

## Question 1.1

A 68-year-old man is brought to the emergency department because of a 2-day history of progressive lethargy and tremors. He has alcoholism and opiate, cocaine, and amphetamine use disorder, but he has abstained from alcohol and illicit substances during the past 2 weeks. He also has alcoholic cirrhosis. His only medication is a daily multivitamin. He previously drank six 12-oz beers daily. He appears chronically ill and is somnolent. Temperature is 36.8°C (98.2°F), pulse is 100/min, respirations are 18/min, and blood pressure is 100/60 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 94%. Examination shows conjunctival icterus, ascites, and 2+ edema of the lower extremities. Cranial nerves are intact. Muscle strength is 4/5 throughout. When he is awake, there is a postural and action tremor of the forearms and hands that is accompanied by a sudden, brief loss of muscle strength. His speech is normal, and he is able to follow simple commands. Serum total bilirubin concentration is 3 mg/dL. Blood and urine cultures grow no pathogens. Which of the following is most likely to improve this patient's cognition and movement disorder?

- (A) Intravenous vancomycin and cefepime therapy
- (B) Intravenous vitamin B<sub>1</sub> (thiamine) therapy
- (C) Oral lactulose therapy
- (D) Oral lorazepam therapy

### Correct Answer:

- (C) Oral lactulose therapy

### Neural Consult Response and Explanation:

#### Answer: C

**Explanation:** The patient's clinical presentation is highly suggestive of overt hepatic encephalopathy (HE) secondary to decompensated alcoholic cirrhosis. Key indicators include his history of alcoholism and cirrhosis, physical findings of portal hypertension (ascites, edema) and liver failure (icterus), and his neuropsychiatric symptoms (lethargy, somnolence). Most significantly, the description of his movement disorder—a postural and action tremor accompanied by a sudden, brief loss of muscle strength—is the classic definition of asterixis (also known as 'liver flap'). Asterixis is a hallmark of hepatic encephalopathy and results from the accumulation of neurotoxins, primarily ammonia, which the cirrhotic liver cannot adequately clear. Oral lactulose is the first-line treatment for HE. It is a non-absorbable disaccharide that is metabolized by colonic bacteria into organic acids. This process acidifies the colonic lumen, converting ammonia (NH<sub>3</sub>) into non-absorbable ammonium (NH<sub>4</sub><sup>+</sup>), which is then trapped in the gut and excreted. Lactulose also acts as an osmotic laxative, further promoting the removal of nitrogenous waste. Regarding the other options: (A) Antibiotics like vancomycin and cefepime are used for infections like spontaneous bacterial peritonitis, but this patient's cultures are negative, and while infection can precipitate HE, lactulose remains the primary treatment for the encephalopathy itself. (B) Thiamine is used to treat Wernicke-Korsakoff syndrome, but the patient lacks the classic triad of ophthalmoplegia, ataxia, and confusion, and thiamine does not treat asterixis. (D) Lorazepam, a benzodiazepine, is used for acute alcohol withdrawal; however, the patient has been abstinent for two weeks, placing him well outside the typical window for withdrawal symptoms (which usually occur within 48–96 hours). Furthermore, benzodiazepines are generally contraindicated in hepatic encephalopathy as they can worsen the patient's mental status and respiratory drive.



## Question 2.1

A 45-year-old woman comes to the emergency department because of a 3-day history of progressive shortness of breath, cough productive of blood-tinged sputum, and fever. She also has a 3-month history of numbness of her left leg and tingling in her right arm. She has not had chills. She was diagnosed with asthma 6 months ago; it is well controlled with inhaled budesonide and albuterol as needed. She has no other history of serious illness and takes no other medications. She appears to be in mild respiratory distress. Temperature is 38.1°C (100.6°F), pulse is 105/min and regular, respirations are 24/min, and blood pressure is 145/95 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 92%. Crackles are heard at the right lung base, and there are occasional diffuse wheezes. Cardiac examination shows no abnormalities. On neurologic examination, sensation to pinprick is decreased over the lateral aspect of the left lower extremity and right upper extremity. Muscle strength is 5/5 throughout. Babinski sign is absent. Deep tendon reflexes are 2+ and symmetric. Which of the following is the most appropriate next step in diagnosis?

- (A) CT angiography of the chest
- (B) Determination of serum angiotensin-converting enzyme activity
- (C) Measurement of serum IgE concentration
- (D) Mesenteric angiography
- (E) Serum antiglomerular basement membrane assay
- (F) Serum antineutrophil cytoplasmic autoantibody assay
- (G) Sweat chloride testing

### Correct Answer:

- (F) Serum antineutrophil cytoplasmic autoantibody assay

### Neural Consult Response and Explanation:



**Answer:** F

**Explanation:** The patient's clinical presentation is highly suggestive of Eosinophilic Granulomatosis with Polyangiitis (EGPA), formerly known as Churg-Strauss syndrome. This diagnosis is supported by a classic triad of findings: 1) Late-onset asthma (diagnosed 6 months ago); 2) Mononeuritis multiplex (asymmetric sensory deficits in the left leg and right arm, indicating involvement of multiple non-contiguous nerves); and 3) Pulmonary involvement (cough with blood-tinged sputum, fever, and crackles, suggesting pulmonary vasculitis or eosinophilic pneumonia). EGPA typically progresses through three phases: a prodromal allergic phase (asthma, rhinitis), an eosinophilic phase (peripheral eosinophilia and organ infiltration), and a vasculitic phase (small-vessel vasculitis affecting the skin, nerves, and kidneys). This patient is currently in the vasculitic phase, as evidenced by her mononeuritis multiplex and respiratory symptoms. Serum antineutrophil cytoplasmic autoantibody (ANCA) assay is a key diagnostic step; in EGPA, ANCA is positive in approximately 40-60% of patients, typically showing a p-ANCA (anti-myeloperoxidase) pattern, especially in those with vasculitic manifestations like neuropathy. (A) CT angiography is used for pulmonary embolism, which does not explain the asthma or neuropathy. (B) ACE activity is a marker for sarcoidosis, which does not typically present with asthma. (C) While IgE is often elevated in EGPA, it is non-specific and less diagnostic than ANCA in the context of suspected vasculitis. (D) Mesenteric angiography is used for Polyarteritis Nodosa (PAN), which causes mononeuritis multiplex but characteristically spares the lungs. (E) Anti-GBM assay is for Goodpasture syndrome, which causes pulmonary hemorrhage and glomerulonephritis but not asthma or neuropathy. (G) Sweat chloride testing is for cystic fibrosis, which is inconsistent with this patient's age and neurological findings.

### Question 3.1

An 87-year-old woman, gravida 6, para 6, is brought to the emergency department because of a 24-hour history of severe abdominal pain and an inability to void. She notes that for the past 2 months, she has had difficulty emptying her bladder, especially at the end of the day. Twenty years ago, she underwent mastectomy for breast cancer; she has been cancer-free since then. She has a 10-year history of osteoporosis. All of her children were delivered vaginally without complications. Her only medication is alendronate. Examination shows the cervix protruding 7.5 cm from the vagina. After the cervix is replaced into the vagina, a urinary catheter drains 700 mL of urine. Urinalysis shows no abnormalities. Which of the following is the most likely diagnosis?

- (A) Overactive bladder
- (B) Overflow incontinence
- (C) Stress incontinence
- (D) Urinary retention
- (E) Urinary tract infection

**Correct Answer:**

- (D) Urinary retention

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient's clinical presentation is classic for acute urinary retention secondary to severe pelvic organ prolapse (POP). An 87-year-old woman with a history of six vaginal deliveries is at high risk for POP. The physical examination finding of the cervix protruding 7.5 cm from the vagina indicates Stage IV uterine prolapse (procidentia). This degree of prolapse can cause mechanical obstruction of the urethra by kinking it or compressing it against the pubic bone, especially as the day progresses and gravity increases the descent of the pelvic organs. The patient's inability to void for 24 hours, her severe abdominal pain (caused by bladder distension), and the drainage of 700 mL of urine (well above normal bladder capacity) immediately after the prolapse was reduced and a catheter was inserted confirm the diagnosis of urinary retention. (A) Overactive bladder involves urgency and frequency, not an inability to void. (B) Overflow incontinence refers to the involuntary leakage of urine when the bladder is overdistended; while it can occur alongside retention, the primary diagnosis for her acute inability to void and large residual volume is urinary retention. (C) Stress incontinence is the leakage of urine with increased intra-abdominal pressure and is not associated with an inability to void. (E) Urinary tract infection is ruled out by the normal urinalysis.

## Question 4.1

A 25-year-old woman is admitted to the hospital because of a 2-day history of fever, dizziness, light-headedness, chills, and shaking. She has hyperthyroidism, gastroesophageal reflux disease, and asthma. Her medications are oral methimazole and omeprazole, and inhaled fluticasone, and she has been on the same dosages for 1 year. She is in the military reserve and will be deployed overseas next week. She began atovaquone-proguanil therapy 1 week ago and received the hepatitis A and yellow fever vaccines 2 weeks ago. She is not sexually active. She does not smoke cigarettes or drink alcohol. She appears ill but is not in acute distress. Temperature is 38.6°C (101.5°F), pulse is 110/min, respirations are 22/min, and blood pressure is 90/60 mm Hg. No wheezing is heard on auscultation. Cardiac examination shows no abnormalities. Laboratory studies show: Hemoglobin = 13.8 g/dL

Leukocyte count = 1100/mm<sup>3</sup>

Segmented neutrophils = 10%

Eosinophils = 10%

Lymphocytes = 40%

Monocytes = 40%

Platelet count = 320,000/mm<sup>3</sup>

Platelet count 320,000/mm<sup>3</sup>

Results of other laboratory studies are within the reference ranges. Which of the following is the most likely cause of this patient's hematologic abnormality? Please choose the best option among the choices below.

- (A) Atovaquone-proguanil
- (B) Fluticasone
- (C) Hepatitis A vaccine
- (D) Methimazole



- (E) Omeprazole
- (F) Yellow fever vaccine

**Correct Answer:**

- (D) Methimazole

**Neural Consult Response and Explanation:**

**Answer:** D

**Explanation:** The patient presents with febrile neutropenia, characterized by a high fever (38.6°C), symptoms of systemic illness (chills, shaking, dizziness), and severe neutropenia. Her laboratory results show a total leukocyte count of 1100/mm<sup>3</sup> with only 10% segmented neutrophils, resulting in an Absolute Neutrophil Count (ANC) of 110/mm<sup>3</sup>. An ANC below 500/mm<sup>3</sup> is defined as severe neutropenia, and below 200/mm<sup>3</sup> it is often termed agranulocytosis. Among the patient's medications, methimazole is a well-known cause of idiosyncratic drug-induced agranulocytosis, occurring in approximately 0.2% to 0.5% of patients. While this adverse effect most commonly occurs within the first three months of treatment, it can occur at any time during therapy. The clinical presentation of sudden fever and chills in a patient taking antithyroid medication must be treated as agranulocytosis until proven otherwise. Other options are less likely: atovaquone-proguanil (A) and omeprazole (E) are rarely associated with such severe hematologic abnormalities; fluticasone (B) is a corticosteroid, which typically causes an increase in the neutrophil count (neutrophilia) rather than a decrease; and the vaccines (C, F) are not standard causes of severe agranulocytosis.

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**Question 5.1**

A 16-year-old boy is brought to the emergency department because of a 2-day history of fever, nausea, vomiting, headache, chills, and fatigue. He has not had any sick contacts. He underwent splenectomy for traumatic injury at the age of 13 years. He has no other history of serious illness and takes no medications. He appears ill. His temperature is 39.2°C (102.5°F), pulse is 130/min, respirations are 14/min, and blood pressure is 110/60 mm Hg. On pulmonary examination, scattered crackles are heard bilaterally. Abdominal examination shows a well-healed midline scar and mild, diffuse tenderness to palpation. Which of the following is the most appropriate next step in management?

- (A) Antibiotic therapy
- (B) Antiemetic therapy
- (C) CT scan of the chest
- (D) X-ray of the abdomen
- (E) Reassurance

**Correct Answer:**

- (A) Antibiotic therapy



## Neural Consult Response and Explanation:

**Answer:** A

**Explanation:** The patient is a 16-year-old boy who is asplenic (due to a previous traumatic splenectomy) and presents with a high fever (39.2°C), tachycardia (130/min), and systemic symptoms (nausea, vomiting, headache, chills). In an asplenic patient, any febrile illness must be treated as a medical emergency due to the risk of Overwhelming Post-Splenectomy Infection (OPSI). OPSI is a fulminant form of sepsis caused primarily by encapsulated organisms such as *Streptococcus pneumoniae*, *Haemophilus influenzae* type b, and *Neisseria meningitidis*. The spleen is essential for filtering these bacteria and producing opsonizing antibodies; without it, these infections can progress from a mild prodrome to septic shock and death within hours. The mortality rate for OPSI is as high as 50-70%. Therefore, the most appropriate and time-sensitive next step in management is the immediate administration of empiric broad-spectrum antibiotic therapy (e.g., ceftriaxone or vancomycin plus ceftriaxone). While the scattered crackles on pulmonary examination might suggest pneumonia as the source, and imaging like a CT scan (C) or abdominal X-ray (D) could eventually be part of a diagnostic workup, these must never delay the administration of life-saving antibiotics. Antiemetic therapy (B) only addresses symptoms, and reassurance (E) is entirely inappropriate given the high risk of rapid clinical deterioration.

## Question 6.1

A previously healthy 29-year-old woman is admitted to the hospital because of a 1-day history of moderate headache, fever, and lethargy. Two days ago, she underwent wisdom tooth extraction. She takes no medications. She cannot remember her vaccination history. She does not smoke cigarettes, drink alcohol, or use illicit drugs. She is a college student, lives in an apartment complex with other students, and eats all her meals in the campus dining hall. She says her study partner had a “really bad fever” during the past week. The patient appears sleepy. Temperature is 40.0°C (104.0°F), pulse is 140/min, and blood pressure is 90/40 mm Hg. Examination shows a diffuse purpuric rash over the trunk and all extremities. There is nuchal rigidity. Lungs are clear to auscultation. Heart sounds are normal. Neurologic examination shows no other focal findings. Which of the following is most likely to have prevented this patient’s current condition?

- (A) Adherence to immunization guidelines
- (B) Avoidance of eating meals in the campus dining hall
- (C) Consistent hand washing
- (D) Isolation of other students on campus with febrile illness
- (E) Prophylactic antibiotic therapy

### Correct Answer:

- (A) Adherence to immunization guidelines

## Neural Consult Response and Explanation:



**Answer:** A

**Explanation:** The patient's clinical presentation is classic for meningococcal meningitis and fulminant meningococemia caused by *Neisseria meningitidis*. Key diagnostic features include the rapid onset of high fever (40.0°C), headache, lethargy, nuchal rigidity (signs of meningitis), and a diffuse purpuric rash with hemodynamic instability (90/40 mm Hg, 140/min), which indicates septic shock and disseminated intravascular coagulation (DIC). The epidemiological context—a college student living in close proximity to others and a history of a sick contact (study partner)—is highly suggestive of *N. meningitidis* transmission via respiratory droplets. Adherence to immunization guidelines is the most effective preventive measure. The meningococcal conjugate vaccine (MenACWY) is routinely recommended for adolescents with a booster at age 16, and it is specifically recommended for college students living in residence halls or similar close-quarters environments. While the patient is 29, her living situation and student status place her at increased risk, and vaccination remains the primary strategy for preventing outbreaks and individual cases. Other options are less effective: (B) and (C) do not address the primary mode of transmission (respiratory droplets/saliva); (D) is a reactive measure rather than a primary prevention strategy; and (E) prophylactic antibiotics are used for post-exposure prophylaxis in close contacts, not as a general preventive measure.

## Question 7.1

A 27-year-old primigravid woman comes to the physician for her first prenatal visit 10 weeks after a home pregnancy test was positive. She feels well, and her pregnancy has been uncomplicated. She previously used an oral contraceptive but discontinued it 3 months ago. She has no history of sexually transmitted diseases. She is sexually active in a monogamous relationship with a male partner who is the father. She has had five lifetime sexual partners. She has a pet cat. Examination shows a uterus consistent in size with a 10-week gestation. Testing for which of the following infectious conditions is the most appropriate recommendation for this patient?

- (A) Bacterial vaginosis
- (B) Cytomegalovirus
- (C) Epstein-Barr virus
- (D) HIV
- (E) Human papillomavirus

**Correct Answer:**

- (D) HIV

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** At the first prenatal visit, standard of care involves screening for several infectious diseases to protect both the mother and the fetus. According to major clinical guidelines (such as those from ACOG and the USPSTF), universal HIV screening is recommended for all pregnant women, regardless of their perceived risk or history. Identifying HIV infection early in pregnancy allows for the initiation of antiretroviral therapy (ART), which can reduce the risk of vertical transmission to the fetus from approximately 25% (without treatment) to less than 1%. Other routine tests at the first visit include screening for Syphilis, Hepatitis B, Chlamydia, and sometimes Hepatitis C and Gonorrhea depending on age and risk factors. (A) Bacterial vaginosis screening is not recommended for asymptomatic pregnant women. (B) Cytomegalovirus and (C) Epstein-Barr virus are not part of routine prenatal screening as there are no standard interventions to prevent congenital transmission for these viruses during pregnancy. (E) Human papillomavirus (HPV) testing is used for cervical cancer screening but is not a routine 'infectious disease' screen for pregnancy management; while a Pap smear may be performed if the patient is due for one, HIV screening is a more fundamental component of the initial prenatal infectious disease workup.

## Question 8.1

An investigator would like to decrease the incidence of type 2 diabetes mellitus among adult patients with risk factors including obesity, decreased physical activity, and family history of diabetes mellitus. A total of 200 men and women aged 30 to 64 years will be enrolled in a regular exercise program for 6 months. A nurse reviews the details of the study with each participant, and each participant signs an informed consent form. One month after the study begins, one of the participants asks to drop out of the study. Which of the following represents the most appropriate next step by this study participant?

- (A) Complete the study because she signed the consent form
- (B) Discuss withdrawal with the institutional review board
- (C) Negotiate her withdrawal with the principal investigator
- (D) Wait to withdraw until after the investigator consults with an ethics team
- (E) Withdraw from the study now

**Correct Answer:**

(E) Withdraw from the study now

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The fundamental ethical principle governing human subject research is autonomy, which is operationalized through the process of informed consent. According to federal regulations (such as the Common Rule) and international ethical standards (such as the Declaration of Helsinki), participation in a research study must be entirely voluntary. A participant has the absolute right to withdraw from a study at any time, for any reason, without penalty or loss of benefits to which they are otherwise entitled. Signing an informed consent form is not a legally binding contract that requires completion of the study; rather, it is a document that ensures the participant has been informed of the risks, benefits, and their rights. Therefore, the participant does not need to negotiate with the principal investigator, consult an ethics team, or seek approval from the Institutional Review Board (IRB) to leave the study.

