining a hypersensitivity reaction is the drug challenge, but this should only be undertaken if the risk of a hypersensitivity reaction is low or after a patient has undergone skin or in vitro testing that was negative. Premedication before a drug challenge is not indicated for the same reason it is not indicated for patients who have experienced a documented anaphylactic reaction to a medication—premedication simply masks the symptoms of a hypersensitivity reaction and can delay identification of and treatment for an immediate hypersensitivity reaction.

If it is determined that the patient requires the offending medication and that they have previously experienced a hypersensitivity reaction, the patient should undergo desensitization to the medication. There are several methods of desensitization (best left to an expert in allergy and immunology) that can be used; desensitization is not indicated for all medications. The risk for a hypersensitivity reaction can be lessened by the administration of premedication; the premedication cocktail may vary from facility to facility but typically involves the use of antihistamines, systemic corticosteroids, NSAIDs (Non-Steroidal Anti-Inflammatory Drugs), and leukotriene receptor antagonists such as montelukast (Singulair^R).

19.

You are managing the vaccine clinic at the community health clinic and have reviewed the daily appointment schedule. All the following individuals should receive the measles, mumps, and rubella (MMR) vaccination except:

A 5-year-old girl with a history of anaphylaxis to gelatin

A 2-year-old boy with a history of anaphylaxis after eating eggs

A 26-year-old woman who is breastfeeding a newborn

A healthcare worker born in 1960 who has an equivocal MMR titer

Correct answer: A 5-year-old girl with a history of anaphylaxis to gelatin

The Measles, Mumps, and Rubella (MMR) vaccine is recommended for all individuals born after 1957. Adults born in 1957 or earlier are considered immune as a result of having had these diseases (native or wild infection); the vaccine against these three formerly common illnesses was unavailable until the 1960s. Adults born after 1957 who did not receive the vaccine series in childhood should receive two vaccinations scheduled one month (at least 28 days) apart. The two vaccine series are recommended during childhood with the first dose being administered between 12 to 15 months of age and the second dose administered between 4 and 6 years of age.

Individuals with a history of anaphylactic reaction to gelatin or neomycin should not receive the MMR vaccination. It is safe to use during lactation, but its use during pregnancy is discouraged because of the theoretical but unproven risk of congenital rubella syndrome from the live virus contained in the vaccine. It was previously believed that individuals with a history of egg allergy should not receive the MMR vaccine; the vaccine is now considered safe for individuals with a known egg allergy.

20.

After reviewing lab work on a patient that was seen in the clinic several days ago, the Nurse Practitioner (NP) was suspicious that the patient was experiencing a type II hypersensitivity reaction to a drug that had been prescribed to him. All of the following examples represent type II hypersensitivity reactions, except:

Leukocytosis, skin necrosis, and detachment of the epidermis while taking a sulfonamide drug

Thrombocytopenia, bleeding gums, and petechiae while taking a cephalosporin antibiotic

Neutropenia, mouth sores, and fever while taking propylthiouracil

Hemolytic anemia, dark urine, and jaundice while taking NSAIDs

Correct answer: Leukocytosis, skin necrosis, and detachment of the epidermis while taking a sulfonamide drug

There are four types of drug hypersensitivity reactions that may occur in individuals who demonstrate an immune-mediated response to a medication. Type I reactions are (typically) IgE-mediated reactions and may occur as an immediate response (up to several hours after administration of the drug) or several days after the initial exposure to the drug with drug re-exposure. Anaphylaxis is the most common example of a type I reaction and includes symptoms of urticaria, bronchospasm, and cardiovascular collapse. Type II hypersensitivity reactions are typically IgG or IgM-mediated responses; these reactions, as well as type III reactions, typically occur after multiple, high-dose, prolonged exposures to the drug. In a type II reaction, the body produces antibodies (in response to exposure to the drug) that bind to receptors on the macrophages, natural killer cells, platelets, and/or granulocytes and are directed against antigens that are present on the surface of the erythrocytes, leukocytes, platelets, or other cell membranes. These cells are then isolated by the liver or spleen and destroyed, resulting in discernible alterations when evaluating lab work. Examples of type II drug hypersensitivity reactions include thrombocytopenia, bleeding gums, and petechiae while taking a cephalosporin antibiotic; neutropenia, mouth sores, and fever while taking propylthiouracil; and hemolytic anemia, dark urine, and jaundice while taking NSAIDs (Non-Steroidal Anti-Inflammatory Drugs). Type III reactions are triggered via the complement pathway, with patients displaying symptoms 1 to 2 weeks after the initial exposure to the drug and typically isolated to the kidneys, joints, Gastrointestinal (GI) tract, and skin. Serum sickness is an example of a type III hypersensitivity reaction. Type IV reactions are delayed hypersensitivity reactions that are T-cell mediated and may occur days or many weeks after exposure to the medication. They are further broken down into four

subcategories (a through d). Poison ivy rash, the wheal that forms in response to a tuberculin test, and maculopapular exanthema are all examples of type IV reactions. Stevens-Johnson Syndrome (SJS) in which there is leukocytosis, skin necrosis, and detachment of the epidermis in response to taking a drug such as a sulfonamide drug is an example of a life-threatening type IV hypersensitivity reaction.

21.

The pregnant woman you are caring for has declined to receive the influenza vaccine during her pregnancy. You inform her that:

Pregnant women are five times more likely to develop serious disease when compared to nonpregnant women.

There are potential risks of receiving the influenza vaccine during pregnancy. However, the benefits outweigh the risks.

The nasal spray influenza vaccine is a simple and effective means of preventing "the flu" in pregnant women.

It is important for her to receive the vaccination while she is pregnant, as the influenza vaccine cannot be administered to breastfeeding women.

Correct answer: Pregnant women are five times more likely to develop serious disease when compared to nonpregnant women.

Influenza is a potentially serious illness associated with significant morbidity and mortality risk across the life span. Over the past several flu seasons, vaccine effectiveness has typically ranged between 40% and 50% with ongoing effort for a target of approximately 70% efficacy in preventing influenza or reducing the severity of disease.

Because of the change in the respiratory and immune system normally present during pregnancy, pregnant women are five times more likely to develop serious disease when contracting influenza than nonpregnant women and should be encouraged to receive the vaccine at any point during the pregnancy. Furthermore, not only does the influenza vaccine provide protection to the pregnant woman, it also provides important protection to the newborn during the first six months of life. It is also safe to administer to lactating women.

The nasal spray flu vaccine is contraindicated in pregnancy because it is a live attenuated vaccine.

22.

A 32-year-old female patient is seen in the medical clinic due to symptoms that include dyspnea on exertion, fatigue, a persistent dry cough, nodule formations just under the skin, and eye and joint pain.

Which of the following tests would you order to confirm a possible diagnosis of sarcoidosis?

Biopsy

Magnetic resonance imaging

Electromyography

Nerve conduction studies

Correct answer: Biopsy

The signs and symptoms described of dyspnea on exertion, fatigue, a persistent dry cough, nodule formations just under the skin, and eye and joint pain are consistent with a possible diagnosis of sarcoidosis. Confirmation of sarcoidosis typically requires a biopsy to check for the presence of noncaseating granulomas. This can involve a transbronchial biopsy or can occur from the affected skin or the outer membrane of the eye.

Magnetic Resonance Imaging (MRI) can detect if the disease is affecting the heart or central nervous system. Pulmonary function tests and carbon monoxide capacity tests are used in evaluation and follow-up, but these tests are not used to diagnose the disease. Electromyography and nerve conduction studies are not used to diagnose sarcoidosis.

23.

The mother of a 2-year-old boy who has experienced anaphylaxis after eating scrambled eggs requests that her son receive the influenza vaccine since her mother was recently diagnosed with breast cancer and is currently undergoing treatment. She states she has recently heard that it is now possible for individuals with an egg allergy to receive the influenza vaccine.

Regarding individuals with a documented egg allergy and influenza vaccine, you know all the following statements are true except:

The live, attenuated influenza vaccine (LAIV4) is preferred for individuals with a known egg allergy.

Individuals who have experienced only hives following exposure to eggs should receive an influenza vaccine.

Individuals who have a known egg allergy may receive any licensed and recommended influenza vaccine.

Tolerance to egg-containing foods does not exclude the possibility of egg allergy.

Correct answer: The live, attenuated influenza vaccine (LAIV4) is preferred for individuals with a known egg allergy.

Until recently, egg allergy was considered a contraindication to receiving all forms of the influenza vaccine. Current recommendations advise that most individuals who are allergic to eggs can safely receive the influenza vaccine.

Individuals who have either experienced only hives following exposure to egg or those who report having had more severe reactions to egg (known as egg allergy) may receive any licensed and recommended influenza vaccine (e.g., appropriate IIV, RIV4, or LAIV4) that is otherwise appropriate for the patient's age and health status. The LAIV4 is not preferred to the other forms of influenza vaccine. The selected vaccine should be administered in an inpatient or outpatient medical center, and vaccine administration should be supervised by a healthcare provider who is able to recognize and manage severe allergic conditions.

People who are able to eat lightly cooked egg (scrambled egg) without a reaction are unlikely to be allergic. Egg-allergic people might tolerate egg in baked products. Tolerance to egg-containing foods does not exclude the possibility of egg allergy.

24.

Your 34-week pregnant patient has potentially been exposed to the varicella-zoster virus (VZV) through a chickenpox outbreak at the elementary school where she works.

Should she contract chickenpox, who is at greater risk of developing complications—your patient or her developing fetus?

Your patient is at greater risk of developing complications such as pneumonia

The developing fetus is at greater risk of developing congenital varicella syndrome

Both are at risk

Neither are at risk

Correct answer: Your patient is at greater risk of developing complications such as pneumonia

Varicella infection during pregnancy places the mother at greatest risk of developing complications such as pneumonia, sepsis, encephalitis, and more commonly, infected skin lesions.

*The concern or threat to the developing fetus is greatest when varicella infection occurs between 8 and 20 weeks of pregnancy. The fetus **under 20 weeks** is at-risk of developing congenital varicella syndrome, which can cause skin scarring, underdeveloped limbs, eye inflammation, and incomplete brain development.*

Should varicella infection take place in a pregnant woman within days of delivery, the infant is at risk for neonatal varicella, which is potentially life-threatening.

25.

The family of a three-year-old male who was recently diagnosed with Chronic Granulomatous Disease (CGD) met with the treatment team to discuss the plan for treatment for their son. The boy's mother asked the team if there was any hope of a cure for her son. The team leader answered the mother's question and made which of the following most accurate statements regarding potential curative options for CGD?

"We are very hopeful that a bone marrow transplant can provide a cure for your son."

"I'm so sorry, but as of right now, despite active research that is attempting to find a cure using gene therapy for CGD, there is no cure for CGD."

"We can attempt a bone marrow transplant when your son is a bit older, but he will have to be without any signs of active infection before this can be undertaken."

"Currently, treatment of CGD using prophylactic antibiotics and antifungals is the focus; bone marrow transplant is being trialed to see if this will be an effective means of providing a cure for CGD in years to come."

Correct answer: "We are very hopeful that a bone marrow transplant can provide a cure for your son."