## Question 9.1

A 70-year-old man comes to the clinic because of a 3-day history of fatigue, dark urine, decreased urine output, mild pain with urination, and a low-grade fever. He has gout, hypertension, and osteoarthritis. His medications are allopurinol, hydrochlorothiazide, and acetaminophen. Temperature is 37.9°C (100.2°F), pulse is 88/min, respirations are 24/min, and blood pressure is 160/95 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 97%. Jugular venous pressure is 7 cm H<sub>2</sub>O (N=5–9). Cardiopulmonary examination shows no abnormalities. Which of the following is the most appropriate next step in management?

- (A) Discontinuation of acetaminophen therapy
- (B) Intravenous administration of fluids
- (C) Measurement of postvoid residual volume
- (D) Oral trimethoprim-sulfamethoxazole therapy
- (E) Renal biopsy

**Correct Answer:**

(C) Measurement of postvoid residual volume

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient is a 70-year-old man presenting with signs of acute kidney injury (AKI), characterized by decreased urine output and dark urine (likely hematuria or highly concentrated urine), along with symptoms suggestive of a urinary tract infection (fever, dysuria, fatigue). In an elderly male with AKI and urinary symptoms, the most common and immediately reversible cause to investigate is post-renal (obstructive) AKI, typically due to bladder outlet obstruction from benign prostatic hyperplasia (BPH). A postvoid residual (PVR) volume measurement, via bladder ultrasound or catheterization, is the most appropriate next step to confirm or rule out this diagnosis. While intravenous fluids (Option B) are a common treatment for prerenal AKI or rhabdomyolysis, this patient is hypertensive (160/95 mm Hg) and euvolemic (JVP 7 cm H<sub>2</sub>O), making aggressive fluid resuscitation potentially inappropriate and risky (risk of volume overload) before ruling out obstruction. Rhabdomyolysis is also unlikely given the lack of trauma, muscle pain, or statin use. Discontinuing acetaminophen (Option A) is incorrect as it is not a primary nephrotoxin at therapeutic doses. Oral trimethoprim-sulfamethoxazole (Option D) is premature before a urinalysis and culture are obtained and could be dangerous in the setting of AKI due to the risk of hyperkalemia. Renal biopsy (Option E) is an invasive procedure reserved for cases where the etiology of intrinsic renal disease remains unclear after initial non-invasive workup.

## Question 10.1

A 52-year-old woman comes to the physician because of a 2-day history of severe pain and markedly decreased range of motion in her right elbow. She has rheumatoid arthritis in her elbows, wrists, and hands. She reports episodes of moderate pain approximately four times yearly. Previous treatment with naproxen, methotrexate, and hydroxychloroquine has provided moderate relief. Treatment with prednisone was begun after her most recent episode 9 weeks ago. She has not had generalized fatigue or muscle aches. She has no other history of serious illness. Her other medications are naproxen, prednisone, and omeprazole. Temperature is 38.4°C (101.1°F), pulse is 90/min, respirations are 12/min, and blood pressure is 110/76 mm Hg. Range of motion of the wrists and ankles is decreased; the right elbow is more severely limited by pain than the left elbow. There is warmth, tenderness, erythema, and edema of the right elbow. Fine-needle aspiration of the right elbow is performed. Gram stain of the fluid shows a leukocyte count of 60,000/mm<sup>3</sup> and no organisms. Which of the following is the most appropriate pharmacotherapy?

- (A) Colchicine
- (B) Infliximab
- (C) Ketorolac
- (D) Methylprednisolone
- (E) Vancomycin

**Correct Answer:**

(E) Vancomycin

**Neural Consult Response and Explanation:**



**Answer: E**

**Explanation:** The patient presents with a 2-day history of acute monoarthritis (severe pain, decreased range of motion, warmth, erythema, and edema) in the right elbow, accompanied by a fever (38.4°C). In a patient with pre-existing rheumatoid arthritis (RA) who is also immunocompromised (taking prednisone and methotrexate), an acute monoarticular flare must be considered septic arthritis until proven otherwise. The synovial fluid analysis reveals a leukocyte count of 60,000/mm<sup>3</sup>, which is significantly above the typical threshold (>50,000/mm<sup>3</sup>) that suggests an infectious process. Although the Gram stain is negative, it has a sensitivity of only about 50% for septic arthritis; therefore, a negative result does not rule out infection. The most common causative organism for septic arthritis is *Staphylococcus aureus*. Given the high risk of joint destruction and the patient's immunocompromised state, immediate empiric intravenous antibiotic therapy is required. Vancomycin (Choice E) is the most appropriate initial choice to provide coverage for Gram-positive organisms, including methicillin-resistant *Staphylococcus aureus* (MRSA). Colchicine (Choice A) is used for crystalline arthropathy, which is less likely here. Infliximab (Choice B) is a TNF inhibitor used for RA but is contraindicated in the setting of active infection. Ketorolac (Choice C) is an NSAID that provides only symptomatic relief. Methylprednisolone (Choice D) is a corticosteroid that could worsen a septic joint by further suppressing the local immune response.

## Question 11.1

**Abstract: Objective:** In patients with cirrhosis and acute bleeding esophageal varices, how do endoscopic sclerotherapy and emergency portacaval shunt compare for control of bleeding and survival?

**Methods Design:** Randomized controlled trial (San Diego Bleeding Esophageal Varices Study).  
ClinicalTrials.gov NCT<sub>00690027</sub>

**Allocation:** Concealed.

**Blinding:** Blinded (gastroenterologist who evaluated patients for portal-systemic encephalopathy).

**Follow-up period:** Up to 17 years.

**Setting:** University of California San Diego Medical Center.

**Patients:** 211 patients (mean age 49 years, 77% men) with acute bleeding esophageal varices resulting from cirrhosis, who required a transfusion of  $\geq 2$  units of blood and, for patients transferred from other hospitals, observation of upper gastrointestinal bleeding within 48 hours of transfer. Exclusion criterion was > 1 previous session of endoscopic sclerotherapy.

**Intervention:** Endoscopic sclerotherapy (n = 106) or emergency portacaval shunt (n = 105). Emergency portacaval shunt comprised a direct side-to-side or direct end-to-side portacaval shunt done within 8 hours of initial contact.

**Outcomes:** Control of bleeding at > 30 days, survival, readmissions for variceal or nonvariceal



bleeding requiring transfusion of packed red blood cells, and recurrent portal-systemic encephalopathy.

Patient follow-up: 100% (minimum follow-up until death or 9.4 years).

### Main results

15-year survival was lower with endoscopic sclerotherapy than with emergency portacaval shunt (10/106 vs 48/105, relative benefit reduction 79%, 95% CI 62 to 89; number needed to harm 3, CI 2 to 4). Other main results are shown in the Table.

Endoscopic sclerotherapy (EST) vs emergency portacaval shunt (EPCS) in patients with cirrhosis and acute bleeding esophageal varices

Outcomes | Child-Pugh risk class | EST | EPCS | P value |

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Control of bleeding at > 30 days\* | | 20% | 100% | <.001 | Median survival (years) | A | 4.62 | 10.43 | .003. | | B | 2.61 | 6.19 | <.001 | | C | 0.58 | 5.30 | .005. | Mean number of readmissions for variceal bleeding requiring packed red blood cell transfusion | | 6.8 | 0.4 | <.001 | Recurrent portal-systemic encephalopathy† | | 35% | 15% | < .001 |

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\*Excluding indeterminate deaths at 14 days from nonbleeding causes. †In patients who survived 30 days and left hospital.

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Conclusion In patients with cirrhosis and acute bleeding esophageal varices, emergency portacaval shunt was better than endoscopic sclerotherapy for control of bleeding, recurrent encephalopathy, and survival.

Sources of funding: National Institutes of Health and Surgical Education and Research Foundation.

Structured abstract based on: Orloff MJ, Isenberg JI, Wheeler HO, et al. Randomized trial of emergency endoscopic sclerotherapy versus emergency portacaval shunt for acutely bleeding esophageal varices in cirrhosis. J Am Coll Surg. 2009;209:25-40. 19651060

A 52-year-old man with hepatic cirrhosis comes to the emergency department because of a 3-hour history of vomiting blood. Esophagogastroduodenoscopy confirms actively bleeding esophageal varices. Based on the abstract shown, the physician is considering an emergency portacaval shunt (EPCS) procedure rather than endoscopic sclerotherapy (EST). According to the results in the abstract, approximately how many patients must be treated with EPCS rather than EST to prevent one case of recurrent portal-systemic encephalopathy?

- (A) 1
- (B) 3
- (C) 5
- (D) 10
- (E) 16

**Correct Answer:**



(C) 5

### Neural Consult Response and Explanation:

**Answer:** C

**Explanation:** The question asks for the Number Needed to Treat (NNT) to prevent one case of recurrent portal-systemic encephalopathy using emergency portacaval shunt (EPCS) instead of endoscopic sclerotherapy (EST), based on the provided study abstract. To calculate the NNT, you first determine the Absolute Risk Reduction (ARR). According to the table in the abstract, the rate of recurrent portal-systemic encephalopathy for the EST group is 35% (0.35) and for the EPCS group is 15% (0.15). The ARR is the difference between these two rates:  $35\% - 15\% = 20\%$  (or 0.20). The NNT is calculated as the inverse of the ARR ( $NNT = 1 / ARR$ ). Therefore,  $NNT = 1 / 0.20 = 5$ . This means that for every 5 patients treated with EPCS instead of EST, one case of recurrent portal-systemic encephalopathy is prevented. While portacaval shunts are traditionally associated with an increased risk of hepatic encephalopathy due to the bypassing of liver filtration, the specific results of this randomized controlled trial (Orloff et al.) indicated a lower rate of recurrent encephalopathy in the shunt group compared to the sclerotherapy group, likely due to the superior control of the underlying cause of decompensation (recurrent bleeding).

### Question 12.1

**Abstract: Objective:** In patients with cirrhosis and acute bleeding esophageal varices, how do endoscopic sclerotherapy and emergency portacaval shunt compare for control of bleeding and survival?

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ClinicalTrials.gov NCT<sub>00690027</sub>

**Allocation:** Concealed.

**Blinding:** Blinded (gastroenterologist who evaluated patients for portal-systemic encephalopathy).

**Follow-up period:** Up to 17 years.

**Setting:** University of California San Diego Medical Center.

**Patients:** 211 patients (mean age 49 years, 77% men) with acute bleeding esophageal varices resulting from cirrhosis, who required a transfusion of  $\geq 2$  units of blood and, for patients transferred from other hospitals, observation of upper gastrointestinal bleeding within 48 hours of transfer.  
**Exclusion criterion** was  $> 1$  previous session of endoscopic sclerotherapy.

**Intervention:** Endoscopic sclerotherapy (n = 106) or emergency portacaval shunt (n = 105).  
Emergency portacaval shunt comprised a direct side-to-side or direct end-to-side portacaval shunt done within 8 hours of initial contact.



Outcomes: Control of bleeding at > 30 days, survival, readmissions for variceal or nonvariceal bleeding requiring transfusion of packed red blood cells, and recurrent portal-systemic encephalopathy.

Patient follow-up: 100% (minimum follow-up until death or 9.4 years).

### Main results

15-year survival was lower with endoscopic sclerotherapy than with emergency portacaval shunt (10/106 vs 48/105, relative benefit reduction 79%, 95% CI 62 to 89; number needed to harm 3, CI 2 to 4). Other main results are shown in the Table.

Endoscopic sclerotherapy (EST) vs emergency portacaval shunt (EPCS) in patients with cirrhosis and acute bleeding esophageal varices

Outcomes | Child-Pugh risk class | EST | EPCS | P value |

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	Control of bleeding at > 30 days*	20%	100%	<.001	Median survival (years)	A	4.62	10.43	.003.	B	2.61	6.19	<.001	C	0.58	5.30	.005.	Mean number of readmissions for variceal bleeding requiring packed red blood cell transfusion	6.8	0.4	<.001	Recurrent portal-systemic encephalopathy†	35%	15%	<.001
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\*Excluding indeterminate deaths at 14 days from nonbleeding causes. †In patients who survived 30 days and left hospital.

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Conclusion In patients with cirrhosis and acute bleeding esophageal varices, emergency portacaval shunt was better than endoscopic sclerotherapy for control of bleeding, recurrent encephalopathy, and survival.

Sources of funding: National Institutes of Health and Surgical Education and Research Foundation.

Structured abstract based on: Orloff MJ, Isenberg JI, Wheeler HO, et al. Randomized trial of emergency endoscopic sclerotherapy versus emergency portacaval shunt for acutely bleeding esophageal varices in cirrhosis. J Am Coll Surg. 2009;209:25-40. 19651060

Which of the following most strongly limits the generalizability of this study's findings?

- (A) The allocation was concealed
- (B) EPCS is available only at specialty centers
- (C) The follow-up period was too short
- (D) The patients were not blinded
- (E) Unmeasured confounders were not controlled by the study design

**Correct Answer:**

(B) EPCS is available only at specialty centers



## Neural Consult Response and Explanation:

**Answer:** B

**Explanation:** Generalizability (external validity) refers to the extent to which the results of a study can be applied to other settings, people, and times. In the San Diego Bleeding Esophageal Varices Study, the emergency portacaval shunt (EPCS) was performed within 8 hours of admission by a highly specialized surgical team led by experts in this specific procedure (the Orloff group). Most medical centers do not have the surgical expertise or the 24/7 infrastructure required to perform emergency portacaval shunts with the same proficiency or within the same timeframe as the study center. Consequently, while the internal validity of the study is high due to its randomized design, the findings are difficult to replicate in general clinical practice. Regarding the other options: (A) Concealed allocation is a strength of RCT design that reduces selection bias, thereby improving internal validity. (C) The follow-up period (up to 17 years) was exceptionally long, which is a major strength of the study. (D) While blinding patients in a surgical trial is difficult, the primary outcomes (survival and bleeding control) are objective and less likely to be influenced by a lack of blinding. (E) Randomization, which was used in this study, is specifically designed to control for both measured and unmeasured confounders, making this statement incorrect.

### Question 13.1

**Abstract: Objective:** In patients with cirrhosis and acute bleeding esophageal varices, how do endoscopic sclerotherapy and emergency portacaval shunt compare for control of bleeding and survival?

**Methods Design:** Randomized controlled trial (San Diego Bleeding Esophageal Varices Study).  
ClinicalTrials.gov NCT<sub>00690027</sub>

**Allocation:** Concealed.

**Blinding:** Blinded (gastroenterologist who evaluated patients for portal-systemic encephalopathy).

**Follow-up period:** Up to 17 years.

**Setting:** University of California San Diego Medical Center.

**Patients:** 211 patients (mean age 49 years, 77% men) with acute bleeding esophageal varices resulting from cirrhosis, who required a transfusion of  $\geq 2$  units of blood and, for patients transferred from other hospitals, observation of upper gastrointestinal bleeding within 48 hours of transfer. Exclusion criterion was  $> 1$  previous session of endoscopic sclerotherapy.

**Intervention:** Endoscopic sclerotherapy (n = 106) or emergency portacaval shunt (n = 105). Emergency portacaval shunt comprised a direct side-to-side or direct end-to-side portacaval shunt done within 8 hours of initial contact.

**Outcomes:** Control of bleeding at  $> 30$  days, survival, readmissions for variceal or nonvariceal



bleeding requiring transfusion of packed red blood cells, and recurrent portal-systemic encephalopathy.

Patient follow-up: 100% (minimum follow-up until death or 9.4 years).

### Main results

15-year survival was lower with endoscopic sclerotherapy than with emergency portacaval shunt (10/106 vs 48/105, relative benefit reduction 79%, 95% CI 62 to 89; number needed to harm 3, CI 2 to 4). Other main results are shown in the Table.

Endoscopic sclerotherapy (EST) vs emergency portacaval shunt (EPCS) in patients with cirrhosis and acute bleeding esophageal varices

Outcomes | Child-Pugh risk class | EST | EPCS | P value |

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Outcomes	Child-Pugh risk class	EST	EPCS	P value
Control of bleeding at > 30 days*	20%   100%	<.001	Median survival (years)   A   4.62   10.43   .003.   B   2.61   6.19   <.001     C   0.58   5.30   .005.	
Mean number of readmissions for variceal bleeding requiring packed red blood cell transfusion		6.8	0.4	<.001
Recurrent portal-systemic encephalopathy†	35%   15%	< .001		

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\*Excluding indeterminate deaths at 14 days from nonbleeding causes. †In patients who survived 30 days and left hospital.

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Conclusion In patients with cirrhosis and acute bleeding esophageal varices, emergency portacaval shunt was better than endoscopic sclerotherapy for control of bleeding, recurrent encephalopathy, and survival.

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Structured abstract based on: Orloff MJ, Isenberg JI, Wheeler HO, et al. Randomized trial of emergency endoscopic sclerotherapy versus emergency portacaval shunt for acutely bleeding esophageal varices in cirrhosis. J Am Coll Surg. 2009;209:25-40. 19651060

Which of the following conclusions is most appropriate based on the results presented in the table?

- (A) The 95% confidence interval for the difference in survival between EPCS and EST for Child-Pugh class A patients includes 0 years
- (B) EPCS is more effective than EST in decreasing hospital readmissions for variceal bleeding requiring transfusion
- (C) The median survival after EPCS is statistically significantly less for Child-Pugh class C than for Child-Pugh class B
- (D) The randomization procedure was ineffective in decreasing bias in this study

**Correct Answer:**



(B) EPCS is more effective than EST in decreasing hospital readmissions for variceal bleeding requiring transfusion

### Neural Consult Response and Explanation:

**Answer:** B

**Explanation:** Based on the data provided in the table and the study abstract, the most appropriate conclusion is (B). The table explicitly lists the 'Mean number of readmissions for variceal bleeding requiring packed red blood cell transfusion' as 6.8 for the Endoscopic Sclerotherapy (EST) group and 0.4 for the Emergency Portacaval Shunt (EPCS) group. The associated p-value is  $< .001$ , which indicates a highly statistically significant difference, demonstrating that EPCS was more effective at reducing readmissions for this cause.

Analysis of incorrect options:

(A) For Child-Pugh class A patients, the p-value for the difference in median survival between EST and EPCS is 0.003. By definition, if a p-value is less than 0.05, the 95% confidence interval for the difference does not include zero. Therefore, this statement is mathematically incorrect based on the provided p-value.

(C) While the median survival for Child-Pugh class C (5.30 years) is numerically lower than for class B (6.19 years) within the EPCS group, the table only provides p-values for the comparison between EST and EPCS within each class. It does not provide a statistical comparison (p-value) between the different Child-Pugh classes themselves. Thus, we cannot conclude the difference is 'statistically significant' from the data provided.

(D) The abstract states that the study was a randomized controlled trial with concealed allocation and blinding. These are the gold-standard methods used specifically to minimize selection and information bias. There is no evidence in the results to suggest the randomization was ineffective.

### Question 14.1

A 42-year-old man comes to the office as a new patient. Three weeks ago, he was hospitalized for treatment of community-acquired pneumonia and diagnosed with HIV infection. He has no other history of serious illness and takes no medications. Vital signs are within normal limits. Examination shows no abnormalities.  $CD_4$  + T-lymphocyte count is  $490/mm^3$ , and plasma HIV viral load is 45,000 copies/mL. Results of other laboratory studies are within the reference ranges. Test results for syphilis and hepatitis B and C are negative. The patient agrees to begin antiretroviral therapy. He asks what his long-term prognosis will be. With adherence to the medication regimen, this patient is at greatest risk of death from which of the following?

- (A) Cardiovascular disease
- (B) Chronic kidney disease
- (C) HIV-related malignancy
- (D) Non-HIV-related malignancy
- (E) Opportunistic infection

**Correct Answer:**



## (A) Cardiovascular disease

### Neural Consult Response and Explanation:

**Answer:** A

**Explanation:** In the modern era of highly active antiretroviral therapy (ART), the clinical course of HIV infection has been transformed from a progressive, fatal immunodeficiency into a manageable chronic condition. For a patient who is adherent to ART and maintains a relatively high CD<sub>4</sub>+ T-lymphocyte count (as in this case, 490/mm<sup>3</sup>), the risk of death from traditional AIDS-defining illnesses has decreased dramatically. Consequently, the leading causes of mortality have shifted toward non-AIDS-defining conditions. Among these, cardiovascular disease (CVD) is recognized as the leading cause of non-AIDS-related mortality. People with HIV (PWH) have a 1.5- to 2-fold increased risk of atherosclerotic cardiovascular disease, including myocardial infarction and stroke, compared to the general population. This elevated risk is driven by a combination of factors, including chronic systemic inflammation despite viral suppression, the metabolic side effects of some antiretroviral medications, and a higher prevalence of traditional risk factors (e.g., smoking, dyslipidemia). While non-HIV-related malignancies (Option D) are also a significant cause of death in this population, cardiovascular disease is statistically the most common cause of non-AIDS-related death. Chronic kidney disease (Option B) is a known comorbidity but is not the leading cause of death. HIV-related malignancies (Option C) and opportunistic infections (Option E) are now much less common causes of death in patients who are adherent to ART and maintain CD<sub>4</sub> counts above 200/mm<sup>3</sup>.

### Question 15.1

A 40-year-old divorced woman comes to the office because of a 1-year history of difficulty sleeping. She says she sometimes does not fall asleep before 2 AM and does not feel rested at 6:30 AM when she has to get up and get her children ready for school. Sometimes she wakes after 1 to 2 hours of sleep and cannot fall back to sleep. On these occasions, she typically gets up for about 30 minutes, does some housework, and smokes a cigarette. She smokes one pack of cigarettes every three to four days. She works in a customer service call center and says she enjoys helping people resolve their problems. She now finds her job much harder and less enjoyable because she feels tired and sleepy. She says she would take a nap if she could, but she picks her children up as soon as she leaves work and spends the evening doing homework with them, making their dinner, and preparing lunches for the following day. By 9 PM, the children are in bed so she eats her own dinner and does some housework. She says that after 9 PM is when she smokes most of her cigarettes. She has not had depressed mood, excessive worry, or change in weight. Vital signs are within normal limits. Examination shows dark circles under the eyes and injected conjunctivae. Which of the following is the most appropriate initial step in management?

- (A) Education on sleep hygiene
- (B) Mirtazapine therapy
- (C) Sertraline therapy
- (D) Setting a date for smoking cessation
- (E) Zolpidem therapy



## Correct Answer:

(A) Education on sleep hygiene

## Neural Consult Response and Explanation:

**Answer:** A

**Explanation:** The patient presents with chronic insomnia disorder, characterized by difficulty falling asleep, difficulty maintaining sleep, and early morning awakenings for at least one year, resulting in significant daytime impairment (fatigue, decreased job satisfaction). The first-line treatment for chronic insomnia is Cognitive Behavioral Therapy for Insomnia (CBT-I), which includes components such as sleep hygiene education, stimulus control, sleep restriction, and relaxation techniques. This patient exhibits several behaviors that negatively impact sleep quality: she consumes nicotine (a stimulant) late at night and during nocturnal awakenings, she engages in stimulating activities (housework) when she cannot sleep, and she eats dinner very late. Education on sleep hygiene is the most appropriate initial step to address these behavioral factors. While smoking cessation (Option D) is important for long-term health, it is specifically addressed within the context of sleep hygiene (avoiding stimulants before bed) as an initial management step for her primary complaint. Pharmacotherapy (Options B, E) is generally reserved for cases where CBT-I is ineffective or unavailable, and antidepressants like sertraline (Option C) or mirtazapine (Option B) are not indicated here as she lacks symptoms of a mood or anxiety disorder.

## Question 16.1

A 58-year-old woman is brought to the office by her husband because of a 6-week history of increasing confusion. Her husband says that, initially, she had difficulty doing “normal” things, such as preparing meals. Since then, she has become progressively less able to care for herself or even use a telephone. During this time, she also has had increased anxiety and restlessness. She has type 2 diabetes mellitus well controlled with an oral hypoglycemic agent. She is alert and appears anxious. She is oriented to person but not to place or time. She startles when the door to the examination room is slammed shut. Her temperature is 36.8°C (98.2°F), pulse is 78/min and regular, and blood pressure is 132/94 mm Hg. Physical examination shows no other abnormalities. On neurologic examination, she can repeat three objects immediately but is unable to recall them after 3 minutes. She is unable to copy a drawing of a cube. Results of a complete blood count and serum electrolyte concentrations are within the reference ranges. Her serum glucose concentration is 155 mg/dL. CT scan of the head shows no abnormalities. Which of the following is the most appropriate next step in diagnosis?

- (A) Determination of hemoglobin A<sub>1c</sub>
- (B) Measurement of cerebrospinal fluid 14-3-3 protein concentration
- (C) Measurement of cerebrospinal fluid beta amyloid concentration
- (D) Measurement of cerebrospinal fluid methylmalonic acid concentration
- (E) Measurement of serum angiotensin-converting enzyme activity
- (F) Serum protein electrophoresis

## Correct Answer:



## (B) Measurement of cerebrospinal fluid 14-3-3 protein concentration

### Neural Consult Response and Explanation:

**Answer:** B

**Explanation:** The patient's clinical presentation is highly characteristic of Creutzfeldt-Jakob disease (CJD), a prion-mediated neurodegenerative disorder. The hallmark of CJD is a rapidly progressive dementia (occurring over weeks to months), which is evident in this patient's 6-week decline from being functional to being unable to care for herself or use a telephone. A classic physical exam finding for CJD is stimulus-sensitive myoclonus, which is demonstrated by the patient's exaggerated startle response to the door slamming. Other common features include psychiatric symptoms like anxiety and restlessness, which are also present here. Among the diagnostic tests used to support a diagnosis of CJD, the measurement of the 14-3-3 protein in the cerebrospinal fluid (CSF) is a well-established marker for the disease in the context of rapidly progressive dementia. While Real-Time Quaking-Induced Conversion (RT-QuIC) is now considered more specific, 14-3-3 remains a standard diagnostic criterion. Other options are incorrect because: (A) Hemoglobin A<sub>1c</sub> monitors diabetes, which does not cause rapid cognitive decline; (C) CSF beta-amyloid is associated with Alzheimer's disease, which typically progresses over years, not weeks; (D) CSF methylmalonic acid is used to evaluate Vitamin B<sub>12</sub> deficiency, which causes a much slower progression of symptoms; (E) Serum ACE activity is a screening tool for sarcoidosis, which is an unlikely cause of this specific presentation; and (F) Serum protein electrophoresis is used to detect monoclonal gammopathies, which do not typically present with rapidly progressive dementia and startle myoclonus.

### Question 17.1

A 38-year-old woman is brought to the emergency department by paramedics 90 minutes after she fell through ice into a stream while hiking. She was stuck in the ice until emergency responders rescued her. On arrival, she has severe pain in her feet. She has no history of serious illness and takes no medications. Temperature is 34.8°C (94.6°F); other vital signs are within normal limits. Examination shows blue discoloration over the toes bilaterally, and the feet are cold to touch. Which of the following is the most appropriate next step in management?

- (A) Place the feet in front of a dry space heater
- (B) Rub the feet with a steaming hot towel
- (C) Submerge the feet in a moderately warm whirlpool
- (D) Wrap the feet in a room-temperature wet-to-dry dressing
- (E) Observation only

**Correct Answer:**

- (C) Submerge the feet in a moderately warm whirlpool

### Neural Consult Response and Explanation:



**Answer: C**

**Explanation:** The patient presents with mild hypothermia (core temperature 34.8°C) and signs of localized cold injury (frostbite), indicated by severe pain, blue discoloration of the toes, and cold extremities after prolonged exposure to ice and water. The standard of care for frostbite is rapid rewarming in a circulating water bath maintained at a constant temperature, typically between 37°C and 39°C (98.6°F–102.2°F). Submerging the feet in a moderately warm whirlpool (Option C) aligns with this management strategy. Other options are inappropriate: (A) Dry heat sources like space heaters are contraindicated because they provide uneven heating and can cause thermal burns, especially if sensation is impaired. (B) Rubbing or massaging the affected area is strictly contraindicated as it can cause mechanical damage to the tissues already compromised by ice crystals. (D) Room-temperature wet-to-dry dressings do not provide the necessary heat for rewarming and may cause further cooling through evaporation. (E) Observation is insufficient, as active rewarming is necessary to salvage tissue in frostbite and to treat the patient's systemic hypothermia.

## Question 18.1

A 52-year-old woman comes to the emergency department because of a 1-day history of bleeding gums and moderate pain in her knees. She first noticed the gum bleeding while brushing her teeth this morning; she has been unable to stop the bleeding. She has systemic lupus erythematosus with inflammatory arthritis and Raynaud disease. Medications are tramadol and hydroxychloroquine. Vital signs are within normal limits. Examination shows bleeding, friable gums. There are multiple ecchymoses and petechiae over the upper extremities. Cardiac and abdominal examinations show no abnormalities. The knees are cool to the touch; there are effusions, and range of motion is limited by pain. Neurologic examination shows no focal findings. Laboratory studies show:

Hemoglobin = 11 g/dL

Hematocrit = 33%

Erythrocyte count =  $4.2 \times 10^{12}/L$  Mean corpuscular volume =  $90 \mu\text{m}^3$  Leukocyte count =  $9000/\text{mm}^3$

Segmented neutrophils = 60%

Bands = 3%

Eosinophils = 2%

Basophils = 1%

Lymphocytes = 30%

Monocytes = 4%

Platelet count =  $20,000/\text{mm}^3$

Serum Creatinine = 0.9 mg/dL

Ferritin = 0 ng/mL

Which of the following is the most appropriate next step in management?

- (A) Factor replacement therapy
- (B) Methotrexate therapy
- (C) Plasmapheresis
- (D) Prednisone therapy



(E) Splenectomy

**Correct Answer:**

(D) Prednisone therapy

**Neural Consult Response and Explanation:**

**Answer:** D

**Explanation:** The patient presents with systemic lupus erythematosus (SLE) and isolated severe thrombocytopenia (platelet count  $20,000/\text{mm}^3$ ) accompanied by mucocutaneous bleeding (gum bleeding, petechiae, and ecchymoses). This clinical picture is highly suggestive of secondary immune thrombocytopenic purpura (ITP), a common hematologic manifestation of SLE. In ITP, autoantibodies (IgG) are directed against platelet surface antigens (like GPIIb/IIIa), leading to their destruction by splenic macrophages. According to standard clinical guidelines, treatment for ITP is indicated when the platelet count is below  $30,000/\text{mm}^3$  or if there is significant active bleeding. First-line therapy for both primary and secondary ITP consists of corticosteroids, such as prednisone. Prednisone works by suppressing the immune response, decreasing the production of anti-platelet antibodies, and reducing the sequestration of platelets by the spleen. (A) Factor replacement is used for coagulation factor deficiencies (e.g., hemophilia), not platelet disorders. (B) Methotrexate is a slow-acting immunosuppressant used for SLE-related arthritis or as a steroid-sparing agent; it is not indicated for the acute management of severe thrombocytopenia. (C) Plasmapheresis is the treatment of choice for thrombotic thrombocytopenic purpura (TTP), which typically presents with microangiopathic hemolytic anemia (schistocytes on smear), fever, renal failure, and neurologic symptoms, none of which are present here. (E) Splenectomy is a second-line treatment for ITP that has failed medical therapy and is not the appropriate next step.

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**Question 19.1**

A 13-year-old boy is brought to the emergency department because of a 3-day history of progressive fatigue, shortness of breath, and difficulty walking up stairs. He had been well until 1 week ago, when he developed rhinorrhea, cough, and a sore throat. These symptoms resolved spontaneously 2 days ago. He has no history of serious illness and takes no medications. On arrival, he is pale and in moderate respiratory distress. Pulse is 120/min, respirations are 25/min, and blood pressure is 80/40 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 91%. On pulmonary examination, crackles are heard throughout the lung fields. On cardiac examination, a gallop is heard.  $S_1$  is soft. A grade 2/6, high-pitched holosystolic murmur is heard best at the apex. The remainder of the examination shows no abnormalities. Which of the following is the most likely diagnosis?

- (A) Glomerulonephritis
- (B) Myocarditis
- (C) Pneumonia
- (D) Rheumatic fever
- (E) Systemic lupus erythematosus



## Correct Answer:

(B) Myocarditis

## Neural Consult Response and Explanation:

**Answer:** B

**Explanation:** The patient's clinical presentation is highly suggestive of acute myocarditis leading to cardiogenic shock. The 13-year-old boy presents with a 3-day history of progressive heart failure symptoms (fatigue, dyspnea, exercise intolerance) following a classic viral prodrome (rhinorrhea, cough, sore throat) one week prior. Physical examination reveals signs of cardiogenic shock and acute decompensated heart failure, including hypotension (80/40 mm Hg), tachycardia (120/min), respiratory distress, and hypoxemia. The presence of crackles throughout the lung fields indicates pulmonary edema. Cardiac findings such as a gallop (likely  $S_3$ , indicating ventricular filling into a dilated, non-compliant chamber), a soft  $S_1$  (suggesting poor contractility), and a holosystolic murmur at the apex (functional mitral regurgitation due to ventricular dilation) further support a diagnosis of myocarditis. While Acute Rheumatic Fever (D) can cause carditis, it typically occurs 2–4 weeks after a streptococcal pharyngitis and is less likely to present as fulminant shock immediately following a viral-like respiratory illness. Glomerulonephritis (A) usually presents with hypertension and hematuria. Pneumonia (C) would not explain the cardiac gallop or profound hypotension. Systemic lupus erythematosus (E) is a multisystem disease and is a much less common cause of acute heart failure in a previously healthy male child.

## Question 20.1

A 10-day-old female newborn is brought to the emergency department because of a 2-day history of bilious vomiting. She was born at term following an uncomplicated pregnancy and spontaneous vaginal delivery. She was 50.8 cm (20 in) in length and weighed 3260 g (7 lb 3 oz) at birth. Examination following delivery showed no abnormalities, and she was discharged at the age of 2 days. She is exclusively breast-fed. She appears ill. Today, she is 50.8 cm (20 in) in length and weighs 3062 g (6 lb 12 oz). Temperature is 38.3°C (100.9°F), pulse is 180/min, and respirations are 52/min. The abdomen is distended; the patient cries on palpation of the abdomen. Which of the following is the most likely diagnosis?

- (A) Duodenal atresia
- (B) Intussusception
- (C) Meconium ileus
- (D) Necrotizing enterocolitis
- (E) Volvulus

## Correct Answer:

(E) Volvulus

## Neural Consult Response and Explanation:



**Answer:** E

**Explanation:** The clinical presentation of a 10-day-old, previously healthy term infant with sudden-onset bilious vomiting, abdominal distension, and systemic signs of illness (fever, tachycardia, and abdominal tenderness) is highly characteristic of midgut volvulus secondary to malrotation. In neonates, bilious vomiting is a surgical emergency and is considered midgut volvulus until proven otherwise. While midgut malrotation itself may be asymptomatic, volvulus occurs when the small bowel twists around the superior mesenteric artery, leading to acute intestinal obstruction and, eventually, vascular compromise. The patient's fever, tachycardia, and crying on palpation (tenderness) are ominous signs suggesting bowel ischemia or necrosis, which are life-threatening complications of volvulus. (A) Duodenal atresia typically presents within the first 24–48 hours of life and would likely have been detected before the infant was discharged at 2 days of age. (B) Intussusception is rare in the neonatal period, typically occurring between 6 and 36 months of age. (C) Meconium ileus usually presents in the first 48 hours with failure to pass meconium and is most commonly associated with cystic fibrosis. (D) Necrotizing enterocolitis (NEC) can present with similar symptoms but primarily affects premature infants; while it can occur in term infants, it is usually associated with specific risk factors like congenital heart disease or perinatal asphyxia, neither of which is present here. Therefore, midgut volvulus is the most likely diagnosis.

## Question 21.1

An 85-year-old man with severe dementia, Alzheimer type, is admitted to the hospital because of a nonhealing ulcer on his right second toe. He lives in a nursing care facility and has been bedridden for the past 3 years. He has type 2 diabetes mellitus, hypertension, and peripheral vascular disease. His medications are metformin, amlodipine, and aspirin. Noninvasive vascular studies of the lower extremities show marked bilateral vascular disease. Subsequent peripheral angiography shows severe stenoses of the right superficial femoral and the left common iliac arteries. The patient undergoes uncomplicated placement of two sequential vascular stents in the superficial femoral artery and placement of an additional stent in the left common iliac artery. The type of stents used was recently approved by the US Food and Drug Administration and has been heavily marketed as a long-lasting solution to restenosis. Each stent costs the hospital \$15,000. Alternatives to this approach include amputation of the toe, balloon angioplasty, and use of less expensive stents. Which of the following best describes the public policy implications of this scenario?