Depending upon the cause of Chronic Granulomatous Disease (CGD) and access to treatment, children with CGD are at an increased risk of dying from CGD within the first ten years of their lives. CGD may occur as a result of an X-linked or autosomal recessive pattern, with most cases (65%) in the US resulting from an X-linked pattern. Twenty percent of these patients will die within the first ten years of life due to the increased severity of X-linked cases of the disease, while 20% of patients with CGD as an autosomal recessive disorder will die by the age of 35 years. As the hallmark of CGD is recurrent bacterial and/or fungal infection in conjunction with granuloma formation, preventative measures are aimed at the prevention of infection through the prescription of prophylactic antibiotic and antifungal drugs. Bone Marrow Transplant (BMT) has been able to provide a cure for CGD patients, even in the face of active infection. Infection that results from some Aspergillus species may not be curable using medical means. Hence, BMT has frequently been successfully performed with the patient known to be actively infected with certain Aspergillus species.

Gene therapy has been utilized in a limited manner for the treatment of CGD; research in perfecting this treatment method is still underway.

26.

A 28-year-old patient who was diagnosed with a bacterial illness was told that she would need antibiotics. The patient stated that she believed she had experienced an allergic reaction to the necessary antibiotic when she had taken the drug before as a young teenager. After exploring other drug options, the provider explained that it would be most beneficial if the patient could take the antibiotic they had initially discussed, so they then began to discuss the possibility of evaluating the patient for a true allergy to the drug. Which of the following methods represents the "gold standard" for the evaluation of drug allergies?

Provocation testing

Intradermal testing

Patch testing

In vitro testing

Correct answer: Provocation testing

In theory, any drug is capable of causing a hypersensitivity reaction, but antibiotic drugs remain the primary cause of hypersensitivity reactions. Reactions range from mild to life-threatening, immediate to delayed by many hours or even days, and some individuals may take a drug seemingly without incident only to be prescribed the same medication at a later date and experience an obvious hypersensitivity reaction to it. Regardless of how or when a hypersensitivity reaction occurs, all occur as a result of the immune system recognizing the drug as a foreign antigen.

A patient who is believed to have experienced a hypersensitivity reaction should undergo diagnostic testing to substantiate (or refute) the hypersensitivity reaction when necessary. Typically, the history and details of the reaction are ample for establishing a diagnosis of hypersensitivity reaction, but at times it is necessary to perform diagnostic testing to fully establish the diagnosis. Provocation testing, also referred to as a drug challenge or test dosing, is the gold standard for establishing a diagnosis of a drug allergy. Provocation testing should not be undertaken lightly or as the first step in the diagnostic process due to the concern of provoking a worse hypersensitivity reaction. Intradermal (skin prick) testing or in vitro testing should be performed first, and if negative, a provocation test can be performed as a second step with cautious administration of low doses of the drug in question. Patch testing may be performed to identify drugs that have resulted in delayed maculopapular exanthem (skin rash).

27.

When should an infant who is born to a mother infected with hepatitis B virus (HBV) receive the HBV vaccine?

During the first 24 hours of life administered along with hepatitis B immune globulin (HBIG)

During the second month of life as part of the Centers for Disease Control (CDC) recommended two-month vaccine schedule

HBV vaccine should be administered during pregnancy to women infected with the virus to protect the developing fetus

During the first 24 hours of life administered alone

Correct answer: During the first 24 hours of life administered along with hepatitis B immune globulin (HBIG)

Perinatal transmission of HBV to the fetus is highly efficient and usually occurs during exposure to blood during labor and delivery. An infant born to a mother infected with HBV should receive the HBV vaccine and HBIG during the first 24 hours of life to minimize the risk of perinatal transmission and the subsequent development of chronic HBV infection.

The Centers for Disease Control (CDC) recommends routine vaccination for all infants, delivered as a three-injection series at birth, one month, and six months of age.

28.

A patient who experienced a severe anaphylactic reaction was transported to the hospital using Emergency Medical Services (EMS) after receiving a dose of Intramuscular (IM) epinephrine. It was determined that the patient had experienced non-IgE-mediated anaphylaxis. Which of the following is most likely to contribute to anaphylaxis via a non-IgE-mediated pathway?

Vancomycin

Peanuts

Eggs

Diclofenac

Correct answer: Vancomycin

Anaphylactic reactions occur most commonly in response to exposure to food, medication, or insect stings. Children are most likely to experience an anaphylactic reaction in response to a new food, and occasionally to a food product that they have eaten previously, without any evidence of allergy. Foods such as peanuts, tree nuts, wheat, eggs, dairy products, soy, fish, and shellfish are responsible for causing most (90%) anaphylactic reactions related to the ingestion of a food product. Medications can also cause anaphylaxis and are more likely to do so in adult patients.

While anaphylaxis most often occurs as an immune-mediated IgE reaction to the offending agent, it may also occur via a nonimmunological pathway, as a non-IgE-mediated reaction. Anaphylaxis that occurs in response to exposure to a food source is most often caused by an IgE reaction. Medications may also cause an IgE-mediated response but are also much more likely to cause a non-IgE-mediated reaction causing a sudden release of mast cells and basophils. Nonsteroidal anti-inflammatory drugs (NSAIDs) such as diclofenac are the number one cause of IgE-mediated anaphylaxis, while vancomycin, a glycopeptide antibiotic, is more likely to cause symptoms of anaphylaxis as a direct result of stimulation of the release of mast cells. Some medications cause non-IgE-mediated anaphylaxis via an IgG antibody pathway; this results in the release of platelets and may contribute to the severity of the reaction.

29.

Your 17-year-old patient's lab results include a positive heterophile antibody test. His chief complaints were sore throat and fatigue. Which specific assessment finding(s) would you expect to see in this patient?

Cervical adenopathy

Purulent eye drainage

Flank pain

Joint pain

Correct answer: Cervical adenopathy

The patient's symptoms and lab results indicate infectious mononucleosis (mono). Diagnostic testing for mono is the heterophile antibody test (Monospot), which has a sensitivity rate of 85% and a specificity rate of 100%.

Mono is characterized by a prodrome of symptoms that lasts for 3-5 days of headache, malaise, myalgia, and anorexia. Acute symptoms of fatigue, exudative pharyngitis, enlarged tonsils, fever, headache, and anterior/posterior cervical lymphadenopathy occur for 5 to 15 days after the prodrome phase. Additional findings include splenomegaly (50% of patients), hepatomegaly (10% of patients), tenderness to palpation over the spleen and liver, jaundice, periorbital edema, petechiae on the soft palate, generalized adenopathy, and maculopapular rash. Streptococcal pharyngitis occurs concurrently in 30% of patients.

Purulent eye drainage, flank pain, or joint pain are not associated with mononucleosis.

30.

You are performing a well-child check-up for a 12-month-old child. Which intervention should be included in your plan of care?

Administration of the first dose of the Measles, Mumps, Rubella (MMR) vaccine

Administration of the second dose of the rotavirus vaccine

Ordering the first oral poliovirus vaccine

Prescribing the first dose of the *Haemophilus influenzae* vaccine

Correct answer: Administration of the first dose of the Measles, Mumps, Rubella (MMR) vaccine

The first Measles, Mumps, Rubella (MMR) vaccine should be given between 12 and 15 months of age. The vaccine is not administered before 12 months of age, as it will not be effective due to immaturity of the immune system. This can prevent the baby from mounting a robust immune response to the vaccine. The second dose of the MMR vaccine should be given between 4 and 6 years of age.

If the infant happens to be traveling to any foreign country, one dose of the MMR vaccine should be given between 6 and 11 months of age. If the dose was given before 1 year old, the child should receive two additional doses of the MMR vaccine that are separated by at least 28 days.

*The second dose of the rotavirus vaccine is given at 4 months of age. Oral poliovirus vaccine, a live virus vaccine, is no longer in use. The *Haemophilus influenzae* vaccine is initially given at 2 months of age.*

31.

An 18-year-old female presented to the primary care office with complaints of pain in her fingertips and toes associated with pallor of the digit tips, followed by cyanosis of the skin and then rubor. The Nurse Practitioner (NP) completed a thorough exam, could not identify any other associated concerns, tentatively assigned a diagnosis of primary Raynaud's phenomenon, and referred the girl to a rheumatologist for a full workup. The NP planned to start medication treatment for the girl based on the nailfold capillary changes that she was able to observe upon examination of the girl's hands. Which of the following medications is the first-line treatment for primary RP?

Oral nifedipine (Adalat^R)

Topically applied nitroglycerin ointment (Nitro Bid^R)

Sublingual nifedipine (Adalat^R)

Oral sildenafil (Viagra^R)

Correct answer: Nifedipine (Adalat^R)

Symptoms of Raynaud's Phenomenon (RP) should be treated using an individualized approach based on the severity of the patient's presenting symptoms. Most patients can be well-managed by advising on lifestyle changes, including cold exposure by wearing a heated hat and/or vest, gloves, socks, and layering of clothing. Patients who present with evidence of more severe disease, such as open or healing sores on the fingertips or toes or, with evidence of change to the nailfold capillaries, require medication treatment. Oral administration of a Calcium Channel Blocker (CCB) such as nifedipine or nicardipine is the first-line treatment for primary RP, with topically applied nitroglycerin ointment (1% or 2%) also being an acceptable treatment option. Patients who are being treated with topical nitroglycerin should be instructed to apply the ointment to the interdigital webs and then apply gloves and socks over the hands and feet to prevent accidental transfer of the antihypertensive agent to another individual. Oral sildenafil (Viagra^R) is an effective second-line treatment for individuals whose disease is refractive to treatment using a CCB drug.

32.

A patient presents to clinic for interpretation of her tuberculin skin test (TST), which she received at your clinic 72 hours ago. She reports having recently immigrated to the United States and having spent 10 months living in a refugee camp with her family while waiting for permission to immigrate. She admits to known contacts with individuals who were diagnosed with TB while living in the refugee camp and verbalizes concern of experiencing a dry cough and dyspnea for the last several months.

When evaluating her TST wheal, which measures 4 mm, you know which of the following statements is true?

Induration test results can be compromised by poor injection technique.

An induration of ≥ 5 mm is considered positive in any person.

An induration of < 5 mm is considered positive in patients who have undergone organ transplants.

An induration of ≥ 8 mm is considered positive in recent immigrants from high-prevalence countries.

Correct answer: Induration test results can be compromised by poor injection technique.

The Tuberculin Skin Test (TST), while an effective standard for identifying individuals infected with tuberculosis, has limitations. Test results may be compromised by poor injection technique or the use of an inferior Purified Protein Derivative (PPD) product, and patients who are immunosuppressed may show low sensitivity to the TST.

When interpreting TST results, an induration of ≥ 5 mm is considered positive in:

- *HIV-infected individuals*
- *People who have recently been in contact with others diagnosed with TB*
- *Individuals who show fibrotic changes on chest radiograph consistent with prior infection with TB*
- *Individuals who have undergone organ transplant*
- *Immunosuppressed people*

An induration of ≥ 10 mm is considered positive in:

- *Recent immigrants from high-prevalence areas*
- *Injection drug users*
- *Residents/employees of high-risk congregate settings*

- *Mycobacteriology laboratory personnel*
- *Children < 4 years old*
- *Infants, children, and adolescents exposed to adults in high-risk categories.*

An induration of ≥ 15 mm is considered positive in any person, including those who have no known risk factors for TB infection.

33.

You have advised a 32-year-old female patient to update her immunizations. This is an example of which level of prevention?

Primary prevention

Secondary prevention

Tertiary prevention

U.S. Preventive Services Task Force (USPSTF) recommendations

Correct answer: Primary prevention

Primary prevention measures include activities provided for individuals to prevent the onset or acquisition of a given disease, such as counseling and education about accident prevention and encouraging the use of bicycle helmets. The goal of primary prevention measures is to spare individuals the suffering, burden, and cost associated with the clinical condition and is the first level of health care. Active immunization through the use of vaccines provides long-term protection from disease.