- (A) Absence of resource stewardship
- (B) Ageism
- (C) Health care disparities
- (D) Health care fraud and abuse
- (E) Lack of access to care

**Correct Answer:**

- (A) Absence of resource stewardship

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The scenario describes a clinical situation where a high-cost, high-technology intervention (three stents costing \$15,000 each, totaling \$45,000) is used for a patient with a very limited life expectancy and poor functional status. The patient is 85 years old, has severe Alzheimer's dementia, and has been bedridden for three years. The primary justification for these specific stents is that they are a 'long-lasting solution to restenosis.' However, in a patient with end-stage dementia and significant comorbidities, the 'long-lasting' benefit is unlikely to be realized. Resource stewardship is the ethical principle and public policy goal of using healthcare resources responsibly and efficiently, prioritizing high-value care over high-cost interventions that offer little marginal benefit over cheaper alternatives (such as balloon angioplasty or less expensive stents). Choosing the most expensive option when a patient's prognosis makes the long-term benefit irrelevant is a clear example of an absence of resource stewardship. Ageism (B) is incorrect because the patient was not denied care based on age; rather, he received an excessively expensive treatment. Health care disparities (C) and lack of access (E) are incorrect as the patient clearly had access to high-end medical technology. Health care fraud and abuse (D) is incorrect because, while the treatment may be an inefficient use of funds, there is no evidence of illegal activity or deception.

## Question 22.1

A 62-year-old woman with myasthenia gravis comes to the office because of a 2-week history of falling. She says her legs "give out" once daily; she falls to the ground but does not hit her head. She took pyridostigmine until 2 weeks ago when she decided that it no longer worked. Respirations are 30/min. Examination shows a hypophonic nasal voice and ptosis bilaterally. Muscle strength is 2/5 in all extremities. The patient is told that she is in imminent danger of respiratory compromise and that she should be admitted to the hospital. She says she knows her breathing could pose a problem, but she hates hospitals and does not want to undergo more tests or therapy. She asks if she can have a prescription for her former medication and if she can go home. Which of the following is the most appropriate next step in management?

- (A) Assessment of medical decision-making capacity
- (B) Electromyography and nerve conduction studies
- (C) Involuntary hospital admission
- (D) Oxygen therapy by nasal canula
- (E) Pulmonary function testing

**Correct Answer:**

- (A) Assessment of medical decision-making capacity

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The patient is presenting with signs of a myasthenic crisis, a life-threatening medical emergency characterized by severe muscle weakness (2/5 strength) and impending respiratory failure (tachypnea of 30/min, hypophonic voice). When a patient refuses life-saving treatment, the physician's first responsibility is to determine if the patient has the medical decision-making capacity to make that choice. Medical decision-making capacity requires that the patient can communicate a clear choice, understand the clinical situation and its risks, appreciate the consequences of their decision (including the risk of death), and provide a rational reason for their choice. In this case, the patient's refusal of admission despite the risk of respiratory arrest necessitates a formal capacity assessment. If she is found to have capacity, her autonomy must be respected, even if the decision leads to her death. If she lacks capacity—potentially due to the physiological stress of her condition or underlying cognitive issues—the physician may proceed with life-saving treatment under the principle of implied consent or through emergency protocols. Involuntary admission (C) is premature without first assessing capacity. Diagnostic tests (B, E) and supportive care (D) are secondary to resolving the ethical and legal conflict regarding her refusal of care.

### Question 23.1

A 55-year-old man is brought to the emergency department by paramedics 45 minutes after his daughter found him unresponsive in his apartment. Paramedics initiated intravenous fluid warming and resuscitation at the scene. The patient has major depressive disorder, hypertension, and alcoholism. His medications are chlorthalidone, fluoxetine, and lisinopril. On arrival, he is arousable but confused. Temperature is 34.0°C (93.2°F), pulse is 64/min, respirations are 14/min, and blood pressure is 94/62 mm Hg. Physical examination shows no sign of trauma or prolonged immobilization. On mental status examination, he is oriented to person but not to place or time. His speech is verbose and nonsensical. Serum glucose concentration is 44 mg/dL, and blood alcohol concentration is 312 mg/dL. Urine toxicology screening is positive for alcohol and benzodiazepines. The most appropriate next step in management is administration of which of the following?

- (A) 50% Dextrose
- (B) Flumazenil
- (C) Lorazepam
- (D) Naloxone
- (E) Vitamin B<sub>1</sub> (thiamine)

**Correct Answer:**

- (E) Vitamin B<sub>1</sub> (thiamine)

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient's clinical presentation—chronic alcoholism, altered mental status (confusion, nonsensical speech), and hypoglycemia (44 mg/dL)—strongly suggests a high risk for Wernicke Encephalopathy (WE). WE is an acute, life-threatening, but reversible neurological emergency caused by thiamine (Vitamin B<sub>1</sub>) deficiency. The classic triad of WE includes encephalopathy, oculomotor dysfunction, and ataxia, though many patients present only with confusion. A critical principle in managing such patients is that thiamine must be administered before or concurrently with intravenous glucose. Glucose metabolism is a thiamine-dependent process (thiamine is a cofactor for enzymes like pyruvate dehydrogenase and alpha-ketoglutarate dehydrogenase). Administering a glucose load (Option A) to a thiamine-deficient patient can rapidly deplete the remaining thiamine stores, potentially precipitating or worsening Wernicke Encephalopathy or leading to irreversible Korsakoff syndrome. While the patient's hypoglycemia (44 mg/dL) requires correction, the 'most appropriate next step' in the context of chronic alcoholism is to provide thiamine first to ensure safe glucose utilization. Option B (Flumazenil) is contraindicated because the patient is a chronic benzodiazepine user (chlordiazepoxide) and an alcoholic; flumazenil can precipitate life-threatening seizures in these populations. Option C (Lorazepam) is used for alcohol withdrawal, but this patient is currently intoxicated (BAC 312 mg/dL), not in withdrawal. Option D (Naloxone) is used for opioid overdose, for which there is no clinical or toxicological evidence in this case.

## Question 24.1

A 16-year-old boy is brought to the emergency department because of a 6-hour history of severe right-sided scrotal pain. He has not had penile discharge, fever, abdominal pain, vomiting, or diarrhea. He has no history of similar pain or any trauma to the region. He is sexually active with one female partner and uses condoms inconsistently. Vital signs are within normal limits. Abdominal examination shows no abnormalities. Genitourinary examination shows moderate edema and diffuse tenderness to palpation of the right scrotum; there is mild erythema. Lifting the right testicle does not relieve the pain. The left testicle is lower than the right testicle. Cremasteric reflex is present on the left and absent on the right. Which of the following is the most likely diagnosis?

- (A) Epididymitis
- (B) Testicular torsion
- (C) Testicular tumor
- (D) Torsion of the appendix testis
- (E) Urinary tract infection
- (F) Varicocele

**Correct Answer:**

- (B) Testicular torsion

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The clinical presentation of this 16-year-old boy is highly characteristic of testicular torsion, a surgical emergency. The key diagnostic features provided in the case include: 1) Acute onset of severe pain (6-hour history); 2) High-riding testis (the right testicle is higher than the left), which occurs because the twisting of the spermatic cord shortens its length; 3) Negative Prehn's sign (lifting the testicle does not relieve the pain), which helps differentiate torsion from epididymitis (where elevation often relieves pain); and 4) Absent cremasteric reflex on the affected side. The absence of the cremasteric reflex is one of the most sensitive physical exam findings for testicular torsion. While the patient is sexually active, making epididymitis (Option A) a consideration, the physical exam findings (especially the absent cremasteric reflex and high-riding testis) and the sudden severity of the pain strongly point toward torsion. Torsion of the appendix testis (Option D) typically presents with more localized tenderness at the upper pole of the testis and often preserves the cremasteric reflex. Testicular tumors (Option C) usually present as painless masses, and varicoceles (Option F) typically present as a 'bag of worms' with a dull ache rather than acute, severe pain.

## Question 27.1

A 64-year-old man comes to the clinic because of a 2-week history of severe pain and generalized muscle weakness. He has hypercholesterolemia and hypertension. Three months ago, he had a myocardial infarction. At that time, he began atorvastatin therapy. Other medications are clopidogrel, lisinopril, and amiodarone. He is 178 cm (5 ft 10 in) tall and weighs 82 kg (180 lb); BMI is 26 kg/m<sup>2</sup>

Pulse is 80/min and blood pressure is 125/67 mm Hg. Muscle strength is 4/5 on abduction of the shoulders and flexion of the hips. Deep tendon reflexes are 2+ throughout. No other abnormalities are noted. Measurement of which of the following is the most appropriate initial step in diagnosis?

- (A) Erythrocyte sedimentation rate
- (B) Serum ALT activity
- (C) Serum calcium concentration
- (D) Serum C-reactive protein concentration
- (E) Serum creatine kinase activity

**Correct Answer:**

- (E) Serum creatine kinase activity

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient's clinical presentation of proximal muscle weakness (4/5 strength in shoulder abduction and hip flexion) and severe pain, occurring three months after starting atorvastatin, is highly suggestive of statin-associated muscle symptoms (SAMS). This risk is significantly increased in this patient due to a drug-drug interaction: he is also taking amiodarone, a known inhibitor of the cytochrome P<sub>450</sub> 3A<sub>4</sub> (CYP<sub>3</sub>A<sub>4</sub>) enzyme. Since atorvastatin is metabolized by CYP<sub>3</sub>A<sub>4</sub>, the addition of amiodarone leads to increased serum concentrations of the statin, elevating the risk of myopathy and rhabdomyolysis. The most appropriate initial diagnostic step to evaluate for muscle injury (myopathy) is measuring the serum creatine kinase (CK) activity. CK is the most sensitive and specific marker for muscle damage. While serum ALT (Option B) can be elevated in muscle injury, it is less specific than CK. ESR (Option A) and CRP (Option D) are non-specific markers of inflammation and are not used to diagnose statin-induced myopathy. Serum calcium (Option C) may be affected in severe rhabdomyolysis but is not a primary diagnostic tool for the condition itself.

## Question 28.1

A 23-year-old man who is on active duty in the US Army comes to the clinic 1 hour after sustaining a bee sting to his right cheek. The patient reports continued pain at the site of the sting, but he has not had shortness of breath, throat tightness, loss of vision, or other neurologic symptoms. Medical history is unremarkable. He takes no medications. The patient has no known allergies. He is 178 cm (5 ft 10 in) tall and weighs 64 kg (140 lb); BMI is 20 kg/m<sup>2</sup>. Temperature is 37.0°C (98.6°F), pulse is 86/min, respirations are 10/min, and blood pressure is 120/70 mm Hg. Examination of the right cheek shows an erythematous, swollen area of induration surrounding a central clear area with the stinger in situ. The swelling encroaches on the lower aspect of the patient's right orbit, which appears puffy and mildly dusky. After the stinger is removed, which of the following is the most appropriate next step in management?

- (A) Administer an injection of epinephrine
- (B) Admit the patient to the hospital for intravenous vancomycin therapy
- (C) Cleanse the site and apply ice
- (D) Obtain an ophthalmologist consultation
- (E) Prescribe oral clindamycin

**Correct Answer:**

- (C) Cleanse the site and apply ice

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient presents with a localized reaction to a bee sting on the cheek. After the removal of the stinger, management should focus on local wound care and symptomatic relief. The patient is hemodynamically stable and denies systemic symptoms such as shortness of breath, throat tightness, or lightheadedness, which rules out anaphylaxis and the need for epinephrine (Choice A). The reaction occurred only one hour ago, which is too rapid for the development of an infection like cellulitis; therefore, antibiotics (Choices B and E) are not indicated. Large local reactions are inflammatory rather than infectious and are often misdiagnosed as cellulitis. While the swelling is near the eye (periorbital edema), the patient explicitly denies vision loss or neurologic symptoms, and the swelling is a common consequence of the loose connective tissue in the facial region reacting to the venom; thus, an ophthalmology consultation (Choice D) is not the next best step. The most appropriate immediate management for a local reaction is to cleanse the site to prevent secondary infection and apply ice to reduce pain and swelling through vasoconstriction.

## Question 29.1

A 32-year-old man is brought to the emergency department after being found by his wife in their bedroom with a gun in his hands. His wife reports that the patient “has not been himself” since their son was stillborn 6 months ago. She says that during the past month, he hardly has slept and has not showered or shaved; he sits in the dark and refuses to eat. He began fluoxetine therapy 3 months ago, but his symptoms have continued to worsen. He appears disheveled. He is 175 cm (5 ft 9 in) tall and weighs 52 kg (115 lb); BMI is 17 kg/m<sup>2</sup>. His pulse is 90/min, and blood pressure is 100/60 mm Hg. Physical examination shows decreased skin turgor and dry mucous membranes. When asked about his mood, he says, “I don’t know.” He has a tearful affect. He responds to most questions with one-word answers in a soft voice. He says he hears a voice telling him that he is a failure and says he wants to join his son in heaven. He refuses to answer questions about suicide. After removing all firearms from the patient’s house and admitting him to a psychiatric facility, which of the following is the most appropriate next step in management?

- (A) Electroconvulsive therapy
- (B) Imipramine therapy
- (C) Mirtazapine therapy
- (D) Sertraline therapy
- (E) Transcranial magnetic stimulation

**Correct Answer:**

- (A) Electroconvulsive therapy

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The patient presents with a severe episode of Major Depressive Disorder (MDD) with psychotic features, as evidenced by his mood-congruent auditory hallucinations (a voice telling him he is a failure), profound psychomotor retardation, and significant weight loss. His clinical status is critical due to severe nutritional compromise (BMI 17, dehydration, refusal to eat) and high acute suicide risk (found with a firearm, expressing a desire to 'join his son,' and refusing to answer safety questions). While the first-line pharmacological treatment for psychotic depression is a combination of an antidepressant and an antipsychotic, Electroconvulsive Therapy (ECT) is the most appropriate next step in this specific case. ECT is indicated as a first-line treatment for MDD when there is a need for a rapid clinical response, such as in cases of severe suicidality, refusal to eat or drink leading to nutritional compromise, or when psychotic features are present. The patient has also already failed a 3-month trial of fluoxetine monotherapy. Options B, C, and D are antidepressant monotherapies, which are generally ineffective for psychotic depression. Option E (TMS) is not indicated for the acute management of severe, psychotic, or suicidal depression.

### Question 30.1

A 60-year-old woman comes to the office as a new patient. She recently moved to the area. She feels well. She has hypertension treated with amlodipine and asthma well controlled with inhaled fluticasone and inhaled albuterol as needed. According to the medical records she brought with her, a mammography 6 months ago showed no abnormalities, results of laboratory studies 1 year ago were within the reference ranges, and colonoscopy 5 years ago showed no abnormalities. Her past three Pap smears have shown no abnormalities; the most recent Pap smear was 1 year ago. Her mother has type 2 diabetes mellitus, and her maternal aunt had breast cancer at the age of 55 years. The patient does not smoke cigarettes. She drinks two glasses of wine weekly. She works as a nurse. She has been monogamous with her husband for 30 years. Pulse is 76/min, respirations are 16/min, and blood pressure is 132/86 mm Hg. Examination shows no abnormalities. Screening for which of the following is the most appropriate next step in management?

- (A) Abdominal aortic aneurysm
- (B) Breast cancer
- (C) Chlamydia trachomatis infection
- (D) Colon cancer
- (E) Hepatitis C

**Correct Answer:**

(E) Hepatitis C

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient is a 60-year-old woman who is up to date on most of her age-appropriate screenings based on current USPSTF guidelines. Her mammography was 6 months ago (recommended every 2 years for women 50-74), her colonoscopy was 5 years ago (recommended every 10 years for adults 45-75), and her Pap smear was 1 year ago (recommended every 3-5 years for women 30-65). Screening for abdominal aortic aneurysm (A) is recommended only for men aged 65-75 who have ever smoked. Screening for Chlamydia (C) is recommended for sexually active women under 25 or older women at increased risk, which does not apply to this patient who has been monogamous for 30 years. However, the USPSTF currently recommends a one-time universal screening for Hepatitis C (HCV) infection in all adults aged 18 to 79 years (Grade B recommendation). Since her medical records do not indicate she has ever been screened for HCV, this is the most appropriate next step in her management.

### Question 31.1

A 12-year-old girl is brought to the physician for a follow-up examination 8 days after starting a course of oral penicillin for streptococcal pharyngitis. Temperature is 38.6°C (101.5°F). Examination shows an erythematous morbilliform rash, urticaria, mild swelling of the hands and feet, arthralgias, and lymphadenopathy. Leukocyte count is 13,000/mm<sup>3</sup> (62% segmented neutrophils, 10% eosinophils, and 28% lymphocytes). Urinalysis shows 2+ protein. Which of the following is most appropriate to prevent recurrence of these symptoms if the patient is diagnosed with streptococcal pharyngitis again?

- (A) Pretreatment with an antihistamine
- (B) Pretreatment with a corticosteroid
- (C) Skin testing with benzylpenicilloyl polylysine prior to treatment
- (D) Use of a nonpenicillin antibiotic to treat the pharyngitis
- (E) Use of a single injection of benzathine penicillin to treat the pharyngitis

**Correct Answer:**

- (D) Use of a nonpenicillin antibiotic to treat the pharyngitis

**Neural Consult Response and Explanation:**



**Answer:** D

**Explanation:** The patient's clinical presentation—fever, morbilliform/urticarial rash, arthralgias, lymphadenopathy, and proteinuria occurring 8 days after starting penicillin—is classic for a serum sickness-like reaction (SSLR). SSLR is a Type III hypersensitivity reaction characterized by the formation of immune complexes that deposit in small blood vessels, leading to complement activation and systemic inflammation. It typically occurs 7 to 14 days after exposure to a drug, most commonly beta-lactams (like penicillin or cefaclor) or sulfonamides. The presence of eosinophilia and proteinuria further supports this diagnosis. To prevent a recurrence, the most appropriate strategy is the strict avoidance of the offending agent. Therefore, if the patient develops streptococcal pharyngitis again, a nonpenicillin antibiotic (such as a macrolide) should be used. Option (C) is incorrect because penicillin skin testing (benzylpenicilloyl polylysine) is used to evaluate Type I (IgE-mediated) hypersensitivity reactions (e.g., anaphylaxis), not Type III reactions. Options (A) and (B) are used for symptomatic management of an active reaction but do not prevent the underlying immune complex formation upon re-exposure. Option (E) is incorrect because benzathine penicillin still contains the offending penicillin antigen and would likely trigger a more rapid and severe recurrence.

## Question 32.1

A 45-year-old woman is hospitalized for management of *Staphylococcus aureus* endocarditis with persistent bacteremia. The patient is discussed during interdisciplinary rounds, which includes physicians, nurses, pharmacists, and social workers. During rounds, a pharmacy student notices that the patient missed two doses of her scheduled antibiotic last week but is unsure why. The physician and nurse are unaware of these missed doses, and the student does not mention her observation. Which of the following measures is most likely to improve communication within this interdisciplinary health care team?

- (A) Conduct interdisciplinary rounds in a quieter location
- (B) Encourage questions from all team members
- (C) Implement a checklist for standardizing patient rounds
- (D) Use computers during rounds to review medications

**Correct Answer:**

- (B) Encourage questions from all team members

**Neural Consult Response and Explanation:**



**Answer:** B

**Explanation:** The scenario described is a classic example of a communication breakdown within a healthcare team due to hierarchical barriers and a lack of psychological safety. The pharmacy student identified a critical piece of information (missed antibiotic doses in a patient with persistent bacteremia) but failed to share it because she was 'unsure why' they were missed and likely felt intimidated by the team structure. In interdisciplinary teams, junior members or those from different disciplines often hesitate to speak up due to perceived power imbalances. Encouraging questions and input from all team members, regardless of their rank or role, is the most effective way to 'flatten the hierarchy.' This creates an environment where every member feels their observations are valued and necessary for patient safety. While a quieter location (A) might reduce distractions, it does not address the psychological barrier to speaking up. A checklist (C) can standardize the flow of rounds but does not inherently empower a hesitant student to voice an observation. Using computers (D) might allow others to see the data, but it is a technical solution rather than a measure to improve the team's communication dynamics and collaborative culture.

### Question 34.1

A 37-year-old man comes to the physician for a routine health maintenance examination. He has no history of serious illness and takes no medications. He does not smoke cigarettes, and he exercises four times weekly. His mother died of colon cancer at the age of 76 years. He is 183 cm (6 ft 0 in) tall and weighs 100 kg (220 lb); BMI is 30 kg/m<sup>2</sup>. Pulse is 68/min and blood pressure is 138/74 mm Hg. The remainder of the examination shows no abnormalities. Which of the following is the most appropriate next step?

- (A) Test of the stool for occult blood
- (B) Complete blood count
- (C) Measurement of serum thyroid-stimulating hormone concentration
- (D) Serum lipid studies
- (E) No further evaluation is necessary

**Correct Answer:**

- (D) Serum lipid studies

**Neural Consult Response and Explanation:**



**Answer:** D

**Explanation:** The most appropriate next step for this 37-year-old man is serum lipid studies. According to the U.S. Preventive Services Task Force (USPSTF) guidelines, screening for lipid disorders is strongly recommended (Grade A) for all men aged 35 and older. Furthermore, this patient has additional cardiovascular risk factors, including obesity (BMI of 30 kg/m<sup>2</sup>) and elevated blood pressure (138/74 mm Hg), which further support the need for a lipid profile to assess his overall cardiovascular risk. Option (A) is incorrect because routine colorectal cancer screening generally begins at age 45. While he has a first-degree relative with colon cancer, her diagnosis at age 76 does not necessitate screening before age 40 (or 45 according to some updated guidelines); at 37, he is still too young. Options (B) and (C) are incorrect as complete blood counts and TSH levels are not recommended for routine, asymptomatic screening in this age group without specific clinical indications. Option (E) is incorrect because the patient meets the age criteria for lipid screening and requires counseling/intervention for his obesity.

### Question 35.1

A 35-year-old woman is evaluated for a persistent fever 4 days after admission to the hospital for treatment of pyelonephritis. She has type 2 diabetes mellitus poorly controlled with insulin. She has received ciprofloxacin since admission. Results of initial blood cultures are pending. Temperature is 40.0°C (104.0°F), pulse is 110/min, respirations are 20/min, and blood pressure is 100/60 mm Hg. Examination shows marked right costovertebral angle tenderness. Which of the following is the most appropriate next step in management?

- (A) Addition of clindamycin to the medication regimen
- (B) Addition of vancomycin to the medication regimen
- (C) CT scan of the abdomen
- (D) Doppler ultrasonography of the lower extremities
- (E) Repeat blood cultures and fungal cultures

**Correct Answer:**

(C) CT scan of the abdomen

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient is a 35-year-old woman with poorly controlled type 2 diabetes mellitus who has failed to improve after 4 days (96 hours) of appropriate antibiotic therapy (ciprofloxacin) for pyelonephritis. Standard clinical guidelines dictate that if a patient with pyelonephritis does not show clinical improvement within 48 to 72 hours of starting antibiotics, imaging of the renal system is mandatory to evaluate for complications. Given her poorly controlled diabetes, she is at particularly high risk for serious complications such as a renal or perinephric abscess, emphysematous pyelonephritis, or an obstructing calculus. Contrast-enhanced CT scan of the abdomen and pelvis is the gold standard and most appropriate next step because it provides superior visualization of the renal parenchyma, the collecting system, and the perinephric space, allowing for the identification of abscesses or gas-forming infections that may require surgical or percutaneous drainage. Adding clindamycin (A) or vancomycin (B) is not indicated as the initial next step, as the primary concern is a structural complication rather than a failure of the antibiotic spectrum. Doppler ultrasonography (D) is used for deep vein thrombosis and is not relevant to her presentation. While repeating cultures (E) may be done, it does not address the immediate need to rule out an anatomical or structural cause for her persistent high fever and systemic symptoms.

## Question 36.1

A 23-year-old man is being evaluated in the intensive care unit because of steadily decreasing blood pressure since he was admitted 2 hours ago for treatment of septic shock caused by pneumonia. Medical history is remarkable for cystic fibrosis and severe obstructive lung disease. In the emergency department, the patient was intubated, had three peripheral intravenous catheters placed, and was treated empirically with broad-spectrum antibiotics, bronchodilators, a continuous infusion of propofol and fentanyl, and 4 L of 0.9% saline. Immediately after administration of fluids, the patient's pulse was 105/min and blood pressure was 100/50 mm Hg. The patient is 173 cm (5 ft 8 in) tall and weighs 59 kg (130 lb); BMI is 20 kg/m<sup>2</sup>. Pulse is 135/min and blood pressure is 79/43 mm Hg. Auscultation of the lungs discloses diffuse rhonchi and inspiratory crackles with low-pitched bilateral expiratory wheezes. Cardiac examination discloses no murmurs, rubs, or gallops. Bedside ultrasonography of the abdomen shows the inferior vena cava is 1.8 cm in diameter with minimum respirophasic collapsibility, and cardiac ultrasonography shows that the left ventricular ejection fraction is approximately 0.65. Results of laboratory studies obtained on admission and now are shown:

On Admission, the White Blood Cell count is 21,000/mm<sup>3</sup> and Blood Lactic acid is 5.2 mg/dL. Now the patient's White Blood Cell count is 19,000/mm<sup>3</sup> and Blood Lactic acid is 4.0 mg/dL

Which of the following is the most appropriate next step in management?

- (A) Administer an additional 1-L bolus of 0.9% saline
- (B) Administer intravenous hydrocortisone
- (C) Administer intravenous voriconazole
- (D) Begin a continuous infusion of norepinephrine
- (E) Order CT scan of the head



### Correct Answer:

(D) Begin a continuous infusion of norepinephrine

### Neural Consult Response and Explanation:

**Answer:** D

**Explanation:** The patient is in septic shock, defined as persistent hypotension requiring vasopressors to maintain a mean arterial pressure (MAP)  $\geq 65$  mmHg and having a serum lactate level  $>2$  mmol/L despite adequate volume resuscitation. This patient has received 4 L of 0.9% saline (approximately 67 mL/kg, exceeding the standard 30 mL/kg recommendation) and remains hypotensive with a MAP of 55 mmHg (calculated as  $[79 + 2(43)] / 3$ ). Bedside ultrasonography shows an inferior vena cava (IVC) diameter of 1.8 cm with minimum respirophasic collapsibility, which indicates that the patient is unlikely to be fluid-responsive and that further fluid administration (Option A) may lead to volume overload and worsen respiratory status, especially given his history of cystic fibrosis and pneumonia. According to the Surviving Sepsis Campaign guidelines, norepinephrine is the first-line vasopressor of choice to restore perfusion pressure when fluid resuscitation is insufficient. Intravenous hydrocortisone (Option B) is reserved for patients with septic shock who remain hemodynamically unstable despite adequate fluid resuscitation and vasopressor therapy. While patients with cystic fibrosis are at risk for fungal infections, there is no immediate indication for voriconazole (Option C) over stabilizing the patient's hemodynamics. A CT scan of the head (Option E) is not indicated as the patient's clinical deterioration is clearly explained by worsening septic shock.

### Question 37.1

A 32-year-old nulligravid woman comes to the office for counseling prior to conception. Menses occur at irregular 40- and 60-day intervals. She has impaired glucose tolerance controlled by diet. She takes no medications. She is 165 cm (5 ft 5 cm) tall and weighs 84 kg (185 lb); BMI is  $31 \text{ kg/m}^2$ . Vital signs are within normal limits. Examination shows no abnormalities. Her fasting serum glucose concentration is 120 mg/dL. This patient is at greatest risk for developing which of the following?

- (A) Gestational diabetes
- (B) Hypothyroidism
- (C) Intrauterine growth restriction
- (D) Placenta previa
- (E) Preterm labor

### Correct Answer:

(A) Gestational diabetes

### Neural Consult Response and Explanation:



**Answer:** A

**Explanation:** The patient presents with several significant risk factors for the development of gestational diabetes mellitus (GDM). First, her irregular menstrual cycles (40- to 60-day intervals) and obesity (BMI 31 kg/m<sup>2</sup>) are highly suggestive of Polycystic Ovary Syndrome (PCOS). PCOS is characterized by insulin resistance and is a known independent risk factor for GDM. Second, the patient already has impaired glucose tolerance, and her fasting serum glucose of 120 mg/dL is at the high end of the pre-diabetic range (100–125 mg/dL). During pregnancy, placental hormones (such as human placental lactogen, growth hormone, and cortisol) naturally increase maternal insulin resistance to ensure adequate glucose supply to the fetus. In a patient who already has significant insulin resistance and pre-diabetes, this physiological shift is highly likely to result in GDM. Regarding the other options: (B) Hypothyroidism is not specifically suggested by her clinical presentation. (C) Intrauterine growth restriction is less likely; GDM is more commonly associated with fetal macrosomia (large for gestational age) due to fetal hyperinsulinemia in response to maternal hyperglycemia. (D) Placenta previa is associated with prior uterine surgery or multiparity, not metabolic syndrome. (E) While PCOS and obesity can slightly increase the risk of preterm labor, the metabolic progression to GDM is the most direct and significant risk given her current fasting glucose and impaired glucose tolerance.

### Question 38.1

A 17-year-old girl is brought to the physician by her parents because they are concerned she is using illicit drugs. They report that, “she just isn’t herself anymore.” She has no history of serious illness and takes no medications. She is upset about being “tricked” to come to the doctor. Physical examination shows no abnormalities. On mental status examination, she has an angry mood and anxious affect. The patient’s parents privately request a toxicology screening for their daughter but ask that she be told that her blood will be taken to “check her thyroid gland.” After discussing the parents’ wish for secrecy, which of the following is the most appropriate next step in management?

- (A) Comply with the parents’ wishes
- (B) Inform the parents that everything the patient tells the physician is confidential
- (C) Inform the parents that if the patient’s toxicology screening is positive, it must be reported to the police
- (D) Inform the parents that the physician cannot deceive the patient

**Correct Answer:**

- (D) Inform the parents that the physician cannot deceive the patient

**Neural Consult Response and Explanation:**



**Answer:** D

**Explanation:** The primary ethical issue in this scenario is the request for the physician to deceive a 17-year-old patient. In adolescent medicine, while parents often have legal decision-making authority, the physician has a duty to foster a therapeutic relationship based on trust and honesty. Deceiving the patient about the purpose of a medical procedure (a blood draw for toxicology) violates the principle of veracity and undermines the patient's developing autonomy. At 17, the patient is near the age of majority and should be involved in her own healthcare decisions. Lying to her would likely destroy any potential for a therapeutic alliance, especially since she already feels 'tricked' by her parents. Option (A) is incorrect because it involves active deception. Option (B) is incorrect because confidentiality in minors is not absolute (e.g., safety concerns) and it does not address the immediate problem of the requested lie. Option (C) is incorrect because positive toxicology results for illicit drugs do not typically require reporting to the police; they are treated as medical and behavioral health issues. Therefore, the most appropriate next step is to explain to the parents that the physician must remain truthful with the patient.

### Question 39.1

A 52-year-old woman with type 2 diabetes mellitus comes to the office for a follow-up examination. Two weeks ago, she was treated with amoxicillin for a urinary tract infection. At that time, her blood pressure was 165/98 mm Hg, and serum creatinine concentration was 1.2 mg/dL; lisinopril therapy was also begun. During the past week, she has had increased swelling of the lower extremities and shortness of breath. Her dysuria has resolved. She appears anxious. Temperature is 36.8°C (98.2°F), pulse is 110/min, respirations are 20/min, and blood pressure is 185/105 mm Hg. Diffuse bilateral crackles are heard on pulmonary examination. An S<sub>3</sub> gallop is heard. There is 3+ pitting bilateral pretibial edema.

The laboratory studies showed that the levels for Serum Urea nitrogen is 45 mg/dL and Serum Creatinine is 4 mg/dL. As for the urine, its specific gravity is 1.010, no blood, and has moderate numbers of Hyaline casts.

Which of the following is the most likely diagnosis?

- (A) Acute glomerulonephritis
- (B) Acute interstitial nephritis
- (C) Acute kidney injury
- (D) Acute obstructive uropathy
- (E) Intravascular volume depletion

**Correct Answer:**

(C) Acute kidney injury

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient's clinical presentation and laboratory findings are most consistent with Acute Kidney Injury (AKI). AKI is defined by a rapid increase in serum creatinine, a decrease in glomerular filtration rate (GFR), and the inability of the kidneys to maintain fluid and electrolyte homeostasis. This patient's serum creatinine rose from a baseline of 1.2 mg/dL to 4.0 mg/dL within two weeks, meeting the KDIGO criteria for Stage 3 AKI (a 3-fold increase or creatinine  $\geq$  4.0 mg/dL). The clinical signs of pulmonary crackles, an S<sub>3</sub> gallop, and 3+ pitting edema indicate severe fluid overload, which is a common and life-threatening complication of AKI. The initiation of lisinopril (an ACE inhibitor) two weeks ago likely precipitated this sudden decline in renal function, a phenomenon often seen in patients with bilateral renal artery stenosis or volume-depleted states, as ACE inhibitors reduce efferent arteriolar resistance and lower intraglomerular pressure. (A) Acute glomerulonephritis is unlikely because the urinalysis shows no blood or red blood cell casts. (B) Acute interstitial nephritis, though possible following amoxicillin use, typically presents with white blood cells or white blood cell casts in the urine, and often systemic signs like fever or rash, which are absent here. (D) Acute obstructive uropathy is less likely as there are no symptoms of obstruction (e.g., flank pain, history of stones) and the urine specific gravity is isosthenuric (1.010). (E) Intravascular volume depletion is incorrect because the physical examination reveals clear signs of volume overload (edema, crackles, S<sub>3</sub> gallop).

## Question 40.1

A 15-year-old girl is brought to the emergency department by her father because of a 2-hour history of right leg pain that began after she fell from her bicycle. Medical history is remarkable for bilateral hearing loss, a fracture of the humerus at age 8 years, and multiple rib fractures. She takes no medications. Family history is remarkable for kyphoscoliosis, hearing loss, and early onset osteoporosis in her mother; the mother died from complications related to a hip fracture at age 44 years. The patient is a refugee who has recently immigrated. The patient appears to be in distress. She is below the 5th percentile for height, at the 70th percentile for weight, and above the 95th percentile for BMI. Her temperature is 37.0°C (98.6°F), pulse is 118/min, respirations are 12/min, and blood pressure is 130/68 mm Hg. Examination shows kyphosis and hypermobile joints of the hands, wrists, and feet. Examination of the right lower extremity shows superficial abrasions and ecchymoses; there is tenderness to palpation and movement of the extremity. Which of the following is the most likely underlying diagnosis?

- (A) Idiopathic juvenile osteoporosis
- (B) Juvenile Paget disease
- (C) Osteogenesis imperfecta
- (D) Osteomalacia
- (E) Rickets

**Correct Answer:**

- (C) Osteogenesis imperfecta

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient's clinical presentation is highly characteristic of Osteogenesis Imperfecta (OI). OI is a group of genetic disorders, most commonly inherited in an autosomal dominant fashion, that result from defects in Type I collagen synthesis. This leads to a classic constellation of symptoms: bone fragility (manifested here as a history of humerus and rib fractures, and a current suspected leg fracture), short stature (below the 5th percentile), and extraskeletal manifestations. Key extraskeletal findings in this patient include bilateral hearing loss (caused by ossicular dislocation, fixation, or fracture) and joint hypermobility (due to ligamentous laxity). The strong family history—specifically the mother's early-onset osteoporosis, hearing loss, kyphoscoliosis, and death from hip fracture complications at age 44—strongly supports a heritable connective tissue disorder. While nutritional deficiencies like Rickets (E) or Osteomalacia (D) can cause bone pain and deformities, they do not typically present with hearing loss, joint hypermobility, or this specific pattern of autosomal dominant inheritance. Idiopathic juvenile osteoporosis (A) is a diagnosis of exclusion that lacks the extraskeletal features and family history seen here. Juvenile Paget disease (B) is extremely rare and involves rapid bone remodeling and expansion, which does not match the clinical picture of recurrent fractures and joint laxity as well as OI does.

## Question 41.1

A 22-year-old primigravid woman at 10 weeks' gestation comes to the emergency department (ED) because of a 3-day history of persistent vomiting. She is treated with intravenous hydration, pyridoxine, and doxylamine. As the resident physician prepares the patient for discharge, he asks who will be picking her up from the ED. She says her husband will be arriving soon and asks if the hospital staff can refer to her symptoms as a "stomach flu." She does not want anyone to mention to her husband that she is pregnant because the pregnancy resulted from an oral contraceptive failure and "he is not expecting this." Which of the following is the most appropriate next question to ask this patient?

- (A) "Are finances tight at home?"
- (B) "How do you think he will react?"
- (C) "Is there somebody else who can pick you up?"
- (D) "Was there a problem with your birth control?"
- (E) "Will he try to force you to do something you aren't comfortable with?"

**Correct Answer:**

- (B) "How do you think he will react?"