Secondary prevention measures identify and treat asymptomatic persons who may be in a preclinical disease state in order to minimize future bodily damage. Examples of secondary prevention include screening exams, such as the HbA1c test to detect diabetes and mammograms to detect breast cancer.

Tertiary prevention measures aim to manage an established disease to minimize its impact and complications. Examples of tertiary prevention include medication, diabetic education, rehabilitation, support groups, and lifestyle modifications.

The U.S. Preventive Services Task Force (USPSTF) is an independent, volunteer group of national experts in prevention and evidence-based medicine that makes recommendations about clinical preventive services, such as screening tests, counseling services, and preventive medications.

34.

A 6-year-old female who has never received an inactivated influenza vaccine has been brought to the office by her mother to be vaccinated to help protect her 4-month-old baby brother during influenza "season."

You inform the girl's mother that she will require:

Two inactivated influenza vaccinations scheduled four or more weeks apart

A single vaccination administered annually

Children under the age of 8 years should not receive the inactivated influenza vaccination

Two inactivated influenza vaccinations, the first scheduled about one month prior to the start of influenza season (October/November) and the second scheduled four weeks after the first

Correct answer: Two inactivated influenza vaccinations scheduled four or more weeks apart

The inactivated influenza vaccine is recommended for all individuals aged 6 months and older. A single annual vaccination confers adequate protection from influenza viruses. However, all children aged 6 months to 8 years who are receiving the vaccination for the first time should receive two doses of the inactivated influenza vaccine scheduled four or more weeks apart.

Protection is thought to persist for at least 6 months. Early vaccination (prior to the start of influenza season) will likely result in suboptimal immunity before the end of the influenza season. Start giving the influenza injection at the end of October of each year (fall to winter season).

35.

The Nurse Practitioner (NP) worked in a clinic that served a large population of individuals who immigrated from various areas around the world. The NP was informed by her colleague that she would be seeing a patient who had a diagnosis of Familial Mediterranean Fever (FMF). Which of the following patients is most likely to be diagnosed with FMF?

An Armenian individual

An Ashkenazi Jewish individual

An Ethiopian Jewish individual

A Greek individual

Correct answer: An Armenian individual

Familial Mediterranean Fever (FMF) is an autosomal recessive disorder that may affect as many as one in three individuals who hail from Turkish, Jewish (primarily non-Ashkenazi, also not Ethiopian Jewish populations), Arabic, and Armenian populations. Almost all patients affected with the disorder develop symptoms before the age of 30 years. FMF is the most common autoinflammatory disease worldwide. The disorder arises from a mutation (or mutations) on the MEFV gene that causes patients to develop symptoms including abrupt high fevers that may persist for as long as three days and inflammation of the serosal tissue (including the pleura, pericardium, and peritoneum). Patients typically present with severe chest or abdominal pain and are often misdiagnosed with acute appendicitis when the presenting symptom includes abdominal pain. The disorder can result in recurrent peritonitis, contributing to the development of adhesions in the abdomen and/or pelvis. Females may experience infertility due to the presence of pelvic adhesions. Patients may also experience painful symptoms in the knees or other joints that mimic arthritis pain (but without associated destruction of the joint). Skin lesions may also occur (erysipelas-like lesions) that primarily affect the anterior lower legs. Less frequently, patients experience symptoms of vasculitis, orchitis, myalgia, pericarditis, and meningitis.

36.

You are teaching a group of clinic patients about influenza. You realize that more instruction is needed when one of the class participants states:

"There is an increased risk of influenza-related complications, including pneumonia, for anyone who contracts the virus."

"Even if I get the flu vaccine, there is still a small chance I could get the flu."

"If I get the flu, I may still have a cough and feel tired for two weeks."

"My doctor may prescribe a medication such as oseltamivir (Tamiflu) to treat influenza."

Correct answer: "There is an increased risk of influenza-related complications, including pneumonia, for anyone who contracts the virus."

The influenza vaccine is 70-80% effective in preventing contraction of the disease or reducing severity of the disease, leaving a 20-30% chance one may get the flu. It's not unusual to have a persistent cough and malaise for two weeks or more after the worst symptoms have resolved. Adults can pass the virus on 1 day before the onset of symptoms, and remain infectious after the onset of the disease, for approximately 5 days.

Medications approved by the FDA for the treatment of influenza include amantadine (Symmetrel), rimantidine (Flumadine), zanamivir (Relenza), oseltamivir (Tamiflu), and peramivir (Rapivab).

Individuals with ongoing health problems such as pulmonary or cardiac disease, young children, and pregnant women (not all patients) also have an increased risk of influenza-related complications, including pneumonia.

37.

When providing care for a patient, you observe a tuberculin skin test (TST) reaction with an induration of 6 mm. What further information would indicate this is a positive test result?

Recent contact with a person with active tuberculosis disease

Immigration from Southeast Asia 4 years prior to testing

Age younger than 4 years old

Residence in a homeless shelter

Correct answer: Recent contact with a person with active tuberculosis disease

A TST induration of ≥ 5 mm is considered positive in:

- *HIV-infected (+) persons*
- *A recent contact of a person with infectious tuberculosis disease*
- *Persons with fibrotic changes on chest radiograph consistent with prior TB*
- *Patients with organ transplants*
- *Persons who are immunosuppressed for other reasons*

An induration of ≥ 10 mm is considered positive in:

- *Recent immigrants from high prevalence regions/countries, such as Southeast Asia or Africa (within the past 5 years)*
- *Injection drug users*
- *Residents and employees of high-risk congregate settings such as homeless shelters, nursing homes, prisons, or healthcare facilities*
- *Mycobacteriology laboratory personnel*
- *Persons with clinical conditions that place them at high risk*
- *Children younger than 4 years old*
- *Infants, children, and adolescents exposed to adults in high-risk categories*

Immigration from Southeast Asia 4 years prior to testing, age younger than 4 years old, and residence in a homeless shelter require an induration of 10 mm or greater to be considered positive for tuberculosis.

38.

The three-year-old child you are examining will be traveling to Belize with their parents over the holidays on vacation. You have been caring for the child since birth and have records that they have received all appropriate immunizations and are up-to-date, according to the Centers for Disease Control (CDC) vaccine schedule.

Regarding measles, mumps, and rubella (MMR) immunization, prior to traveling, the child requires which of the following?

No further MMR vaccinations

A "booster" dose of MMR vaccination

Two MMR vaccinations scheduled one month apart

Children under age five are not vaccinated against MMR

Correct answer: No further MMR vaccinations

MMR is a live attenuated virus vaccine. The Centers for Disease Control (CDC) immunization schedule recommends the first dose of MMR to be administered at 12 months of age (between 12 and 15 months of age is acceptable). A second "booster" dose is recommended between the ages of 4 to 6 years (preschool age). Therefore, the patient in this scenario does not require any further MMR immunizations at this time.

For infants 6 to 11 months who will be traveling internationally (regardless of the destination country), one dose of MMR should be given. If the dose was given before 1 year of age, the child should receive two additional doses of MMR (separated by at least 28 days). Older children who were not immunized earlier in life should receive two doses of vaccine, one month apart.

39.

A 45-year-old African American female presented to the family practice office for an evaluation after she noticed persistent edema of her fingers, hands, and face, and that her lower legs were edematous and pitting. She also described experiencing intense pruritus and a burning sensation in the affected areas. The patient stated she had been diagnosed with Raynaud's approximately one year ago and that she has been taking oral nifedipine to manage Raynaud's symptoms. Based on the information provided in the scenario, which of the following is the most likely cause of the patient's symptoms?

Systemic sclerosis

Poor response of Raynaud's phenomenon to medication treatment with marked worsening of Raynaud's

Severe adverse effects associated with the use of oral nifedipine

Systemic lupus erythematosus

Correct answer: Systemic sclerosis

Systemic Sclerosis (SSc), also referred to as scleroderma (which is a more specific term for the skin lesions that may be experienced by some individuals), is an autoimmune inflammatory disorder with a high association with Raynaud's Phenomenon (RP). The earliest symptoms of SSc are vague and nonspecific, including fatigue, musculoskeletal stiffness and/or pain, and feelings of illness. Patients may also complain of experiencing dysphagia, heartburn, and gastroesophageal reflux in conjunction with RP, with this constellation of symptoms often preceding a diagnosis of SSc by several years. It is common for patients to be diagnosed with RP, and then within a short time frame (one to two years) to return with symptoms of soft tissue edema (hands, fingers, face, lower extremities), severe pruritus, and a burning sensation to the affected areas, and pitting edema of the lower extremities. The skin may become hyperpigmented or develop areas of hypopigmentation similar to that seen in vitiligo, especially noted along the scalp, the back of the hands, the chest, and the back. Musculoskeletal symptoms tend to gradually worsen with the patient noticing weakening of the muscles and a decrease in joint mobility. After the edematous/inflammatory phase of SSc has subsided, the fibrotic phase begins, with fibrosis first affecting the skin and then progressing to the subcutaneous fat, fascia, muscle, and other soft tissue structures.

SSc is divided into four subtypes: limited cutaneous SSc, diffuse cutaneous SSc, systemic sclerosis sine scleroderma, and morphea. Choctaw Native Americans and

African Americans have higher rates of systemic SSC, while European Americans have higher rates of localized variants of the disease.

40.

The parents of a three-year-old male who was diagnosed with Chronic Granulomatous Disease (CGD) met with the Nurse Practitioner (NP) and the rest of the treatment team to discuss the plan for the boy's medication treatment. Which of the following medications is most likely to be prescribed prophylactically in the treatment of CGD?

Trimethoprim-Sulfamethoxazole (TMP-SMX)

Clotrimazole

Amoxicillin-clavulanate

Fluconazole

Correct answer: Trimethoprim-Sulfamethoxazole (TMP-SMX)

*Since patients diagnosed with Chronic Granulomatous Disease (CGD) are at life-long risk of developing severe bacterial and fungal infections, the mainstays of treatment include prescribing prophylactic antibiotic and antifungal drugs in an attempt to prevent this possibility. CGD patients are at the highest risk of infection due to catalase-positive bacteria and fungi, with *S. aureus* being most frequently implicated in causing infection in CGD patients. Prophylactic prevention of *S. aureus* is most often undertaken using Trimethoprim-Sulfamethoxazole (TMP-SMX); dicloxacillin can be used for patients who are allergic to sulfa drugs. Prophylactic antifungal medications are also typically prescribed in conjunction with the antibiotic, with itraconazole being most commonly prescribed to prevent infection with *Aspergillus* species.*

41.

An adolescent male patient presents with fever, fatigue, pharyngitis, and lymphadenopathy. Which laboratory test result would be consistent with the diagnosis of infectious mononucleosis?

Lymphocytes 65%

Hematocrit 30%

Platelet count 350,000

Erythrocyte sedimentation rate (ESR) 20 mm/hr

Correct answer: Lymphocytes 65%

Leukopenia with lymphocytosis is present with acute mononucleosis, which is a viral infection. The normal range for lymphocytes is 20-40%, and the patient has an elevated lymphocyte count. Lymphocytosis is characteristic of a viral infection, whereas elevated neutrophils, or a "left shift," points to a bacterial infection.

A hematocrit of 30% falls outside the normal range of 42 to 52% in males. Anemia is rare with acute mononucleosis, so if seen, patients with anemia should undergo a workup for another cause of their anemia.

The platelet count and Erythrocyte Sedimentation Rate (ESR) reported are within the normal range.

42.

You are providing care for a patient with a history of a positive tuberculin skin test (TST) who exhibits no symptoms or physical findings suggestive of active tuberculosis (TB) disease today. She has declined treatment for TB at this time.