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The patient's request to conceal her pregnancy from her husband because 'he is not expecting this' is a significant clinical 'red flag' that suggests potential relationship distress or a risk of intimate partner violence (IPV). In such scenarios, the physician's primary goal is to maintain patient confidentiality while assessing the patient's safety and the nature of her concerns. The most appropriate next step in patient-centered communication is to use an open-ended question that allows the patient to elaborate on her perspective and feelings. Option (B), 'How do you think he will react?', is the best choice because it directly addresses the patient's stated concern in a non-judgmental, open-ended manner. This approach helps the physician understand the patient's psychosocial context and assess whether her fear is related to emotional stress, financial concerns, or physical safety. If the patient's response indicates a fear of harm, the physician can then proceed to more specific screening for IPV. Option (A) makes an assumption about the cause of her concern (finances). Option (C) offers a solution before the problem is fully understood. Option (D) focuses on the medical history of contraceptive failure, which is irrelevant to the immediate psychosocial issue. Option (E) is a direct screening question for coercion; while safety is a priority, starting with a broader open-ended question like (B) is more effective for building rapport and allowing the patient to share her story before moving to specific safety assessments.

## Question 42.1

Five days after admission to the hospital for management of an ST-elevation myocardial infarction, a 59-year-old man has the sudden onset of severe abdominal and bilateral lower extremity pain, cyanosis of the lower body, and paresthesias. On hospital days 1 and 2, he received vasopressor and inotropic therapy. On hospital day 2, echocardiography showed extensive anterolateral akinesis of the left ventricle. He has no history of serious illness. His medications are metoprolol, lisinopril, simvastatin, and dalteparin. He appears to be in acute distress. Pulse is 105/min and regular, respirations are 24/min, and blood pressure is 80/60 mm Hg. Examination shows lower body cyanosis to the level of the costal margins. Crackles are heard over the lower lung fields bilaterally. Distant heart sounds but no murmurs are heard. The abdomen is nondistended and nontender. Pulses are 1+ in the upper extremities and absent in the lower extremities. Muscle strength is 3/5 in the lower extremities. Sensation to touch and temperature is decreased over the lower extremities. ECG shows sinus tachycardia. Which of the following is the most likely explanation for this patient's clinical findings?

- (A) Aortic dissection
- (B) Aortic embolism
- (C) Pericardial tamponade
- (D) Right ventricular failure
- (E) Ventricular rupture

**Correct Answer:**

- (B) Aortic embolism

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The patient's clinical presentation is most consistent with an aortic embolism (specifically a saddle embolus at the aortic bifurcation) originating from a left ventricular (LV) thrombus. This is a well-recognized complication occurring typically 3 to 14 days after a large myocardial infarction (MI). The patient had an extensive anterolateral STEMI with echocardiographic evidence of anterolateral akinesis on day 2; akinetic endocardium promotes blood stasis and thrombus formation. The sudden onset of the '6 Ps' of acute limb ischemia—pain, pallor (cyanosis), pulselessness, paresthesia, and paralysis (3/5 strength)—occurring bilaterally in the lower extremities, combined with absent lower extremity pulses and abdominal pain, strongly points to a large embolus lodging at the aortic bifurcation. While the patient is hypotensive (BP 80/60) and has crackles, this reflects his underlying poor LV function (cardiogenic shock) following a massive MI, which is exacerbated by the acute embolic event. (A) Aortic dissection is less likely given the specific context of a recent MI and known wall motion abnormalities. (C) Pericardial tamponade and (E) Ventricular rupture (free wall) could explain hypotension and distant heart sounds, but they would not cause the sudden, isolated loss of pulses in the lower extremities while upper extremity pulses remain palpable. (D) Right ventricular failure typically presents with clear lung fields and would not explain the acute arterial occlusion findings.

### Question 43.1

A 75-year-old man comes to the clinic because of a 2-year history of progressive shortness of breath. He also has had an occasional dry cough for the past 6 months. He has not had chest pain, palpitations, or swelling of his legs. Medical history is unremarkable, and the patient takes no medications. He has smoked one pack of cigarettes daily for 57 years. He does not drink alcoholic beverages. Vital signs are temperature 37.0°C (98.6°F), pulse 92/min, respirations 18/min, and blood pressure 122/76 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 89%. The patient has mild dyspnea when he speaks. Auscultation of the lungs discloses fine and dry crackles in the bases of both lungs. Cardiac examination discloses a normal S<sub>1</sub> and S<sub>2</sub>. No extra heart sounds are heard. Jugular venous pulsation is measured at 2 cm above the sternal angle with the head of the bed elevated at 30 degrees. Examination of the extremities shows clubbing of the digits of both hands. Results of complete blood count, serum chemistry profile, and urinalysis are within the reference ranges. Chest x-ray shows scattered reticular opacities in both lung bases. There is no hilar lymphadenopathy. Which of the following is the most appropriate next step in evaluation?

- (A) Echocardiography
- (B) High-resolution CT scan of the chest
- (C) Lung biopsy
- (D) Serum antiglomerular basement membrane antibody assay
- (E) Thoracic PET scan

**Correct Answer:**

(B) High-resolution CT scan of the chest

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The patient's clinical presentation is highly suggestive of interstitial lung disease (ILD), specifically idiopathic pulmonary fibrosis (IPF). Key findings include a 2-year history of progressive dyspnea, a dry cough, bibasilar fine 'Velcro-like' crackles, digital clubbing, and hypoxemia (89% oxygen saturation). The initial chest X-ray showing reticular opacities in the lung bases further supports this diagnosis. In the evaluation of suspected ILD, the most appropriate next step after a chest X-ray is a high-resolution CT (HRCT) scan of the chest. HRCT is the gold standard for characterizing the pattern of lung involvement (e.g., the Usual Interstitial Pneumonia [UIP] pattern) and can often provide a definitive diagnosis, potentially sparing the patient from more invasive procedures like a lung biopsy. Echocardiography (A) would be useful for evaluating pulmonary hypertension, which can be a complication of ILD, but it is not the primary diagnostic tool for the lung disease itself. Lung biopsy (C) is reserved for cases where HRCT is inconclusive. Serum antiglomerular basement membrane antibody assay (D) is used for Goodpasture syndrome, which typically presents with hemoptysis and renal involvement (neither of which are present here). A thoracic PET scan (E) is used for malignancy or inflammatory activity and is not indicated for the initial diagnosis of ILD.

## Question 44.1

A previously healthy 20-year-old woman, who is a sophomore in college, is brought to the emergency department by her roommates because of an 8-hour history of weakness and vomiting blood and a 2-day history of dizziness. She has no history of similar symptoms. She says she overeats in response to the stress of her classes. She induces vomiting after consuming a significant amount of food because she feels "too full" and "out of control." She now vomits almost daily. She feels she is slightly overweight. She is physically active and exercises moderately two to three times weekly. She does not use laxatives or diuretics. She has many friends and enjoys going out socially. She takes no medications. She drinks three to four beers on weekends and does not use illicit drugs. She appears uncomfortable and is tearful and mildly diaphoretic. She is 157 cm (5 ft 2 in) tall and weighs 59 kg (130 lb); BMI is 24 kg/m<sup>2</sup>. Temperature is 37.5°C (99.5°F), pulse is 115/min and regular, and blood pressure is 100/68 mm Hg. Examination shows tender parotid glands bilaterally and poor dentition. Results of laboratory studies are most likely to show which of the following in this patient?

- (A) K<sup>+</sup> is Decreased, Cl<sup>-</sup> is decreased, HCO<sub>3</sub><sup>-</sup> is decreased
- (B) K<sup>+</sup> is Decreased, Cl<sup>-</sup> is decreased, HCO<sub>3</sub><sup>-</sup> is increased
- (C) K<sup>+</sup> is Decreased, Cl<sup>-</sup> is increased, HCO<sub>3</sub><sup>-</sup> is decreased
- (D) K<sup>+</sup> is Increased, Cl<sup>-</sup> is decreased, HCO<sub>3</sub><sup>-</sup> is increased
- (E) K<sup>+</sup> is Increased, Cl<sup>-</sup> is increased, HCO<sub>3</sub><sup>-</sup> is decreased
- (F) K<sup>+</sup> is Increased, Cl<sup>-</sup> is increased, HCO<sub>3</sub><sup>-</sup> is increased

**Correct Answer:**

(B) K<sup>+</sup> Decreased Cl<sup>-</sup> decreased HCO<sub>3</sub><sup>-</sup> increased

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The patient's clinical presentation is classic for bulimia nervosa, purging type. Key diagnostic features include her age (20 years old), normal BMI ( $24 \text{ kg/m}^2$ ), history of binge eating followed by compensatory self-induced vomiting, and physical exam findings such as bilateral parotid gland enlargement (sialadenosis) and poor dentition (dental erosion from gastric acid). The acute symptoms of weakness, dizziness, tachycardia (115/min), and hypotension (100/68 mm Hg) suggest volume depletion and electrolyte imbalances resulting from chronic vomiting. Pathophysiologically, self-induced vomiting leads to the loss of gastric hydrochloric acid (HCl). The loss of hydrogen ions ( $\text{H}^+$ ) results in a primary metabolic alkalosis, characterized by an increased serum bicarbonate ( $\text{HCO}_3^-$ ) concentration. The loss of chloride ( $\text{Cl}^-$ ) leads to hypochloremia. Furthermore, the resulting volume depletion activates the renin-angiotensin-aldosterone system (RAAS). Aldosterone acts on the distal tubule of the kidney to reabsorb sodium at the expense of secreting potassium ( $\text{K}^+$ ) and hydrogen ions into the urine. This renal response, combined with the loss of potassium in the gastric contents and the obligate loss of potassium with bicarbonate in the urine, results in hypokalemia. Therefore, the classic laboratory profile for a patient with chronic vomiting is hypokalemic, hypochloremic metabolic alkalosis (Decreased  $\text{K}^+$ , Decreased  $\text{Cl}^-$ , Increased  $\text{HCO}_3^-$ ).

## Question 45.1

A 58-year-old man comes to the clinic for a follow-up examination 3 months after beginning warfarin therapy for deep venous thrombosis. He noted blood in his urine 1 week ago but has not seen any since that time. He has not had pain, fever, or increased urinary frequency. He has not sustained any recent trauma. His prothrombin time and INR have been within the therapeutic ranges during his previous measurements. He has hypertension and benign prostatic hyperplasia. Medications are warfarin and hydrochlorothiazide. He smoked one pack of cigarettes daily for 40 years but quit when diagnosed with deep venous thrombosis. Temperature is  $35.9^\circ\text{C}$  ( $96.6^\circ\text{F}$ ), pulse is 88/min, respirations are 18/min, and blood pressure is 135/87 mm Hg. The prostate is moderately enlarged; no nodules are noted.

Laboratory studies showed that the Prothrombin time is 19 sec (INR=2.5), serum Urea nitrogen is 18 mg/dL, serum Creatinine is 1 mg/dL, and Prostate-specific antigen is 3.8 ng/mL ( $\text{N}<4$ ).

The laboratory result on urine showed the following: blood is 3+, protein is 1+, RBC is too numerous to count, WBC is 2/hpf, no casts, and negative for Nitrites and Leukocyte esterase.

In addition to a CT scan of the abdomen, which of the following is the most appropriate next step in management?

- (A) Adjustment of the warfarin dosage to maintain an INR between 1.5 and 2.0
- (B) Ciprofloxacin therapy
- (C) Cystoscopy
- (D) Discontinuation of hydrochlorothiazide therapy
- (E) Finasteride therapy



## Correct Answer:

(C) Cystoscopy

## Neural Consult Response and Explanation:

**Answer:** C

**Explanation:** The patient is a 58-year-old man with a significant smoking history (40 pack-years) presenting with painless gross hematuria. In any adult patient, especially those over age 35 with risk factors like smoking, painless gross hematuria is considered a sign of urologic malignancy (such as bladder or renal cell carcinoma) until proven otherwise. The standard diagnostic workup for gross hematuria includes both upper urinary tract imaging (typically CT urography) and lower urinary tract visualization (cystoscopy). Since the prompt states a CT scan of the abdomen is already being performed, the most appropriate next step to complete the evaluation is cystoscopy to visualize the bladder mucosa and urethra. While the patient is on warfarin, his INR is within the therapeutic range (2.5); regardless, anticoagulation does not cause hematuria but rather 'unmasks' underlying pathology, meaning a full workup is still mandatory. Benign prostatic hyperplasia (BPH) can cause hematuria, but it is a diagnosis of exclusion in this context, and malignancy must be ruled out first. There is no evidence of infection (negative nitrites/leukocyte esterase, low WBC count) or glomerular disease (no casts, minimal proteinuria), making ciprofloxacin or further renal workup inappropriate.

## Question 46.1

A 32-year-old woman is brought to the emergency department immediately after being involved in a motor vehicle collision. She was the unrestrained driver. On arrival, she says she has severe pain in her right groin. On examination, any movement of the right hip produces pain. An x-ray of the pelvis shows a completely displaced fracture of the femoral neck. In addition to intravenous morphine, which of the following is the most appropriate management?

- (A) Bed rest
- (B) Closed reduction followed by traction
- (C) Hip spica hinge brace
- (D) Limited weight bearing with use of crutches
- (E) Operative reduction and internal fixation

## Correct Answer:

(E) Operative reduction and internal fixation

## Neural Consult Response and Explanation:



**Answer:** E

**Explanation:** The patient is a 32-year-old woman with a completely displaced femoral neck fracture. Femoral neck fractures are intracapsular, and displacement significantly increases the risk of disrupting the blood supply to the femoral head (primarily the medial circumflex femoral artery), which can lead to avascular necrosis (AVN) and nonunion. In young patients (typically defined as those under 60–65 years of age), the primary goal of management is to preserve the native femoral head. This is achieved through urgent anatomical reduction (either closed or open) and internal fixation (ORIF) using cannulated screws or a sliding hip screw. Non-operative management options such as bed rest (A), traction (B), bracing (C), or limited weight-bearing (D) are inappropriate for a displaced, unstable fracture and would lead to a high rate of complications and permanent disability. While older patients with similar fractures might undergo arthroplasty (joint replacement), joint preservation via ORIF is the standard of care for a 32-year-old to maintain long-term function and avoid the limitations of prosthetic joints in a young, active individual.

## Question 47.1

A 57-year-old man comes to the physician 1 week after he had a 45-minute episode of slurred speech and clumsiness of his right hand. The episode occurred during his daily walk; the symptoms resolved during the next 24 hours. He has no history of similar symptoms. He has a 20-year history of hypertension and a 15-year history of hypercholesterolemia controlled with a low-cholesterol diet and daily exercise. He takes no medications. He has smoked one pack of cigarettes daily for 40 years and drinks one to two glasses of wine nightly with dinner. He is alert and fully oriented. He is 178 cm (5 ft 10 in) tall and weighs 86 kg (190 lb); BMI is 27 kg/m<sup>2</sup>. His temperature is 37.0°C (98.6°F), pulse is 88/min, respirations are 10/min, and blood pressure is 170/90 mm Hg. Examination, including neurologic examination, shows no other abnormalities. Daily enteric-coated aspirin therapy is begun. Which of the following is the most appropriate next step to decrease this patient's risk for subsequent cerebral infarction?

- (A) Alcohol cessation
- (B) Smoking cessation
- (C) Weight loss program
- (D) Antihypertensive therapy
- (E) Cholesterol-lowering therapy

**Correct Answer:**

- (D) Antihypertensive therapy

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient in this scenario has experienced a transient ischemic attack (TIA), defined by focal neurologic deficits (slurred speech, right-hand clumsiness) that resolved within 24 hours. A TIA is a significant predictor of a future ischemic stroke, and management focuses on secondary prevention through aggressive modification of vascular risk factors. This patient has several modifiable risk factors: untreated hypertension (BP 170/90 mm Hg), untreated hypercholesterolemia, and active smoking (40 pack-years). While all the listed interventions (smoking cessation, statin therapy, and blood pressure control) are essential components of secondary prevention, antihypertensive therapy is the most appropriate next step to decrease the risk of subsequent cerebral infarction. Hypertension is the single most important modifiable risk factor for both primary and secondary stroke. Clinical guidelines recommend initiating antihypertensive therapy for patients with a BP >140/90 mm Hg following a TIA or stroke, as it can reduce the risk of subsequent stroke by 30-40%. Although smoking cessation (B) is a critical lifestyle modification and cholesterol-lowering therapy (E) is indicated (high-intensity statins are standard post-TIA), the relative and absolute risk reduction provided by blood pressure control in a patient with Stage 2 hypertension (170/90 mm Hg) is generally considered the most impactful medical intervention for stroke prevention. Alcohol cessation (A) and weight loss (C) are beneficial for overall health but have a lower impact on immediate stroke risk reduction compared to BP control.

### Question 48.1

A 27-year-old primigravid woman at 21 weeks' gestation comes to the emergency department because of a 2-day history of moderate headache, shortness of breath, nausea, vomiting, muscle aches, and malaise. She also has had cough occasionally productive of sputum. Pregnancy had been uncomplicated. She has no history of serious illness, and her only medication is a prenatal vitamin. She immigrated to the USA from India 6 months ago. Temperature is 38.3°C (100.9°F), pulse is 100/min, respirations are 18/min, and blood pressure is 100/60 mm Hg. On examination, breath sounds are decreased at the right lung base. Fundal height is 22 cm. Fetal heart rate is 160/min. Chest x-ray shows right-sided interstitial infiltrates. Which of the following is the most likely infectious agent?

- (A) Haemophilus influenzae
- (B) Influenza A virus
- (C) Legionella pneumophila
- (D) Mycobacterium tuberculosis
- (E) Pseudomonas aeruginosa
- (F) Streptococcus pneumoniae

**Correct Answer:**

(B) Influenza A virus

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The patient's clinical presentation is most consistent with Influenza A virus infection. The acute onset (2-day history) of prominent systemic symptoms, including fever, headache, severe malaise, and myalgias (muscle aches), followed by respiratory symptoms (cough, shortness of breath), is the classic presentation of influenza. Pregnancy is a significant risk factor for severe influenza and its complications, such as viral pneumonia. Chest x-ray findings of interstitial infiltrates are characteristic of viral pneumonia, whereas bacterial pneumonia (like *Streptococcus pneumoniae* or *Haemophilus influenzae*) more typically presents with lobar consolidation. While the patient's immigration from India is a risk factor for *Mycobacterium tuberculosis*, TB usually presents more subacutely or chronically with symptoms like weight loss, night sweats, and a longer duration of cough, and it typically shows upper lobe cavitory lesions or different patterns on imaging. *Legionella pneumophila* often presents with high fever and gastrointestinal symptoms like diarrhea, and *Pseudomonas aeruginosa* is rare in healthy individuals without structural lung disease. Therefore, Influenza A is the most likely infectious agent.

## Question 49.1

A 7-year-old boy is brought to the physician because of a 1-year history of poor performance in school. His parents say that he is bright, has many friends, and seems to want to do well in school. His teachers report that he seems frustrated with his own progress and his inability to meet the expectations of his parents. Speech fluency and articulation and motor skills are appropriate for age. Physical examination shows no abnormalities. When asked to read during the examination, he has significant difficulty sounding out words he is unfamiliar with. Visual acuity test and audiometry show no abnormalities. Which of the following is the most likely diagnosis?