Which of the following new findings would be of MOST concern?

Fasting plasma glucose of 150 mg/dL

A positive heterophile antibody test

Hematocrit 32.4%, hemoglobin 11.5 g/dL

A positive interferon-gamma release assay (IGRA) test

Correct answer: Fasting plasma glucose of 150 mg/dL

Reactivation of latent TB infection (LTBI) is noted with immunocompromising disorders, immunosuppressive medications, and diabetes mellitus (due to a depressed immune system). A fasting plasma glucose of 150 mg/dL is diagnostic for diabetes (>126 mg/dL). Further follow-up regarding the risk of developing active TB is indicated in this scenario.

*A positive heterophile antibody test is associated with infectious mononucleosis, and a hemoglobin of 11.5 g/dL and hematocrit of 32.4% indicates anemia. Neither of these problems is associated with the reactivation of latent TB. A positive IGRA test is a likely finding in a patient with a **history** of a positive TST; IGRAs do not help differentiate latent TB Infection (LTBI) from TB disease. The two IGRAs that have been approved by the U.S. Food and Drug Administration (FDA) and are commercially available in the U.S are:*

- 1. QuantiFERON-TB Gold In-Tube test (QFT-GIT)*
- 2. T-SPOT TB test (T-Spot)*

*Any patient with a positive TST or IGRA test result should have a chest x-ray to help exclude the diagnosis of active pulmonary TB. In addition, evaluation for clinical evidence of active disease (e.g., malaise, weight loss, fever, night sweats, and chronic cough) should be carried out. For those suspected of active TB disease, the presence of acid-fast bacilli from sputum should be performed via acid-fast microscopy. A culture for *M tuberculosis* will confirm the diagnosis.*

43.

When discussing adult vaccinations with your 61-year-old patient, she states she does not need a shingles vaccination because she contracted chickenpox as a child.

You know that the MOST effective shingles protection is:

The varicella-zoster immunization

Having contracted chickenpox as a child

A previous history of shingles

Contact with a child infected with chickenpox

Correct answer: The varicella-zoster immunization

Vaccination with the varicella-zoster immunization is recommended for all adults aged 60 and older. Shingrix is a recombinant zoster vaccine that has nearly 100% efficacy in preventing shingles. The vaccine is recommended for immunocompetent adults aged 50 and older and is given in two doses separated by 2 to 6 months.

Individuals with a childhood history of chickenpox or previous infection with shingles may still experience reactivation of the varicella virus and should receive the varicella-zoster vaccination for prevention.

Contact with a child infected with chickenpox does not confer immunity against shingles, because the varicella zoster virus, once contracted, will lie dormant in the dorsal root ganglia of a dermatome until reactivation.

44.

All of the following individuals are most likely to experience drug hypersensitivity/drug allergies, except:

Individuals with atopy

Females

Children with cystic fibrosis

HIV-infected individuals

Correct answer: Individuals with atopy

Drug hypersensitivity reactions are examples of extreme immune system adverse responses to exposure to prescribed or Over-the-Counter (OTC) medications. In a hypersensitivity reaction, the immune system identifies the administered medication as a foreign antigen and mounts an immune system attack against the "invader." Almost 50% of hypersensitivity reactions occur "immediately," i.e., within six hours of administration of the drug, with urticaria being the most commonly reported symptom. Delayed reactions most commonly involve the appearance of a drug rash (maculopapular exanthema) and rarely Severe Cutaneous Drug Reactions (SCARs). Females are more likely than males to experience drug hypersensitivity reactions (2:1) but males are more likely to experience acute interstitial nephritis and fixed drug eruptions (sharply defined lichenified lesions that occur in the exact same location[s] with each exposure to the offending agent). Adults are more likely than children to experience a drug hypersensitivity reaction, likely due to increased or repeated exposures to the drug unless the child has cystic fibrosis, which then increases the risk of them developing a drug hypersensitivity reaction. Individuals with HIV are also far more likely to experience a drug hypersensitivity reaction, especially with exposure to sulfonamide antibiotics, abacavir, and nevirapine (the latter two of which are frequently used to treat HIV). Viral infection can also increase an individual's risk of developing a drug hypersensitivity reaction, with first exposure to a respiratory virus frequently being the cause of developing a drug hypersensitivity reaction in pediatric-aged individuals and the Epstein-Barr virus and HIV frequently the cause in adults.

Surprisingly, atopy does not appear to be a major player in the risk of drug hypersensitivity reactions.

45.

Which of the following statements most accurately describes the disease processes that are included in the diagnostic term spondyloarthritis?

Acute anterior uveitis and spondylitic heart disease are included within the spectrum of spondyloarthritic disorders.

Spondyloarthritis is a type of inflammatory arthritis that primarily affects the smaller spinal joints (facets) and the sacroiliac joints.

Psoriatic and enteropathic arthritis are not included within the spectrum of spondyloarthritic disorders.

Strict diagnostic criteria must be met in order for a disease process to be included within spondyloarthritis.

Correct answer: Acute anterior uveitis and spondylitic heart disease are included within the spectrum of spondyloarthritic disorders.

The term spondyloarthritis is used to describe a whole host of inflammatory autoimmune disease processes that are characterized by inflammatory arthritis of the joints of the spine and periphery, as well as inflammation of the tendon and ligament attachments, and mucocutaneous, ocular, and cardiac manifestations of inflammatory arthritis. Ankylosing spondylitis, reactive arthritis, enteropathic arthritis or spondylitis associated with Crohn's disease/ulcerative colitis/inflammatory bowel disease, peripheral spondyloarthritis, psoriatic arthritis, juvenile-onset spondyloarthritis, acute anterior uveitis, and spondylitic heart disease are all included within the diverse group of disorders which comprise the spondyloarthritis diseases. None of these disease processes have any diagnostic criteria that can be used to aid in establishing a diagnosis, and groups that represent the best of the minds in research and treatment of individuals with spondyloarthritic disorders may not agree on which of these disorders should be included within the diagnostic category.

46.

The 62-year-old male patient you are seeing today for a routine wellness visit casually mentions that he has separated from his male partner of many years and has recently found a new partner. He states that while he has been consistent with using condoms for all sexual activity with his new partner, "in a moment of rashness several weeks ago," he had several sexual encounters when he did not use barrier protection, and was informed a few days ago by his new partner that he is a chronic hepatitis B carrier. Your patient provides documentation that he has completed the hepatitis B series.

Which of the following should you recommend?

A single booster dose of hepatitis B vaccine

Repeating the 3-dose hepatitis B series

Hepatitis B immune globulin (HBIG)

Testing for hepatitis B surface antibody (HBsAb) and Hepatitis B immune globulin (HBIG)

Correct answer: A single booster dose of hepatitis B vaccine

The risk for Hepatitis B Virus (HBV) infection is greatest among people whose sexual partners have HBV, sexually active people who are not in a long-term, mutually monogamous relationship, men who have sex with men, injection drug users, individuals who live or care for people infected with HBV (including healthcare workers), and patients receiving hemodialysis, among others.

HBV can be prevented by limiting exposure to blood or body fluids and through immunization. Postexposure prophylaxis is effective in preventing HBV infection. For individuals who have documentation of a complete HBV vaccine series and who did not receive postvaccination testing, a single HBV vaccine booster dose should be offered for recent exposure to HBV (known HBsAg-positive sources).

A person who is in the process of being vaccinated but who has not completed the vaccine series should receive the appropriate dose of HBIG, and should complete the vaccine series.

Unvaccinated persons should receive HBIG and hepatitis B vaccine as soon as possible after HBV exposure, preferably within 24 hours after exposure. Testing for HIV, hepatitis A, and hepatitis C should also be offered.

47.

A patient who was new to a family medicine practice met with the Nurse Practitioner (NP) to establish care at the clinic. While reviewing the patient's history, the patient reported that he had experienced anaphylaxis while undergoing a surgical procedure in the past. Which of the following commonly administered anesthetic drugs is most likely to cause anaphylaxis?

Rocuronium

Sevoflurane

Propofol

Midazolam

Correct answer: Rocuronium

Drug-induced anaphylaxis occurs approximately 0.5% to 1% of the time and more frequently in adults than in children. Antibiotics are the most frequent cause of anaphylaxis, with penicillin and cephalosporin drugs having the highest association with causing allergic or anaphylactic reactions. In the perioperative setting, cefazolin is the most common cause of anaphylaxis but can be challenging to identify due to the patient being intubated, sedated, and draped. Anaphylaxis in the perioperative setting is common, with several commonly used agents contributing to the incidence of anaphylaxis. Antibiotics, skin cleansing disinfectants, latex, and anesthetic agents are the most frequent causes of anaphylaxis in the Operating Room (OR). Antibiotics and Neuromuscular Blocking Agents (NMBAs) are the most frequently implicated in causing anaphylaxis, with rocuronium being the NMBA drug most likely to cause anaphylaxis. Succinylcholine is the second most likely NMBA to cause anaphylaxis.

Sevoflurane is an inhaled anesthetic.

Propofol is a non-barbiturate sedative.

Midazolam is a benzodiazepine.

48.

When providing care for a patient with a diagnosis of active tuberculosis (TB), which of the following clinical symptoms would you expect to observe?

Unexplained weight loss

Frank hemoptysis

Abnormal chest examination

Dyspnea

Correct answer: Unexplained weight loss

Clinical evidence of acute TB includes symptoms of fatigue, unexplained weight loss or anorexia, fever, night sweats, and chronic mild, nonproductive cough; the duration of these symptoms is often variable, and symptoms have been occurring intermittently over a protracted period of time.

Although frank hemoptysis (coughing up blood or bloody sputum) is occasionally reported, the cough associated with TB is often dry (nonproductive); frank hemoptysis is rarely reported. The chest examination is usually normal with dyspnea seldom reported unless the disease is extensive.

49.

The health care providers at a local clinic hosted a mini-grand rounds presentation within their office after a patient who received a first dose of antibiotics in the office experienced a severe anaphylactic reaction. At the time of the event, the Nurse Practitioner (NP) who was present in the office had administered a dose of Intramuscular (IM) epinephrine (first-line treatment agent) and activated the Emergency Medical Services (EMS) system before requesting a dose of the most commonly used second-line treatment agent (diphenhydramine). Unable to locate the requested agent, the quick-thinking NP quickly identified the next best alternate second-line agent and administered it to the patient. Which of the following second-line agents for the treatment of anaphylaxis is the *next best alternative* if diphenhydramine is not available?

Cetirizine

Methylprednisolone

Albuterol

Ranitidine

Correct answer: Cetirizine

Anaphylaxis is a potentially life-threatening event resulting from exposure to what is typically a non-threatening source--food, medications, and sometimes insect stings. Patients who experience anaphylaxis may experience anaphylaxis from exposure to the offending agent either as an immediate or delayed reaction, several hours after exposure. First-line treatment of anaphylaxis is the administration of Intramuscular (IM) epinephrine which is most effective when injected into the vastus lateralis. Providers should administer a first dose of epinephrine and then immediately activate EMS if no one else is available to activate EMS simultaneously with epinephrine administration. Once epinephrine has been administered, someone should remain with the patient to evaluate for improvement and/or worsening of symptoms, as some patients may require a second dose (or subsequent) of epinephrine if there is not any improvement within five to 15 minutes of initial administration of the drug. Second-line treatment using the administration of oral diphenhydramine should also be given, but not before the administration of epinephrine. If oral diphenhydramine is not available or the patient is unable to take an orally administered medication due to the severity of the anaphylaxis, parenteral dosing of diphenhydramine may be given. Administering an H2 antagonist such as ranitidine in conjunction with the H1 antihistamine (diphenhydramine) is beneficial and is often administered during anaphylaxis. If diphenhydramine is not available at all, cetirizine (Zyrtec^R) can be administered in its place.

Systemic corticosteroid administration has not been found to be useful in the treatment of acute anaphylaxis but can help prevent a recurrence of anaphylaxis or prolonged anaphylaxis.

Albuterol should be administered to patients who are experiencing bronchospasm, but this is not a replacement for either epinephrine or diphenhydramine.

50.

A 34-year-old American male who scheduled an appointment at the clinic due to his complaints of pain and stiffness in the knees, ankles, and feet received a full work-up and was diagnosed with reactive arthritis. Based on the information provided in the scenario, which of the following is the most likely cause of reactive arthritis?

Chlamydia trachomatis

Neisseria gonorrhoeae

Shigella sonnei

Salmonella typhimurium

Correct answer: *Chlamydia trachomatis*

Reactive arthritis, a type of spondyloarthritic (autoimmune) disease process, is known to occur in response to infection. The disorder was previously referred to as Reiter syndrome, which, worldwide, most commonly occurs in response to infection with *Shigella sonnei*, *Salmonella typhimurium*, and *Campylobacter jejuni*. Within the US, reactive arthritis occurs most commonly in younger men (under the age of 40 years) who have been infected with *Chlamydia trachomatis*. Symptoms of reactive arthritis tend to present within one week to one month after chlamydia infection and a triad of symptoms that affect the conjunctiva, urethra, and joints comprising the hallmark of the disorder. Initial symptoms are vague and include general malaise, fatigue, and fever with progression to unilateral or asymmetric arthritis of the lower extremities. The upper extremities are rarely affected by the disorder. Prominent, acute swelling of the fingers and toes occurs, resulting in a painful, sausage-like appearance (dactylitis) of the digits that may become chronic. Patients may also experience severe or chronic back pain due to spondylitis and sacroiliitis, although this is less common. The Achilles tendon and plantar fascia may also be affected, with asymmetric swelling of the affected area and impairment of ambulation. Psoriatic-like lesions are often present on the genital region and the palms and soles. A conjunctivitis-like appearance affects the eyes unilaterally or bilaterally, and lesions may be noted on the oral mucosa.

Most patients with reactive arthritis notice a significant improvement in their symptoms within six months; individuals who continue to experience symptoms beyond six months are likely to develop chronic disease. Antibiotics to treat chlamydia infection or gastrointestinal infections associated with reactive arthritis do not appear to provide any benefit in relieving the symptoms of reactive arthritis. NSAIDs, orally and intraarticularly administered corticosteroids, methotrexate, anti-tumor necrosis

factor agents, sulfasalazine, and Disease-Modifying Antirheumatic Drugs (DMARDs) may be prescribed to treat the peripheral joint symptoms of reactive arthritis.

Integumentary

Integumentary

51.

Your patient is a two-year-old child presenting with a rash on his face and neck consisting of pustular vesicles. Which result of a culture of the purulent drainage would confirm a diagnosis of impetigo?

Group A streptococci

Group B streptococci

Group C streptococci

Group G streptococci

Correct answer: Group A streptococci

Impetigo is a highly contagious skin condition. It usually occurs on the face, neck, and hands of young children and infants. Children who wear diapers also tend to get it around the diaper area. Impetigo occurs more rarely in adults, usually following another skin condition or an infection.

*Nonbullous impetigo is a bacterial infection caused by *Streptococcus pyogenes* (gram-positive Group A streptococci), *Staphylococcus aureus*, or a combination of both. *S. aureus* is the primary causative bacteria of bullous impetigo and is responsible for a substantial portion of nonbullous infections as well. Recommended treatment often depends on which bacteria are causing the infection.*

While other serogroups (e.g., Groups B, C, and G streptococci) are occasionally observed, they are not considered a primary cause of impetigo.

52.

A 78-year-old female patient with poorly fitting dentures is examined by a family nurse practitioner (FNP) after the patient presents to the clinic complaining of painful cracking and ulceration at the corners of her mouth. The FNP refers the patient to the local dental clinic for evaluation of her dentures and recommends treatment of the cheilosis using which of the following *first-line* treatments?

Topical miconazole

Vitamin B supplementation

Mupirocin

Zinc oxide cream

Correct answer: Topical miconazole

Cheilosis is known by several names, including angular cheilitis, perleche, and angular stomatitis. It most commonly affects older adults who wear dentures, particularly when the dentures do not fit correctly. The condition may also be caused by vitamin B deficiencies, autoimmune diseases such as lupus or Sjögren's syndrome, irritant dermatitis, squamous cell carcinoma, and hypersalivation. Cheilosis may also occur in children as a result of thumb or pacifier sucking and licking of the lips. Patients typically present with painful cracking and ulceration at the corners of the mouth or scaling and erythema at the corners of the mouth.

Cheilosis may be acute or chronic; improper treatment of acute cheilosis can result in a chronic case. The lesions of cheilosis can become secondarily infected with Candida. First-line treatment for cheilosis includes the administration of a topical azole such as miconazole, or nystatin. If the condition does not fully resolve with the use of topical antifungal medication and microscopy has confirmed the presence of yeast, oral treatment with fluconazole may be indicated. Cheilosis may also become secondarily infected with Staphylococcus, which should be treated with mupirocin. If a vitamin B deficiency is suspected, lab studies should be ordered and the patient should be treated accordingly.

Applying zinc oxide cream or petroleum jelly to the corners of the mouth once the condition has been resolved can help prevent the recurrence of cheilosis.

53.

You are providing care for a child diagnosed with impetigo. Which instruction will you include in your teaching plan for the child's mother?

The child should be kept out of daycare for 24 hours after initiation of antibiotic therapy.

The child should be kept out of daycare until the last lesions to develop form crusts.

The child should be kept out of daycare until the child has been afebrile for 24 hours.

The child should be kept out of daycare until the child is no longer scratching at the lesions.

Correct answer: The child should be kept out of daycare for 24 hours after initiation of antibiotic therapy.

Impetigo is a contagious skin infection that usually consists of discrete purulent lesions. During treatment of impetigo, it is important to minimize the risk of infectious transmission. In terms of preventing transmission in a daycare or school setting, this is accomplished by keeping the child at home for 24 hours after starting antibiotic therapy. Family members should also be checked for lesions.

Waiting for the lesions to form crusts, become less irritated, or for the child to become afebrile are not indicated measures.

54.

Your 47-year-old patient has just returned from a business trip to Connecticut where she stayed at a 5-star hotel she has stayed at many times. She is now experiencing an itchy rash on her neck and shoulders. The rash is comprised of raised, erythematous papules with darker red centers in a zig-zag like pattern. She has otherwise been healthy and has a negative health history.

Your patient is experiencing:

A reaction to bed bug bites

An atopic dermatitis flare

An outbreak of herpes zoster

Evidence of Lyme disease

Correct answer: A reaction to bed bug bites

*Bed bugs (*Cimex lectularius*) are parasitic insects that have been implicated in increasing numbers of infestations worldwide. They are found everywhere, from the most unkempt homes to pristine 5-star hotels. They require only a warm host and hiding places to flourish.*

Repeated exposure to bed bug bites can lead to skin reactions, which can include macules, wheals, vesicles, bullae, nodules, and papules with a darker red spot in the center. A bed bug bite closely resembles a flea or mosquito bite and often appears in a "breakfast, lunch, and dinner" pattern, in that the parasite will bite in one location, then move laterally to bite again, and repeat the action for a third bite (hence the zig-zag pattern). The bites are most often found on exposed skin of the arms, legs, neck, and shoulders. The rash is pruritic and self-limited, and should resolve without treatment in 1-2 weeks.

Atopic dermatitis is characterized by pruritic, lichenified lesions. Herpes zoster is characterized by painful, pruritic vesicular lesions in a linear pattern that do not cross the midline. Lyme disease is characterized by a single painless annular lesion.

55.

Nail removal may be required for all the following conditions except:

Acute paronychia

Onychogryphosis

Onychocryptosis

Onychomycosis

Correct answer: Acute paronychia

The nurse practitioner may be faced with needing to remove a patient's nail for a variety of different reasons. Chronic conditions such as chronic recurrent paronychia, onychogryphosis (curved deformed nails), onychocryptosis (ingrown nail), and onychomycosis (fungal infection of the nail) may require treatment by removing the nail.

Acute paronychia is not an indication for removal of the nail.

56.

Your patient is undergoing treatment for cancer. You have completed instructing her about the use of a topical medication for relief of symptoms related to her treatments. Which statement by the patient indicates that further instruction is needed to be effective?

"The thicker the skin where I rub in the medicine, the better the medication will work."

"More of the medicine in an ointment will absorb than the medicine that is in a lotion."

"I won't benefit very much if I only rub the medicine into the palms of my hands."

"Even though this isn't an oral medication, I will still benefit from it."

Correct answer: "The thicker the skin where I rub in the medicine, the better the medication will work."

Cutaneous drug absorption is typically inversely proportional to the thickness of the stratum corneum.

In general, the less viscous the vehicle containing a topical medication, the less of the medication is absorbed. As a result, medication contained in a gel or lotion is absorbed in smaller amounts than medication contained in a cream or ointment. The thickness of the palms of the hands and the soles of the feet creates a barrier so that relatively little topical medication is absorbed when applied to these sites. Topical medications provide a viable alternative for patients who are unable, for various reasons, to take oral medications.

57.

The 52-year-old female you have diagnosed with rosacea has responded well to metronidazole gel 1% applied to her rash but feels her rash does worsen occasionally. She is unsure what triggers the worsening of the rash.

After reviewing the patient's general diet and lifestyle activities, you recommend avoidance of which of the following?

The glass of wine she has before bed each night

The tuna fish and gluten-containing crackers she eats for lunch at work

The humidifier she uses at home

The detergent she uses when washing her laundry

Correct answer: The glass of wine she has before bed each night

Rosacea is a chronic and relapsing inflammatory skin condition of unclear origin that is more common in people with light-colored skin. It is characterized by symptoms of facial flushing and a spectrum of clinical signs, including erythema, telangiectasia, and papulopustular eruptions resembling acne. Flares of the disease may be triggered by many factors and can be different for individual patients.

Some rosacea flares include:

- *UV/sunlight exposure*
- *hot/cold exposure*
- *exercise*
- *stress*
- *coffee and caffeine*
- *chocolate*
- *alcohol*
- *spicy foods*
- *cosmetic products*
- *certain medications*

In addition to the metronidazole gel the patient is already using, avoidance of triggers that cause exacerbation should be implemented. This includes alcohol intake. The other answer choices are not factors that could trigger rosacea flare-ups.

58.

While conducting a well-child check-up for a two-year-old, you note the presence of three superficial pustular vesicles on her neck. Which medication will you plan to prescribe as treatment?

Topical mupirocin

Oral erythromycin

Oral penicillin

Topical neomycin

Correct answer: Topical mupirocin

Topical antimicrobial therapy is adequate for nonbullous impetigo with a single lesion or small area of involvement. First-line therapy for a mild infection is mupirocin (Bactroban, Centany) as the preferred agent. Retapamulin (Altabax) is another antibacterial that is sometimes used during initial treatment of lesions.

Mupirocin use is associated with higher cure rates compared with oral erythromycin; however, both are noted to be superior to penicillin. Bacitracin and neomycin are less effective topical treatments; use of these products is not recommended for the treatment of impetigo.

59.