- (A) Attention-deficit/hyperactivity disorder
- (B) Expressive language disorder
- (C) Intellectual developmental disorder
- (D) Learning disorder
- (E) Social anxiety disorder (social phobia)
- (F) Normal behavior

**Correct Answer:**

- (D) Learning disorder

**Neural Consult Response and Explanation:**



**Answer:** D

**Explanation:** The clinical presentation is most consistent with a Specific Learning Disorder, specifically one with impairment in reading (commonly referred to as dyslexia). The hallmark of this condition is a persistent difficulty in learning and using academic skills, which in this case is manifested by the boy's significant difficulty 'sounding out words he is unfamiliar with' (decoding). Key features that support this diagnosis and rule out others include: 1) Normal intelligence: He is described as 'bright' and wants to do well, which distinguishes a learning disorder from Intellectual Developmental Disorder (IDD). 2) Normal social and motor development: He has many friends and age-appropriate motor skills, further ruling out IDD and social anxiety disorder. 3) Normal speech and language: His speech fluency and articulation are appropriate for his age, ruling out Expressive Language Disorder. 4) Normal sensory function: Normal vision and hearing tests rule out sensory deficits as the cause of his reading difficulties. 5) Specificity of the deficit: While ADHD can cause poor school performance, the specific difficulty with phonological processing (sounding out words) is the defining feature of a reading-based learning disorder rather than a generalized attention deficit. Therefore, a learning disorder is the most accurate diagnosis.

## Question 50.1

A 23-year-old woman who is an active-duty enlisted airman in the US Air Force comes to the base clinic because of a 4-week history of an itchy sensation in her right ear. She has not had ringing in her ears or hearing loss. She works as a fuel specialist and at first attributed her symptom to the earplugs she uses when she is on the flight line. The symptom has not improved despite the patient's wearing headphones instead of the earplugs during the past 2 weeks. She has no history of serious illness and takes no medications. Vital signs are within normal limits. During examination, pulling of the right pinna inferiorly to examine the ear canal produces pain. The right ear canal appears erythematous and edematous. The tympanic membrane cannot be fully visualized because of the presence of cerumen. Examination of the left ear shows no abnormalities. Which of the following is the most likely diagnosis?

- (A) Cerumen impaction
- (B) Ear canal trauma
- (C) Otitis externa
- (D) Polychondritis
- (E) Seborrheic dermatitis

**Correct Answer:**

- (C) Otitis externa

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient's clinical presentation is classic for otitis externa (OE), also known as 'swimmer's ear.' The key diagnostic features present in this case include pruritus (itching), significant pain elicited by the manipulation of the pinna (a hallmark physical exam finding for OE), and the visualization of an erythematous and edematous external auditory canal. While the patient uses earplugs (a known risk factor for OE due to potential microtrauma and moisture entrapment), the resulting clinical condition is the infection/inflammation of the canal itself. Cerumen impaction (A) would not typically cause pain on pinna manipulation or canal edema. Ear canal trauma (B) is a predisposing factor rather than the diagnosis of the current inflammatory state. Polychondritis (D) is an inflammatory condition affecting the cartilage of the ear (pinna) while sparing the non-cartilaginous earlobe, which does not match the canal-focused findings here. Seborrheic dermatitis (E) can cause itching and skin changes but does not typically present with the acute canal edema and severe tenderness on manipulation seen in this patient.

## Question 51.1

A 34-year-old woman who is on active duty in the US Army comes to the military urgent care clinic because of a 4- day history of headache, purulent nasal discharge, and left facial pain. She has not had fever or chills. She has chronic bilateral knee pain, which she attributes to multiple parachute jumps while she was assigned to an airborne unit 7 years ago. The knee pain is exacerbated by long-distance running on pavement. Her only medication is occasional ibuprofen for the knee pain. The patient has no known medication allergies. Temperature is 37.1°C (98.8°F), pulse is 60/min, respirations are 14/min, and blood pressure is 122/80 mm Hg. Cervical lymph nodes are not palpable. There is tenderness to palpation over the left maxillary sinus. Nasal examination shows inflamed turbinates and purulent discharge. The patient needs to blow her nose twice during the examination. Bilateral otoscopic examination discloses no abnormalities. Examination of the oropharynx shows scant purulent discharge posteriorly. The remainder of the examination discloses no abnormalities. Which of the following is the most appropriate next step in management?

- (A) CT scan of the sinuses
- (B) Gram stain and culture of nasal discharge
- (C) Ibuprofen and decongestant therapy
- (D) Trimethoprim-sulfamethoxazole therapy
- (E) X-ray of the sinuses

**Correct Answer:**

(C) Ibuprofen and decongestant therapy

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient presents with signs and symptoms of acute rhinosinusitis (ARS), characterized by purulent nasal discharge, facial pain, and headache. The primary clinical challenge is distinguishing between acute viral rhinosinusitis (AVRS) and acute bacterial rhinosinusitis (ABRS). According to established clinical guidelines, ABRS should only be suspected if at least one of the following criteria is met: (1) symptoms persist for 10 or more days without clinical improvement; (2) symptoms are severe, characterized by a high fever ( $\geq 39^{\circ}\text{C}$  or  $102.2^{\circ}\text{F}$ ) and purulent nasal discharge or facial pain lasting for at least 3–4 consecutive days; or (3) symptoms worsen after an initial period of improvement ('double-sickening'). This patient has only had symptoms for 4 days, is afebrile ( $37.1^{\circ}\text{C}$ ), and has not experienced a biphasic illness. Therefore, her presentation is most consistent with AVRS. The most appropriate management for AVRS is symptomatic relief, which includes analgesics like ibuprofen for facial pain and headache, and decongestants to reduce nasal congestion. Imaging (CT or X-ray) is not recommended for the routine diagnosis of uncomplicated ARS. Gram stain and culture of nasal discharge are not useful as they do not accurately reflect the pathogens within the sinuses. Antibiotics, such as trimethoprim-sulfamethoxazole, are not indicated for viral infections and should be reserved for patients meeting the clinical criteria for ABRS.

## Question 52.1

A 16-year-old boy with VATER syndrome is brought to the physician because of 2-week history of harsh cough that began with a common cold. He receives no medications. Temperature is  $37^{\circ}\text{C}$  ( $98.6^{\circ}\text{F}$ ), pulse is 70/min, respirations are 20/min, and blood pressure is 112/64 mm Hg. Examination shows a harsh vibratory sound in the mid anterior chest with forced expiration. A systolic murmur is heard best at the lower left sternal border. There is mild scoliosis. Spirometry shows an FVC of 2.54 L (78% of predicted) and a slow vital capacity of 2.88 L (85% of predicted). A flow volume loop shows scooping on the expiratory limb. Which of the following is the most likely cause of the discrepancy between this patient's forced and slow vital capacity measurements?

- (A) Bronchospasm
- (B) Laryngeal braking
- (C) Subglottic mass
- (D) Tracheal collapse
- (E) Upper airway compression

**Correct Answer:**

- (D) Tracheal collapse

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient's presentation is classic for tracheomalacia, which is characterized by tracheal collapse during expiration. This condition is highly associated with VATER syndrome (Vertebral defects, Anal atresia, Tracheo-Esophageal fistula, Renal/Radial anomalies) because tracheoesophageal fistula (TEF) is a core component of the syndrome, and tracheomalacia often persists or develops at the site of the TEF repair. The clinical hallmark of tracheomalacia is dynamic airway obstruction. During a forced vital capacity (FVC) maneuver, the high positive intrathoracic pressure causes the weakened tracheal wall to collapse inward, prematurely narrowing the airway and trapping air, which results in a lower measured volume and the 'scooping' seen on the expiratory limb of the flow-volume loop. In contrast, during a slow vital capacity (SVC) maneuver, the intrathoracic pressure remains lower, which prevents the same degree of tracheal collapse and allows for a more complete exhalation, explaining why the SVC (2.88 L) is greater than the FVC (2.54 L). The 'harsh vibratory sound' heard specifically during forced expiration further supports the diagnosis of dynamic central airway collapse.

## Question 55.1

A chief medical officer at a hospital has received several reports that one of her colleagues, a 64-year-old male surgeon, has “not been acting like himself” recently. An administrative assistant says that during the past 6 months, the surgeon’s dictations have become hard to follow and appear to be missing information; previously, they were comprehensive and easy to transcribe. The assistant adds that after the surgeon missed three meetings in a row during the past 2 months, he asked her to send him a text message 5 minutes before the next meeting to let him know its location. Previously, he was always in attendance and on time for meetings. A senior resident also has noted unusual behavior by the surgeon; the resident says that while on rounds 3 days ago, the surgeon listed incorrect indications for a specific surgical procedure. A scrub nurse reported that the surgeon used unsterile practices three times during a 2-hour procedure today. The chief medical officer meets with the surgeon and asks him about these reported incidents. The surgeon says that “nothing is wrong” and the people who reported him are angry with him for various reasons and “are trying to stir up trouble.” Which of the following is the most appropriate action for the chief medical officer to take?

- (A) Accept the surgeon’s answer and only pursue further action if there is another complaint
- (B) Determine whether other staff have noticed anything different about the surgeon’s behavior
- (C) Inform the surgeon that he should consider retirement
- (D) Instruct the surgeon to take a temporary leave of absence and undergo a medical evaluation

**Correct Answer:**

(D) Instruct the surgeon to take a temporary leave of absence and undergo a medical evaluation

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The primary responsibility of a Chief Medical Officer (CMO) when faced with reports of physician impairment is to ensure patient safety. In this case, the surgeon has demonstrated a clear pattern of cognitive and professional decline over the past six months, culminating in immediate safety concerns (unsterile practices and incorrect clinical indications). These reports come from multiple independent sources (administrative assistant, resident, and scrub nurse), suggesting the issues are pervasive and not isolated incidents. The surgeon's lack of insight and use of projection (blaming others) are characteristic of cognitive impairment or neurocognitive disorders. Option (D) is the most appropriate action because it addresses the immediate risk to patients by removing the surgeon from clinical duties (temporary leave) while initiating a formal process to identify the underlying cause (medical evaluation). Option (A) is negligent given the evidence of harm. Option (B) is unnecessary as sufficient evidence already exists to warrant intervention. Option (C) is premature, as the underlying cause of the impairment has not yet been diagnosed and could potentially be a reversible medical condition.

## Question 56.1

A 33-year-old woman is admitted to the hospital because of visual field loss following a 48-hour history of acute eye pain. She also has a 3-week history of numbness and a feeling of "heaviness" in both legs. She has no history of serious illness and takes no medications. Six weeks ago, she returned from a hiking expedition in the northeastern USA; she has no recent history of international travel. Vital signs are within normal limits. Muscle strength is 5/5 in the upper extremities, 3/5 in the hip flexors and knee extensors, and 4/5 in the knee flexors and ankle dorsiflexors. Patellar and ankle reflexes are 3+ bilaterally, and there is nonsustained ankle clonus bilaterally. Sensation to pinprick is absent throughout the lower extremities. Ophthalmologic examination discloses optic neuritis and reconfirms the visual field loss. Which of the following studies is most likely to confirm the diagnosis?

- (A) CT scan of the cervical spine
- (B) Electromyography and nerve conduction studies
- (C) Lumbar puncture for examination of cerebrospinal fluid
- (D) Measurement of serum Lyme (*Borrelia burgdorferi*) antibody concentration
- (E) MRI of the brain

**Correct Answer:**

- (E) MRI of the brain

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The clinical presentation of this 33-year-old woman is highly characteristic of Multiple Sclerosis (MS). She exhibits 'dissemination in space' and 'dissemination in time,' which are the hallmarks of MS diagnosis. Specifically, she has acute optic neuritis (eye pain and visual field loss) and signs of transverse myelitis (lower extremity weakness, hyperreflexia, clonus, and a sensory level). These symptoms represent two distinct areas of the central nervous system (CNS) affected at different times (the leg symptoms began three weeks ago, while the visual symptoms began 48 hours ago). The most sensitive and standard tool for confirming a diagnosis of MS is Magnetic Resonance Imaging (MRI) of the brain. MRI can identify characteristic demyelinating white matter lesions (such as periventricular 'Dawson's fingers,' juxtacortical, or infratentorial lesions) and can demonstrate dissemination in space and time (via the presence of both enhancing and non-enhancing lesions) according to the McDonald criteria. While the patient's history of hiking in the northeastern USA might suggest Lyme disease, the clinical pattern of optic neuritis combined with upper motor neuron signs in the legs is much more classic for a primary demyelinating disease like MS. Furthermore, serum Lyme antibodies (Option D) would not confirm neuroborreliosis without CSF studies, and MRI (Option E) remains the most definitive study for MS. Lumbar puncture (Option C) can support the diagnosis via the presence of oligoclonal bands, but MRI is the primary and most likely study to provide confirmation.

## Question 57.1

A 68-year-old woman comes to the office because she is concerned about developing Alzheimer disease. She says she has had increasing difficulty recalling names of people and objects during the past 6 months. She has not had difficulty with her activities of daily living, finances, or shopping. She teaches part-time at a local community college. She has no history of serious illness and takes no medications. She does not smoke cigarettes. She drinks one 5-oz glass of wine daily. Her mother developed dementia, Alzheimer type, in her mid 70s. Physical and neurologic examinations of the patient show no abnormalities. On cognitive testing, she has delayed recall of three of five words. She is able to perform serial sevens, knows similarities, is fully oriented, and has intact executive, visuospatial, and attention abilities. Which of the following is the most appropriate next step in management?

- (A) Amyloid plaque imaging
- (B) Determination of ApoE allele status
- (C) Measurement of beta-amyloid in the cerebrospinal fluid
- (D) MRI of the brain with volumetric analysis
- (E) No additional diagnostic studies are indicated

**Correct Answer:**

(E) No additional diagnostic studies are indicated

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient presents with subjective cognitive concerns (difficulty recalling names) but lacks objective evidence of cognitive impairment or functional decline. In clinical practice, a score of 3 out of 5 on a delayed word recall test, especially when all other cognitive domains (executive function, visuospatial skills, attention, orientation, and abstract reasoning) are intact, is considered within the normal range for a 68-year-old individual. According to the criteria for Mild Cognitive Impairment (MCI), a patient must demonstrate objective impairment in one or more cognitive domains, typically defined as performing 1 to 1.5 standard deviations below the mean on standardized testing. Since this patient's objective testing is normal (a score of 28/30 on a MoCA-like assessment) and she maintains full functional independence (teaching part-time, managing finances, and ADLs), she does not meet the diagnostic criteria for MCI. Instead, her presentation is consistent with Subjective Cognitive Decline (SCD) or age-associated memory changes. The most appropriate management for SCD is clinical monitoring and reassurance; specialized diagnostic studies such as MRI with volumetric analysis, amyloid imaging, or CSF biomarkers are not indicated unless objective impairment is documented. Therefore, no additional diagnostic studies are indicated at this time.

## Question 58.1

A 55-year-old man with major depressive disorder is brought to the emergency department 1 1/2 hours after he was found by his brother in his home acting strangely. On arrival, he is babbling incoherently and cannot answer questions. There are two empty pill bottles in his pockets; one is for paroxetine and the other is for duloxetine. He is restless, diaphoretic, and says he has a severe headache. Temperature is 38.5°C (101.3°F), pulse is 130/min, and blood pressure is 145/105 mm Hg. The pupils are 8 mm and reactive to light. Deep tendon reflexes are 4+ and symmetric in all extremities. There is spontaneous myoclonus in the upper extremities. Results of laboratory studies, including a complete blood count, serum electrolyte concentrations, creatine phosphokinase activity, and thyroid function tests, are within the reference ranges. After admitting the patient to the hospital for observation and supportive care, what are you going to give or change in terms of pharmacotherapy?

- (A) Add carbamazepine to the medication regimen
- (B) Add dantrolene to the medication regimen
- (C) Add haloperidol to the medication regimen
- (D) Discontinue paroxetine and duloxetine
- (E) Switch from duloxetine to olanzapine

**Correct Answer:**

- (D) Discontinue paroxetine and duloxetine

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient's clinical presentation is highly characteristic of Serotonin Syndrome (SS), a potentially life-threatening condition caused by excessive serotonergic activity. The diagnosis is based on the classic triad of altered mental status (babbling incoherently, restlessness), autonomic hyperactivity (tachycardia, hypertension, hyperthermia, diaphoresis, and mydriasis), and neuromuscular abnormalities (hyperreflexia 4+ and spontaneous myoclonus). The history of ingesting paroxetine (an SSRI) and duloxetine (an SNRI) further confirms the diagnosis. According to the Hunter Toxicity Criteria, the presence of spontaneous myoclonus in the setting of serotonergic agent use is sufficient for the diagnosis of SS. The most critical and immediate step in the management of Serotonin Syndrome is the discontinuation of all offending serotonergic agents. Supportive care, including intravenous fluids and benzodiazepines for agitation and to control neuromuscular symptoms, is also standard; however, stopping the causative medications (paroxetine and duloxetine) is the primary pharmacotherapeutic change. (A) Carbamazepine is not indicated for SS. (B) Dantrolene is primarily used for Malignant Hyperthermia and sometimes for Neuroleptic Malignant Syndrome (NMS), but it is not a standard treatment for SS. (C) Haloperidol, a dopamine antagonist, can cause NMS and may worsen the clinical picture in SS. (E) While some atypical antipsychotics have serotonin-antagonist properties, switching to olanzapine is not the appropriate acute management; the priority is to stop the agents causing the toxidrome.

## Question 59.1

A 32-year-old man comes to the office for a follow-up examination 2 months after he was diagnosed with hypertension. He arrives late for the appointment, stating that he had to make sure no one followed him here because some "drug dealers" are after him. He insists that he be seen in an examination room with no windows. He says he is "fine" but is reluctant to answer questions because "doctors hold everything against me." He doubts his diagnosis and says, "Doctors and drug companies are in cahoots trying to get my money." He refuses to speak with the office manager about his bill because he thinks "she looks at me funny and makes nasty remarks about me behind my back." He says he has no history of psychiatric illness; his medical record indicates that he has made similar statements during the past 7 years concerning doctors and office staff but he always refused to elaborate on his statements. His medications are metoprolol and hydrochlorothiazide. He does not drink alcohol or use illicit drugs. Vital signs are within normal limits. Physical and neurologic examinations show no abnormalities. Results of screening laboratory studies are within the reference ranges. Which of the following is the most appropriate next step in management?