The risk of which type of skin cancer does NOT increase with exposure to sunlight?

Malignant melanoma

Squamous cell carcinoma

Basal cell carcinoma

Actinic keratosis

Correct answer: Malignant melanoma

Malignant melanoma is a malignancy that originates from melanocytes, and the risk of this type of cancer does not increase with exposure to sunlight. Therefore, the use of sunscreen has little effect on reducing the risk of this type of skin cancer.

Sun exposure increases the risk of actinic keratosis (a precancerous skin lesion), as well as squamous cell carcinoma and basal cell carcinoma. The consistent use of high sun protection factor (SPF) sunscreen is critical and helps reduce, but not eliminate, the risk of these conditions.

60.

You are planning care for an elderly patient who reports experiencing a painful rash in a band on one side of the torso. The rash began with blisters, which have since scabbed over. Your plan of care will include interventions related to which disorder?

Shingles

Severe atopic dermatitis

Scabies

Psoriasis Vulgaris outbreak

Correct answer: Shingles

The rash described is typical of shingles, or Herpes Zoster infection, a reactivation of the chickenpox virus. Anyone who has a history of chickenpox may develop shingles, but the risk increases with advancing age. It is most common in those 50 and older, and can also be seen in patients with immunocompromise (cancer, HIV, immunosuppressant medications) and those with an underlying health issue. When seen in younger adults, immunocompromise should be ruled out.

The signs described are not consistent with severe atopic dermatitis, scabies, or a Psoriasis Vulgaris outbreak.

61.

When preparing a diet plan for a patient with a stasis ulcer, you understand that for a healthy adult, the daily nutritional requirement of protein needed to heal a wound is approximately how many grams?

1.25 to 1.50 grams of protein per kilogram of body weight

1.50 to 1.75 grams of protein per kilogram of body weight

1.0 to 1.25 grams of protein per kilogram of body weight

1.75 to 2.0 grams of protein per kilogram of body weight

Correct answer: 1.25 to 1.50 grams of protein per kilogram of body weight

For a healthy adult, the daily nutritional requirement of protein needed to heal a wound is approximately 1.25 to 1.50 grams of protein and 30 to 35 calories per kilogram of body weight. These requirements are increased in the presence of sizable wounds. Inadequate protein-calorie nutrition, even after just a few days, can impair normal wound-healing mechanisms.

62.

A 21-year-old college student presents to the on-campus health clinic complaining of a diffuse, mildly pruritic rash that started on his trunk and has now spread to include his neck and extremities. He states he was treated for strep throat two weeks ago with amoxicillin and that his strep throat symptoms have completely resolved since completing the medication. The patient has a low-grade fever today, and you identify what appears to be a diffuse morbilliform viral exanthem.

Based on the patient's history of symptoms and current examination findings, what is the most likely diagnosis?

Drug eruption

Rubeola virus

Early guttate psoriasis

Dermatologic manifestation of rubella

Correct answer: Drug eruption

Morbilliform drug eruption is the disorder that most commonly mimics a viral morbilliform exanthem. Even to the trained eye, the morbilliform rash of a drug eruption can be clinically indistinguishable from a viral morbilliform exanthem. While a number of drugs can cause a morbilliform eruption, antibiotics are the most common culprits behind this rash.

A morbilliform drug eruption is most common in adults who have started taking a medication in the last one to two weeks or who have completed medication treatment within the most recent week. The rash may also be accompanied by low-grade fever and pruritus.

Rubeola virus (measles) is less likely in this scenario due to the patient's recent history of antibiotic usage, the presence of a low-grade versus high-grade fever, and lack of other systemic symptoms typically associated with rubeola virus.

Early guttate psoriasis may also cause a morbilliform rash and typically occurs two to three weeks after streptococcal infection or tonsilitis; however, in this condition, the rash typically starts on the extremities or trunk and then may spread to the face, ears, or scalp.

In adults infected with rubella virus, the exanthem typically starts on the face as discrete macules and then spreads downward over the neck, trunk, and extremities.

Individuals infected with rubella virus also may experience fever, sore throat, and rhinitis.

63.

A six-year-old child has been bitten by her pet cat and is brought to the medical clinic for treatment. Following cleansing and debridement, which intervention should be included in the treatment plan?

Prescribe oral amoxicillin with clavulanate to be taken two times per day

Prescribe daily application of bacitracin, neomycin, and polymyxin B ointment

Administer a loading dose of intramuscular doxycycline

Give human rabies immune globulin (HRIG) and rabies vaccine immediately

Correct answer: Prescribe oral amoxicillin with clavulanate to be taken two times per day

As 80% of cat bites become infected, antimicrobial therapy should begin immediately. The primary medication recommended is amoxicillin with clavulanate. Alternative antibiotics include cefuroxime or doxycycline.

As cat bites are typically deep puncture wounds, topical ointments are not effective. Doxycycline is an optional medication but cannot be given intramuscularly. Rabies risk with pet bites is typically negligible, so rabies prophylaxis is not usually indicated.

64.

A patient presents to your urgent care clinic with a thermal injury over his left forearm. The injured area is reddened and blistered with raw, moist areas observed and is quite painful. Which intervention would you incorporate into your treatment plan?

Prescribe topical application of silver sulfadiazine (Silvadene)

Refer the patient for specialty burn care

Order oral antibiotic prophylaxis

Arrange for admission to a hospital

Correct answer: Prescribe topical application of silver sulfadiazine (Silvadene)

Topical application of silver sulfadiazine (Silvadene) or mafenide acetate (Sulfamylon) is an effective therapy for infection prophylaxis. Oral antibiotics are not as effective as topical medication for prevention of infection.

Generally, smaller first- or second-degree burns can be effectively treated on an outpatient basis, not requiring hospitalization or referral to a burn unit.

65.

You interview a 72-year-old female patient who presents to the office with complaints of a patchy, erythematous rash. The patient states she first noticed dry, pruritic skin along the right mid-axillary line that extended onto the right lateral breast. She describes the pruritus as severe and says that in the last 4 to 6 weeks, the pruritic area has become erythematous, and she has noted a non-tender lump in her right axillary region.

Based on this history, what disease are you most concerned about, and what should be the next step in performing or ordering diagnostic tests or procedures?

Cutaneous T-cell lymphoma; large-bore punch biopsy

Systemic lupus erythematosus (SLE); shave biopsy

Allergic contact dermatitis; punch biopsy

Tinea corporis; potassium hydroxide (KOH) examination of skin scrapings

Correct answer: Cutaneous T-cell lymphoma; large-bore punch biopsy

Cutaneous T-Cell Lymphoma (CTCL) is a rare type of cancer that begins in the white blood cells and attacks the skin. It is one of several types of lymphoma collectively called non-Hodgkin's lymphoma. CTCL usually occurs in the older adult (>65 years) and may progress and affect the lymph nodes, blood, and the internal organs.

The nurse practitioner who is seeing a patient in the office setting and who has a concern of CTCL should perform a large-bore punch biopsy of the rashy area to ensure a generous sample that extends down into the subcutaneous fat.

The rash of SLE typically affects sun-exposed skin, often first presenting as an erythematous malar rash. Discoid lesions often appear on the sun-exposed areas and are plaque-like. Photosensitivity also occurs. SLE is diagnosed through use of a punch biopsy, not a shave biopsy.

Allergic contact dermatitis typically occurs in an area that has been in contact with an allergen-producing agent. In its acute phase, it is characterized by pruritic papules and vesicles on an erythematous base; in its chronic phase, lichenified pruritic plaques occur. While punch biopsy may be used to aid in the diagnosis of allergic contact dermatitis, the patch test is the gold standard of diagnosis.

Tinea corporis is characterized by erythematous, scaly, plaque-like lesions that may quickly worsen and spread followed by gradual resolution of the central area of the lesions resulting in an annular shape.

66.

A 32-year-old male Caucasian patient presents to the clinic with complaints of an "intensely itchy blister-like rash," which has been affecting both forearms near his elbows, his knees, and his buttocks. He also reports noticing bloating, cramping, and diarrhea after some meals. He states his ancestry is Lithuanian, and he is unaware if any other family members have experienced similar symptoms.

Based on your suspicion for dermatitis herpetiformis (DH), what plan of action should you take to confirm the diagnosis?

Punch biopsy

Patch test

Endoscopic biopsy

Serum amylase and lipase levels

Correct answer: Punch biopsy

DH is a chronic immunodermatologic condition associated with a gluten-sensitive enteropathy. Individuals with DH may also have celiac disease or may have evidence of disease in the small intestine. DH is characterized by the presence of intensely itchy herpetiform blisters that typically occur bilaterally affecting the forearms near the elbows, the knees, and the buttocks. The dermatitis results from dietary gluten intake; an occasional patient who has been diagnosed with DH will report gastrointestinal symptoms such as bloating, cramping, and diarrhea. The disease affects men twice as often as women, is more common among individuals of Northern European ethnicity, and typically presents between the third and fourth decades of life.

The condition is diagnosed by use of a punch biopsy of a lesion. The tissue sample is then exposed to a fluorescent dye that identifies granular deposits of IgA.

Patch testing is used to diagnose allergic dermatitis. Endoscopic biopsy is used to diagnose celiac disease; some patients with DH may show evidence of disease on endoscopic biopsy, but this is not a diagnostic tool for DH. Serum amylase and lipase levels are used to help diagnose acute pancreatitis; they are not used to diagnose DH.

67.

A 15-year-old boy is brought to the clinic by his mother for evaluation of chronic "bumps" on his hands. The boy's mother states they first noticed the "bumps" approximately one year ago, and that the lesions have slowly increased in size and have proliferated in number.

You identify several medium-sized common verruca vulgaris lesions on the boy's hands and can plan to manage them using all the following methods except:

Imiquimod

Keratolytic agents

Liquid nitrogen

Tretinoin

Correct answer: Imiquimod

Verruca vulgaris lesions are commonly known as warts and are caused by any number of different strains of Human PapillomaViruses (HPVs), most causing nongenital warts. Patients typically become infected with HPV through direct skin contact or, more uncommonly, through contact with the virus on inanimate objects. Warts on the hands are caused by a non-high-risk HPV and, while unsightly, do not typically pose a problem. "Watch and wait" therapy, where no treatment is prescribed, is appropriate, as most warts will self-resolve within 12 to 24 months. There are also a number of treatment options available, either provided in a clinic setting or at home, through use of:

- *Keratolytic agents*
- *Liquid nitrogen cryotherapy*
- *Podophyllum resin (podofilox)*
- *Tretinoin*
- *Laser therapy*

Imiquimod is an immune system modulator drug indicated for treatment of anogenital warts, or external condylomata acuminata. It has more recently been used off-label for treatment of common verruca, but the evidence supporting this off-label usage is lacking. It may rarely be indicated for treatment of common verruca located in areas with concern for scarring, such as the face.

68.

Which of the following wounds would benefit from treatment with an alginate rope?

A wound with a sinus tract located on the buttocks

A diabetic foot ulcer that has been refractory to treatment with becaplermin

A dry necrotic pressure ulcer located over the femoral head area

A clean, granulating wound located on the forearm

Correct answer: A wound with a sinus tract located on the buttocks

Alginate dressing materials are a highly absorbent dressing material that is most appropriate for wounds that are highly exudative or have copious drainage. Alginate is derived from a seaweed extract and provides a tensile material with excellent absorptive capability. Alginate rope is particularly useful in packing wounds with sinus tracts.

A diabetic foot ulcer that has been refractory to treatment with becaplermin should be re-evaluated frequently and then continue treatment with becaplermin.

A dry necrotic pressure ulcer benefits from debridement followed by treatment with a debriding agent such as hypertonic saline gel, collagenase, or other enzymatic debriding agents.

A clean, granulating wound on the forearm benefits from treatment with a foam or polyurethane foam wound dressing.

69.

An elderly client from a long-term care facility is brought to the emergency department with second-degree burns covering the entire surface of the bilateral anterior legs and the genitalia. These burns encompass a body surface area of approximately:

19%

18%

10%

4.5%

Correct answer: 19%

According to the rule of nines, each leg accounts for 18% of the Body Surface Area (BSA), and the genitalia accounts for 1% of the BSA. In this client, both legs are burned but only on the front (anterior). In addition, the genitalia was burned.

- *Left leg (anterior): 9%*
- *Right leg (anterior): 9%*
- *Genitalia: 1%*

$$9 + 9 + 1 = 19\%$$

70.

When reviewing the records of a 19-year-old patient, you observe that permethrin is included on the patient's current medication list.

This medication indicates the presence of which condition?

Scabies

Psoriasis vulgaris

Onychomycosis

Seborrheic dermatitis

Correct answer: Scabies

Permethrin (Elimite, Nix) lotion is the preferred method of treatment for scabies. The lotion should be applied and left on for 8 to 14 hours to be effective and then removed through bathing. Bedclothes and other fabric items should be washed in hot water and placed in a hot clothes dryer afterwards. Alternatively, items can be placed in plastic storage bags for at least 1 week.

In the past, lindane (Kwell) was used, but the use of this product presents potential problems with neurotoxicity, as well as a resulting seizure risk and lower efficacy. In particular, lindane should not be used by pregnant women, children, and elderly patients.

Permethrin is not indicated for psoriasis vulgaris (treatment involves topical corticosteroids), onychomycosis (treatment involves antifungals), or seborrheic dermatitis (treatment involves antifungals).

71.

A 38-year-old male has been diagnosed with chronic recurrent paronychia with coexisting onychomycosis and requires removal of the damaged nail.

What is the most commonly used method of anesthesia for a nail removal procedure?

Local ring block

General anesthesia

Procedural anesthesia

Transthecal digital block

Correct answer: Local ring block

Nail removal may be required for treatment of several nail deforming disease processes, such as onychocryptosis (ingrown nail), onychogryphosis (deformed, curved nail), onychomycosis (fungal nail infection), chronic recurrent paronychia and to treat trauma or injury to the nail. Nail removal can be safely undertaken with the use of local anesthesia, although some patients may request general anesthesia for the procedure. Administering a local ring block is commonly used for nail removal and provides adequate local anesthesia to the region to be treated.

Procedural anesthesia, while not required or recommended for nail removal, may need to be considered only if a patient is extremely anxious and unable to sit for the procedure. The administration of a transthecal digital block can also be used for nail removal; however, this is a more specialized nerve block and requires additional training.

72.

A 77-year-old male presents to the clinic with complaints of a painful, swollen mass on the back of his neck and feeling generally unwell. He states he first noted the mass approximately 1 month ago and states it has increased in size and has become more painful. You examine the area and note a 3-cm erythematous mass on the patient's posterior neck and further note the patient appears somewhat unkempt and dirty and has a low-grade fever but otherwise appears well.

You diagnose the patient with a carbuncle and plan to treat the patient how?

By performing an incision and drainage (I&D) of the area and ordering oral antibiotics

By recommending the patient apply hot packs at home 3 to 4 times per day and return to the clinic in one week for re-evaluation

With cephalexin (Keflex) 500 mg administered orally four times per day for 7 days

With amoxicillin/clavulanic acid (Augmentin) 875 mg/125 mg administered orally two times per day for 10 days

Correct answer: By performing an incision and drainage (I&D) of the area and ordering oral antibiotics

A carbuncle is a collection of boils, or furuncles, that occur in one area and may measure up to 4 inches across. They affect males more often than females, occur more frequently in men with poor health or a weakened immune system, and affect those living in unhygienic circumstances. Fever and general malaise may accompany a carbuncle. Carbuncles occur more frequently on the back of the neck, the thighs, and on the back.

*Treatment of a carbuncle in an individual who does not present with systemic symptoms includes I&D of the area followed by oral antibiotics. Usage of a broad-spectrum antibiotic, such as amoxicillin/clavulanic acid (Augmentin), should be limited to those patients who are immunocompromised or who present with complications of the skin or soft tissue infection. Typically, carbuncles are caused by *S. aureus* and respond well to second-generation cephalosporins, not first-generation cephalosporins, such as cephalexin (Keflex).*

Hot packs applied to the area should only be recommended in those patients who have been experiencing symptoms for 2 weeks or fewer and who are not

experiencing other symptoms consistent with infection, such as fever, inflammation, and pain.

73.

You are providing care for an adolescent with acne vulgaris for whom you have prescribed isotretinoin. Which symptoms indicate the need to discontinue this medication?

Difficulty sleeping, back pain, or stiff joints

Epistaxis and cracks in the corners of the mouth

Dry lips, dry mouth, and minor swelling of the eyelids

Cracking or peeling skin, itching, or a rash

Correct answer: Difficulty sleeping, back pain, or stiff joints

Isotretinoin (Claravis, Sotret, Myorisan, and discontinued brand: Accutane) is effective in treating cystic acne that does not respond to conventional therapy. Although most patients who take it have adverse effects related only to dry skin, the prescriber and patient need to be well aware of potentially serious problems associated with its use.

Serious side effects include:

- *Depressed mood, trouble concentrating, sleep problems, crying spells, aggression or agitation, changes in behavior, hallucinations, thoughts of suicide*
- *Sudden numbness or weakness, especially on one side of the body*
- *Blurred vision, sudden and severe headache or pain behind the eyes, sometimes with vomiting*
- *Hearing problems, hearing loss, or tinnitus*
- *Seizure*
- *Severe stomach pain radiating to the back; nausea and vomiting*
- *Fast heart rate*
- *Loss of appetite; dark urine; clay-colored stools; severe diarrhea; rectal bleeding; black, bloody, or tarry stools*
- *Jaundice*
- *Fever, chills, body aches, flu symptoms, urticaria, easy bruising or bleeding*
- *Severe blistering, peeling, and red skin rash*
- *Joint stiffness, bone pain, or fracture*

Epistaxis, cracking in the corners of the mouth, dry lips and mouth, minor swelling of the eyelids, cracking or peeling skin, itching or rash are common side effects that would not indicate the need for discontinuation of isotretinoin treatment.

74.

A concerned mother brings her 9-year-old daughter to the clinic due to concern about a small cluster of warts located on the girl's hand. Which of the following statements made by the primary care provider regarding the treatment of warts is appropriate?

"These warts should clear on their own in 12 months or so. Let's watch and see what happens to them before we decide to do anything."

"We can apply liquid nitrogen to the warts today in the office. This is the best course of action for warts of this type, and the treatment is relatively painless."

"I'm going to send a prescription for imiquimod to your pharmacy. I would like you to apply the cream to the warts 3 times a week for the next 16 weeks. This will permanently get rid of them."

"I can easily remove those warts with a scalpel here in the office; I'll give your daughter a small injection to numb the area first, and then I'll take off the warts. Would you like me to do that today, or would you rather come back next week?"

Correct answer: "These warts should clear on their own in 12 months or so. Let's watch and see what happens to them before we decide to do anything."

There are several strains of the human papillomavirus (HPV) that are responsible for causing harmless warts among the general population. HPV-3 and HPV-10 cause flat cutaneous warts, HPV-2 and HPV-7 cause common warts, and HPV-1, HPV-2, and HPV-4 cause plantar warts. The wart-causing virus typically gains entry into the body through a cut or scrape on the hands or feet (hangnail on the finger, splinter in the sole) or from damage to the fingertips from biting the nails. These warts are harmless and typically resolve without treatment in 12 to 24 months, making a watch-and-wait method of management appropriate for most patients affected by warts.

If warts are painful or are impairing daily function, such as in large, painful plantar warts, removal may be indicated. Surgical excision of the warts is rarely indicated anymore due to the many effective pharmaceutical methods of treatment that are available. If removal of the wart is indicated, liquid nitrogen may be applied in the office but may cause pain; the patient may need to return to the office for subsequent treatments to eliminate the wart. Keratolic agents may be applied to larger, thickened warts (usually plantar warts) in the office and reapplied at home after 5 days.

Imiquimod is indicated for the treatment of genital warts.

75.

Which of the following conditions is most likely to raise the suspicion of child abuse in an uninformed provider because of its resemblance to bruising?

Mongolian spots

Capillary hemangiomas

Port-wine stain

Erythema toxicum neonatorum

Correct answer: Mongolian spots

Mongolian spots are the most common type of pigmented skin lesion in newborns, occurring in about 90% of children of African and Asian ancestries and in less than 10% of children of European ancestry. The distribution is usually over the lower back and buttocks (lumbosacral area) but can occur over a wider area anywhere on the body. Caused by an accumulation of melanocytes, these are benign lesions that typically fade by the age of seven years without special therapy. Uninformed providers can misinterpret this normal finding as an ecchymotic area, raising the suspicion of child abuse. In contrast to an area of bruising or ecchymosis, when a Mongolian spot is pressed or palpated, there is no discomfort.

Capillary hemangioma is a congenital vascular malformation; it does not resemble a bruise. A port-wine stain is a flat hemangioma. Erythema Toxicum Neonatorum (ETN) resembles flea bites, not bruises.

76.

A family nurse practitioner (FNP) who works in solo practice in a rural farming community evaluated a 23-year-old male patient who presented to the office with a localized painful, erythematous swollen area on his arm. The patient was helping his father separate their pigs for slaughter and was bitten by one of them. The FNP examines the patient and does not find any systemic concerns, and the patient's vital signs are all normal. The patient denies any drug allergies.

What is the most appropriate treatment option?

Prescribe amoxicillin with clavulanate 875 mg/125 mg PO BID

Administer a tetanus shot

Administer a rabies shot

Prescribe clindamycin 300 mg PO QID plus a fluoroquinolone

Correct answer: Prescribe amoxicillin with clavulanate 875 mg/125 mg PO BID

Bite wounds, whether from an animal or a person, affect approximately 50% of individuals living in the US at some point during their lives. Dog and cat bites are the most common, with cat bites being more likely to become infected (80%) due to the penetrating nature (puncture) of the bite. Dog bites are more common in children, who are more likely to be bitten on the face or upper part of the body, but are the least likely type of bite to become infected (5%). Other animals also contribute to bite wounds, including wildlife such as rats, bats, raccoons, and skunks, and farm animals such as pigs. Human bites most often occur in the context of a fight and tend to have the most serious consequences due to the many types of bacteria that may be found in the mouth, potentially causing infection of the bite wound(s).

Individuals who work on a farm or in another area of agriculture may present with bites from pigs, horses, sheep, or cows, which the primary care provider should be able to manage and treat. After being assessed for the extent of the injury, all bite wounds should be thoroughly irrigated and cleaned using an antimicrobial agent. Bites from certain animals may warrant the administration of a rabies vaccine (bat, raccoon, skunk) and possibly a tetanus vaccine. Almost all bites can be adequately treated with the administration of amoxicillin with clavulanate unless the patient has a contraindication to its use. Pig bites are most likely to become infected with gram-positive cocci, gram-negative bacilli, anaerobic bacteria, and a variety of Pasteurella species. If the patient is unable to take amoxicillin with clavulanate, a third-generation parenteral cephalosporin such as ceftriaxone or cefotaxime should provide adequate bacterial coverage.

A patient who has been bitten by a dog and is unable to take amoxicillin with clavulanate should be treated using clindamycin 300 mg PO QID plus a fluoroquinolone.

77.

Your patient has come to the clinic with an extensive itchy rash related to exposure to poison sumac plants. In developing your plan of care, which topical corticosteroid would be most effective to prescribe?

Clobetasol propionate (Olux-e, Olux, Clobex) 0.05%

Fluocinolone acetonide (Synalar) 0.2%

Triamcinolone acetonide (Kenalog) 0.1%

Desoximetasone (Topicort) 0.25%

Correct answer: Clobetasol propionate (Olux-e, Olux, Clobex) 0.05%

The relative potency of topical corticosteroid preparations is primarily based upon their vasoconstrictive activity. Clobetasol propionate (class 1) has a significantly greater vasoconstricting action than the least potent agents, such as hydrocortisone (class 7). In addition, the therapeutic effect of corticosteroids is exhibited through mechanisms such as immunosuppressive and anti-inflammatory properties.

Clobetasol propionate is a super-high potency topical corticosteroid, significantly more potent than fluocinolone acetonide (low potency), triamcinolone acetonide (low potency), and desoximetasone (high potency).

78.

The nurse practitioner is seeing a patient for an infected wound. The patient states she is a nurse in the emergency department of a local hospital where she was bitten on the hand approximately 1 week ago by a patient experiencing a mental health crisis. The wound was cleaned, and the nurse received ampicillin/sulbactam 1.5 mg via intravenous (IV) route for two doses administered 6 hours apart, and was sent home with a prescription for amoxicillin/clavulanate 500 mg orally every eight hours for 14 days. Within several hours of arriving home, the nurse states she developed a maculopapular polymorphic rash and vomiting. She did not start the oral prescription as she was concerned she may have experienced a penicillin (PCN) allergy and presents today due to symptoms of an infected wound.

Which of the following alternate antibiotic options is MOST appropriate in this scenario?

Clindamycin with TMP-SMX (Bactrim DS)

Cephalexin (Keflex) with doxycycline (Monodox)

Moxifloxacin (Avalox) as a single therapy treatment

Levofloxacin (Levaquin) with azithromycin (Zithromax)

Correct answer: Clindamycin with TMP-SMX (Bactrim DS)

The research regarding prophylactic antibiotic treatment of human bite wounds is limited, with study results varying widely. Research has found that bite wounds inflicted by children are less likely to become infected than bite wounds inflicted by adults. Bites that do not penetrate deep into the epidermis are also less likely to become infected than bites that do penetrate the epidermis. Any bite to the human hand is at great risk of becoming infected and should be treated prophylactically with antibiotics.

The most appropriate treatment for early (not yet infected) human bites to the hand in non-PCN allergic patients is amoxicillin/clavulanate orally, 3 to 24 hours later (with signs of infection), and parenteral therapy with ampicillin/sulbactam or cefoxitin, among others.

For PCN-allergic patients, alternative antibiotic treatment includes trimethoprim-sulfamethoxazole (Bactrim DS) or a quinolone, such as ciprofloxacin, in addition to clindamycin.

*Cephalexin, while typically used for skin and soft tissue infections, is not appropriate for treatment of human bite wounds due to its ineffectiveness against *E. corrodens*, a*

common pathogen isolated in infected human bites.

While moxifloxacin is an appropriate treatment for human bite wounds, in this scenario, which depicts a complicated, infected wound, it is not appropriate for single-therapy treatment.

Levofloxacin is also an appropriate treatment for infected human bite wounds. However, the co-treatment of azithromycin is not indicated in the treatment of infected human bite wounds.

79.

A shave biopsy is most appropriate for sampling which of the following lesions?

A 4 millimeter (mm) tan-colored crusty lesion located on the forehead

An area of diffuse hypopigmentation and a parchment paper-like appearance on the vulva

A 2 centimeter (cm) irregularly colored lesion with irregular borders located on the arm

A 0.5 centimeter (cm) pedunculated flesh-colored lesion located adjacent to the axillary region

Correct answer: A 4 millimeter (mm) tan-colored crusty lesion located on the forehead

Biopsy is appropriate when concern for neoplasia exists. There are several methods of biopsy, including punch biopsy, shave biopsy, and scissor biopsy and complete excision by use of a scalpel.

Shave biopsy is indicated for lesions that do not require a full-thickness specimen for diagnosis, including actinic keratoses (which is described in the correct answer), basal cell or squamous cell carcinoma, warts, and seborrheic keratosis.

Lesions that require a full-thickness specimen for diagnosis, such as lichen sclerosus (an area of diffuse hypopigmentation and a parchment-paper like appearance often located on the vulva of post-menopausal women or pre-pubertal girls) or melanoma (a dark-colored lesion characterized by asymmetry, irregular borders, irregular coloration or the presence of multiple colors, large diameter, and change in size of the lesion) should either be fully removed by use of a punch biopsy or, if the lesion is large, multiple punch biopsies should be taken to ensure adequate sampling.

Pedunculated lesions can often be removed by use of scissor excision without use of anesthesia.

80.

A 60-year-old patient presents with a rash consisting of raised, red bumps and blisters occurring in a discrete band on the left side of the torso.

Which additional data would be of significance?

History of chickenpox

Recent exposure to poison ivy

History of psoriasis outbreaks

Recent exposure to grandchild with impetigo

Correct answer: History of chickenpox

Herpes zoster infection, or shingles, is caused by the varicella-zoster virus (VZV), which is also responsible for chickenpox. Anyone who has had chickenpox may develop shingles later in life.

Skin lesions appearing along a neurocutaneous dermatome (the area of skin supplied by the cutaneous branches from a single spinal nerve) are characteristic of herpes zoster infection. The thoracic and lumbar dermatomes are most commonly affected, but 10-15% of patients have lesions involving the ocular dermatome. There is a 1-2 day prodrome prior to onset of the skin lesions, which includes mild, nonspecific symptoms such as generalized body aches as well as itching, burning or pain at the area where the lesions will erupt. The quality of pain once the rash erupts can be described as burning, throbbing, stabbing, or itching. Regional lymphadenopathy can occur.

Shingrix is the approved vaccine in the U.S. to prevent herpes zoster infection. It is a recombinant zoster vaccine that is given in two doses separated by 2 to 6 months.

Poison ivy rash occurs in areas that have come into contact with the plant. A history of psoriasis is not associated with developing shingles. Lesions related to impetigo typically occur on areas of exposed skin.

81.

A 44-year-old female patient you have diagnosed with lichen sclerosis needs to be treated for her chronic skin condition. You want the medication you prescribe to have maximum absorption and also to provide lubrication to her vulvar tissues.

You know the best choice of topical medication type to meet these requirements is a(n):

Ointment

Cream

Gel

Lotion

Correct answer: Ointment

Safe prescription of topical agents involves knowledge of the best vehicle for the medication. In general, the less viscous the vehicle containing a topical medication is, the less of the medication is absorbed.

Ointments provide maximum absorption as well as provide lubrication to the lichenified tissues found in lichen sclerosis.

Creams also provide good lubrication to dry tissues but are not as well-absorbed as ointments. Medication contained in a gel or lotion medium are absorbed in smaller amounts than medication contained in a cream or ointment.

82.

The 59-year-old male patient you are following up with has been diagnosed with onychomycosis of his toenails and is here today to discuss his treatment plan. You review his chart and see he is being treated for hypertension with diltiazem (Cardizem) and has a prescription for diazepam (Valium) for anxiety, which he states he uses every day.

Of the following onychomycosis treatment options, you know the best choice for your patient is:

Terbinafine (Lamisil)

Itraconazole (Sporanox)

Fluconazole (Diflucan)

Griseofulvin (Grifulvin)

Correct answer: Terbinafine (Lamisil)

Onychomycosis is a chronic, disfiguring dermatophytosis of the nail that causes dull, thickened, lusterless nails with a pithy appearance. Diagnosis is obtained through pulverized nail clippings sent for fungal culture.

Onychomycosis may be treated with various antifungal agents, including itraconazole (Sporanox), terbinafine (Lamisil), fluconazole (Diflucan), and griseofulvin (Grifulvin). All antifungals have hepatotoxic potential and can cause an increase in hepatic enzyme levels.

In addition, several of the antifungal drugs used in the treatment of onychomycosis cause inhibition on cytochrome pathways through which as much as 50% of commonly prescribed drugs are processed. Itraconazole (Sporanox, Onmel) inhibits cytochrome P450 3A4, the pathway through which diazepam (Valium) is used. Fluconazole (Diflucan) inhibits cytochrome P450 2CP, the pathway through which calcium channel blockers, such as diltiazem (Cardizem), and benzodiazepines, such as diazepam (Valium), are used. Griseofulvin (Grifulvin) is an oral agent requiring months of therapy and a high rate of relapse.

Terbinafine (Lamisil) has significantly less drug interaction potential overall and is the best option for this patient.

83.

Your patient, who has been diagnosed with atopic dermatitis, complains that the pruritus he has been experiencing is debilitating because it prevents him from sleeping at night, thus causing him to feel poorly during the day.

Which of the following should you prescribe?

Hydroxyzine (Atarax, Vistaril)

Cetirizine (Zyrtec)

Diphenhydramine (Benadryl)

Tacrolimus (Protopic)

Correct answer: Hydroxyzine (Atarax, Vistaril)

The pruritus of atopic dermatitis (eczema) is a distressing symptom negatively impacting the quality of life in some patients. The pruritus is caused by histamine release, making use of an antihistamine the best choice for treatment. Pruritus tends to be worse at night, disrupting sleep patterns, consequently negatively affecting the following day. Providing the patient with a sedating antihistamine at bedtime can both decrease the pruritus and improve quality of sleep. Oral hydroxyzine (Atarax, Vistaril) usually provides better relief of itching than other antihistamines while also potentially improving sleep quality.

Cetirizine (Zyrtec) is a metabolite of hydroxyzine and is a less-sedating antihistamine. It is not preferred over oral hydroxyzine.

Diphenhydramine (Benadryl) is an antihistamine that often causes drowsiness in patients but is not the first choice as an anti-pruritic for someone diagnosed with atopic dermatitis.

Tacrolimus (Protopic) is an immunomodulator ointment used in the treatment of atopic dermatitis. It blocks T-cell stimulation and inhibits mast cell activation. It is used topically in the treatment of atopic lesions and is not used to treat pruritus. It should be used only as labeled and only if other prescription and supportive treatments have failed to work or cannot be tolerated.

84.

You are providing care for an elderly patient who reports experiencing persistent pain in the region of a past herpes zoster outbreak. The patient has a current prescription for amitriptyline (Amitrip) as therapy for depression. Which intervention will you incorporate into your plan of care?

Prescribe application of topical lidocaine patches

Order the affected area to be cleansed with Burow's solution

Prescribe oral antiviral therapy

Order application of bacitracin, neomycin, and polymyxin B ointment

Correct answer: Prescribe application of topical lidocaine patches

Effective treatment for the pain of postherpetic neuralgia includes tricyclic antidepressants such as amitriptyline (Amitrip, Elavil, Endep, Levate), gabapentin (Neurontin, Gralise, Horizant), and topical lidocaine patches. Since the patient is already taking a tricyclic antidepressant, adding a topical lidocaine patch for pain control would be most appropriate. Alternatively, topical capsaicin can be applied five times daily as needed to the area of pain.

Burow's solution is a therapy for a herpes zoster outbreak but is not indicated for postherpetic neuralgia, nor are oral antiviral or topical antimicrobial medications.