- (A) Begin clonazepam therapy
- (B) Begin risperidone therapy
- (C) Begin sertraline therapy
- (D) Determine whether the patient has friends or family who can monitor him at home
- (E) Determine whether the patient has had thoughts of harming others
- (F) Determine whether the patient is adherent to his medication

**Correct Answer:**

(E) Determine whether the patient has had thoughts of harming others



## Neural Consult Response and Explanation:

**Answer:** E

**Explanation:** The patient's presentation is consistent with Delusional Disorder, Persecutory Type. He exhibits fixed, non-bizarre delusions (believing drug dealers are after him, doctors and drug companies are conspiring against him, and the office manager is making nasty remarks) that have persisted for at least 7 years. Despite these delusions, his psychosocial functioning is relatively preserved (he attends medical appointments) and he lacks the other hallmark symptoms of schizophrenia (hallucinations, disorganized speech, or negative symptoms). In the management of any patient presenting with psychotic symptoms, including delusions, the most appropriate next step is to perform a safety assessment. This involves determining if the patient has thoughts of harming himself or others (suicidal or homicidal ideation). Patients with persecutory delusions are at an increased risk of acting on their beliefs, sometimes taking 'defensive' or 'preemptive' action against those they perceive as threats (in this case, the drug dealers or the office manager). Therefore, assessing the risk of violence is a mandatory prerequisite before determining the setting of care or initiating treatment. While risperidone (Option B) is a first-line pharmacological treatment for delusional disorder, it is not the immediate next step. Furthermore, establishing a therapeutic alliance and ensuring safety are necessary before a patient with significant paranoia and distrust of 'doctors and drug companies' would likely agree to or adhere to an antipsychotic regimen.

## Question 61.1

An 87-year-old woman, gravida 2, para 2, is brought to the emergency department from a skilled nursing care facility because of profuse vaginal bleeding for 2 days. At the age of 41 years, she underwent a cold knife cone biopsy for cervical dysplasia. Annual follow-up Pap smears until the age of 65 years showed no abnormalities. She is in moderate distress. Temperature is 36.1°C (97.0°F), pulse is 84/min, respirations are 30/min, and blood pressure is 140/90 mm Hg. Abdominal examination shows mild distention and tenderness; no masses are palpated. Pelvic examination shows a large verrucous lesion on the perineum partially covering the anal verge. Speculum examination shows atrophic changes on the vagina and cervix. Which of the following is the most likely explanation for these findings?

- (A) Cervical carcinoma
- (B) External hemorrhoids
- (C) Rectal carcinoma
- (D) Rectal polyps
- (E) Vulvar carcinoma

**Correct Answer:**

(E) Vulvar carcinoma

## Neural Consult Response and Explanation:



**Answer:** E

**Explanation:** The patient is an 87-year-old woman presenting with profuse bleeding and a large verrucous (warty) lesion on the perineum. In elderly women, the most common cause of a new, large, exophytic, or verrucous mass on the vulva or perineum is vulvar carcinoma, specifically squamous cell carcinoma. The patient's history of normal Pap smears until age 65 and the current speculum examination showing only atrophic changes (normal for her age) effectively rule out cervical carcinoma as the source of the bleeding. While the bleeding is described as 'vaginal,' blood from a large, friable perineal or vulvar lesion can easily be mistaken for vaginal bleeding, especially in a nursing home setting. Verrucous carcinoma is a specific subtype of squamous cell carcinoma that presents as a slow-growing, cauliflower-like mass, which fits the description provided. Other options such as hemorrhoids, rectal polyps, and rectal carcinoma are less likely given the specific 'verrucous' description and the primary location on the perineum.

## Question 62.1

A 47-year-old woman comes to the office for a routine health maintenance examination. She feels well and has no history of serious illness. Examination shows a 2-cm, soft, nontender nodule in the right lobe of the thyroid gland. There is no lymphadenopathy. Her serum thyroid-stimulating hormone concentration is within the reference range. Which of the following is the most appropriate initial step in management?

- (A) CT scan of the neck
- (B) Fine-needle aspiration biopsy
- (C) Reexamination in 3 months
- (D) Surgical excision
- (E) Ultrasonography of the thyroid gland

**Correct Answer:**

- (E) Ultrasonography of the thyroid gland

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The evaluation of a thyroid nodule follows a standardized diagnostic algorithm. After a nodule is discovered on physical examination, the first step is to measure the serum thyroid-stimulating hormone (TSH) level. If the TSH is normal or elevated, the most appropriate next step is thyroid ultrasonography. Ultrasound is used to characterize the nodule's features (such as composition, echogenicity, margins, and the presence of microcalcifications) and to determine if a fine-needle aspiration (FNA) biopsy is indicated based on size and risk stratification (e.g., TI-RADS or ATA criteria). If the TSH had been low (suppressed), the next step would have been a radionuclide (scintigraphy) scan to evaluate for a hyperfunctioning ('hot') nodule. In this case, because the TSH is within the reference range, ultrasonography (Option E) is the correct next step. While FNA (Option B) may eventually be required for a 2-cm nodule, it is performed after ultrasound characteristics are assessed. CT scan (Option A) is not a primary modality for thyroid nodule evaluation. Reexamination (Option C) is inappropriate for a nodule of this size without further investigation. Surgical excision (Option D) is typically reserved for nodules confirmed to be malignant or suspicious on FNA, or those causing obstructive symptoms.

### Question 63.1

A 1-hour-old male newborn is examined in the hospital nursery. He was born at term to a 22-year-old woman, gravida 1, para 1, with HIV infection. The mother took antiretroviral therapy throughout her pregnancy, and her HIV viral load was consistently <1000 copies/mL. She received intravenous zidovudine (AZT) during labor. The patient's Apgar scores were 8 and 9 at 1 and 5 minutes, respectively. He is at the 50th percentile for length, weight, and head circumference. He appears well. Examination shows no abnormalities. In addition to administration of the hepatitis B vaccine, which of the following is the most appropriate pharmacotherapy for this newborn?

- (A) Lopinavir-ritonavir and trimethoprim-sulfamethoxazole
- (B) Lopinavir-ritonavir only
- (C) Penicillin
- (D) Trimethoprim-sulfamethoxazole only
- (E) Zidovudine (AZT)

**Correct Answer:**

(E) Zidovudine (AZT)

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The newborn in this scenario is HIV-exposed, as the mother is HIV-positive. Standard of care for all HIV-exposed infants is the initiation of antiretroviral post-exposure prophylaxis (PEP) as soon as possible after birth, ideally within 6 to 12 hours. Zidovudine (AZT) is the cornerstone of this prophylaxis. For infants born to mothers who received antiretroviral therapy (ART) during pregnancy and achieved viral suppression (typically defined as <50 copies/mL, though older guidelines used <1000 copies/mL), AZT monotherapy for 4 to 6 weeks is the standard regimen. Even if the infant were considered higher risk (due to a viral load >50 copies/mL), AZT would still be a mandatory component of a combination regimen. Option (A) and (B) are incorrect because lopinavir-ritonavir is contraindicated in infants under 14 days of age due to the risk of toxicity from the ethanol and propylene glycol stabilizers in the oral solution. Options (A) and (D) are incorrect because trimethoprim-sulfamethoxazole (TMP-SMX) for *Pneumocystis jirovecii* prophylaxis is not initiated until 4 to 6 weeks of age; starting it at birth is avoided to prevent the displacement of bilirubin from albumin, which increases the risk of kernicterus. Option (C) is incorrect as there is no indication for penicillin (e.g., no evidence of Group B *Streptococcus* exposure or congenital syphilis).

## Question 64.1

A 25-year-old woman comes to the office because she has not had a menstrual period for 6 months. Previously, menses occurred at regular 28-day intervals. She has not had blurred or double vision. She has no history of serious illness and takes no medications. Temperature is 37.0°C (98.6°F), pulse is 72/min, and blood pressure is 108/60 mm Hg. The pupils are equal and reactive to light; extraocular muscles are intact. Funduscopic examination shows no abnormalities. Visual field testing shows bitemporal hemianopia. Milky discharge can be expressed from the nipples. Pelvic examination shows no abnormalities. Serum studies show a thyroid-stimulating hormone concentration of 2.0 µU/mL and a prolactin concentration of 100 ng/mL. A urine pregnancy test is negative. MRI of the pituitary gland shows a 1.2 × 1.5-cm mass compressing the optic chiasm. Which of the following is the most appropriate next step in management?

- (A) Biopsy of the pituitary gland
- (B) Cabergoline therapy
- (C) Gamma knife radiation to the pituitary gland
- (D) Oral contraceptive therapy
- (E) Transsphenoidal pituitary surgery

**Correct Answer:**

(B) Cabergoline therapy

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The patient presents with secondary amenorrhea, galactorrhea, and bitemporal hemianopia, which are classic signs of a pituitary macroadenoma. Her serum prolactin level is 100 ng/mL, and MRI confirms a 1.2 × 1.5-cm mass (macroadenoma) compressing the optic chiasm. In the case of a prolactin-secreting pituitary adenoma (prolactinoma), the first-line treatment is medical therapy with dopamine agonists, such as cabergoline or bromocriptine, regardless of the tumor's size or the presence of visual field defects. Cabergoline is generally preferred due to its higher efficacy and better side-effect profile. These medications are highly effective at both normalizing prolactin levels and rapidly shrinking the tumor size, which typically leads to the resolution of mass-effect symptoms like bitemporal hemianopia. Transsphenoidal surgery (Choice E) is considered a second-line treatment, reserved for patients who are resistant to or intolerant of dopamine agonists, or in rare cases of pituitary apoplexy. Biopsy (Choice A) is not standard for pituitary masses, as diagnosis is based on imaging and laboratory findings. Gamma knife radiation (Choice C) is reserved for aggressive or refractory cases. Oral contraceptives (Choice D) may treat the amenorrhea but do not address the underlying tumor or its mass effect.

## Question 65.1

A 2-week-old boy is evaluated in the neonatal intensive care unit because of temperature instability and decreased activity. He was born by cesarean delivery at 30 weeks' gestation because of premature rupture of membranes. Since birth, he has been fed breast milk by orogastric tube. He was feeding and growing appropriately until today, when his axillary temperature was 36.5°C (97.7°F) and he had decreased activity. During the past 4 hours, gastric residue has been noted in the orogastric tube when it is aspirated prior to feedings. Temperature is now 37.0°C (98.6°F), pulse is 160/min, respirations are 50/min, and blood pressure is 70/40 mm Hg. The anterior fontanel is soft. Cardiopulmonary examination shows no abnormalities. The abdomen is mildly distended, and there is mild tenderness to palpation diffusely; there are no masses. Bowel sounds are decreased. There is a small amount of blood-streaked stool in the diaper. The remainder of the examination shows no abnormalities. Leukocyte count is 18,000/mm<sup>3</sup> (N=5000–34,000) (80% segmented neutrophils, 5% bands, 10% lymphocytes, and 5% monocytes), and platelet count is 100,000/mm<sup>3</sup>. Blood culture results are pending. Which of the following is most likely to confirm the diagnosis?

- (A) Measurement of prothrombin time and partial thromboplastin time
- (B) Measurement of stool reducing substances
- (C) Stool culture
- (D) Upper gastrointestinal series
- (E) X-ray of the abdomen

**Correct Answer:**

- (E) X-ray of the abdomen

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The clinical presentation of this 2-week-old premature infant (born at 30 weeks' gestation) is highly characteristic of Necrotizing Enterocolitis (NEC). Key features include feeding intolerance (increased gastric residuals), abdominal distension, decreased bowel sounds, and hematochezia (blood-streaked stool). Systemic signs such as temperature instability, lethargy (decreased activity), hypotension (70/40 mm Hg), and thrombocytopenia (platelet count  $100,000/\text{mm}^3$ ) further support this diagnosis. In a neonate with suspected NEC, the most appropriate and definitive diagnostic step to confirm the diagnosis is an X-ray of the abdomen. The pathognomonic radiographic finding for NEC is pneumatosis intestinalis (gas within the bowel wall), which results from gas-producing bacteria invading the intestinal mucosa. Other potential findings include portal venous gas or pneumoperitoneum (indicating bowel perforation). While other tests like PT/PTT (Option A) might be used to monitor for complications like DIC, and stool cultures (Option C) might be performed to rule out infectious colitis, they do not confirm the diagnosis of NEC. Stool reducing substances (Option B) are non-specific indicators of carbohydrate malabsorption, and an upper GI series (Option D) is primarily used to diagnose malrotation or volvulus and is not the standard for evaluating suspected NEC.

## Question 66.1

A 13-month-old boy is brought to a small rural emergency department (ED) near his family's community because of an erythematous, edematous mass in his perianal area that is hot to touch. He has no history of serious illness and receives no medications. Growth and development are appropriate for age. Vaccinations are up-to-date. He is at the 50th percentile for length and weight. Temperature is  $39.4^{\circ}\text{C}$  ( $103.0^{\circ}\text{F}$ ), pulse is 160/min, and respirations are 36/min. Examination shows fluctuance and exquisite tenderness to palpation of the perianal mass. Oral acetaminophen and a dose of oral cephalexin are administered, and the parents are told that their child's case is beyond the capabilities of the hospital. They are referred to the nearest hospital with a pediatric service, a suburban hospital 50 miles away. The suburban hospital is contacted regarding the referral and a pediatric surgeon accepts transfer of the patient. When the patient is brought to the ED of the suburban hospital, a triage nurse obtains his oral temperature of  $37.7^{\circ}\text{C}$  ( $99.8^{\circ}\text{F}$ ) and pulse of 126/min. The nurse notes that the family has no health insurance and states that the case is beyond the capabilities of the hospital. The nurse recommends taking the patient to the ED of a downtown university hospital 4 miles away. The parents follow this recommendation, and the patient undergoes incision and drainage of the abscess at the downtown hospital later that day. Which of the following is the most accurate characterization of this patient's pattern of care?

- (A) The patient received appropriate care under the circumstances
- (B) The pediatric surgeon at the suburban hospital should have insisted on personally examining the patient and draining the abscess
- (C) The rural hospital should have sent the patient directly to the downtown university hospital
- (D) The suburban hospital executed unethical but legal conduct in this case
- (E) The suburban hospital violated the Emergency Medical Treatment and Active Labor Act (EMTALA)



### Correct Answer:

(E) The suburban hospital violated the Emergency Medical Treatment and Active Labor Act (EMTALA)

### Neural Consult Response and Explanation:

**Answer:** E

**Explanation:** The suburban hospital violated the Emergency Medical Treatment and Active Labor Act (EMTALA). EMTALA mandates that any individual who comes to a Medicare-participating hospital's emergency department (ED) must receive a Medical Screening Examination (MSE) to determine if an Emergency Medical Condition (EMC) exists, regardless of their ability to pay or insurance status. If an EMC is identified, the hospital is required to provide stabilizing treatment within its capabilities. In this case, the patient presented with a perianal abscess and systemic symptoms (fever, tachycardia), which constitutes an EMC. The suburban hospital had already demonstrated it had the capability to treat the patient because a pediatric surgeon at that facility had accepted the transfer. By refusing to provide care (failing to perform an MSE and failing to stabilize the patient) and instead redirecting the family to another hospital after noting their lack of insurance, the suburban hospital engaged in 'patient dumping,' a direct violation of EMTALA. The triage nurse's claim that the case was 'beyond the capabilities of the hospital' was contradicted by the fact that the pediatric surgeon had already accepted the patient.

### Question 67.1

A 25-year-old woman is brought to the emergency department by paramedics because of a seizure that began 45 minutes ago at home. Intravenous antiepileptic therapy begun en route to the hospital has not stopped her seizure. Her parents report that she initially began crying, then fell to the floor and exhibited asymmetric kicking and thrashing of all extremities. Fifteen years ago, she was diagnosed with a seizure disorder. Her seizures had been well controlled with oral antiepileptic therapy until this morning. Today, while the physician is in the patient's room, the movements of her extremities gradually subside. The patient then sits up and asks the physician what happened. She is fully oriented. Vital signs are within normal limits. Examination shows no evidence of tongue biting, urinary incontinence, or other abnormalities. Which of the following is most likely to confirm this patient's diagnosis?

- (A) Interview following amobarbital administration
- (B) Measurement of serum antiepileptic concentration
- (C) Measurement of serum creatine kinase activity
- (D) Neuropsychological testing
- (E) Video EEG monitoring

### Correct Answer:

(E) Video EEG monitoring



## Neural Consult Response and Explanation:

**Answer:** E

**Explanation:** The patient's presentation is highly characteristic of Psychogenic Non-Epileptic Seizures (PNES), a type of functional neurological symptom disorder. Key clinical features supporting PNES over epileptic seizures include the prolonged duration (45 minutes), the specific semiology (crying at onset, asymmetric kicking, and thrashing), and the immediate return to a fully oriented baseline without a post-ictal period of confusion. In an epileptic seizure lasting 45 minutes (status epilepticus), one would expect significant post-ictal depression, possible vital sign abnormalities, and potentially evidence of physical trauma like lateral tongue biting or urinary incontinence, all of which are absent here. Video-EEG monitoring is the gold standard for confirming the diagnosis of PNES. It allows for the simultaneous recording of the patient's behavior (video) and brain electrical activity (EEG). A diagnosis is confirmed when a typical event is captured on video while the concurrent EEG shows no ictal epileptiform discharges. Other options like measuring serum antiepileptic levels (B) or creatine kinase (C) are not definitive; CK can be elevated in various conditions and is not specific enough to confirm PNES. Amobarbital interviews (A) and neuropsychological testing (D) are not the standard diagnostic tools for confirming the nature of paroxysmal seizure-like events.

## Question 68.1

A 32-year-old woman comes to the emergency department because of a 1-day history of sharp, right-sided chest pain that worsens with coughing and sneezing. Four days ago, she had a mild sore throat and runny nose followed by nonproductive cough 1 day later. Over-the-counter decongestant and aspirin mildly relieved the symptoms. She has not had shortness of breath, blood-tinged sputum, fever, or chills. She has a long-standing history of recurrent aphthous ulcers. Her only medication is an oral contraceptive. Temperature is 37.2°C (99.0°F), pulse is 65/min, and respirations are 14/min. Pulse oximetry on room air shows an oxygen saturation of 99%. Splinting is observed over the right hemithorax with deep breathing. On cardiac examination, no abnormalities are heard. The remainder of the examination shows no abnormalities. Chest x-ray shows no abnormalities. Which of the following is the most appropriate next step in management?

- (A) Azithromycin therapy
- (B) CT angiography
- (C) Electrocardiography
- (D) Ibuprofen therapy
- (E) Prednisone therapy
- (F) Transthoracic echocardiography

**Correct Answer:**

(D) Ibuprofen therapy

## Neural Consult Response and Explanation:



**Answer: D**

**Explanation:** The patient's clinical presentation is most consistent with viral pleuritis (pleurisy). This diagnosis is supported by the characteristic sharp, pleuritic chest pain (worsened by coughing and sneezing), a preceding viral upper respiratory infection (sore throat, runny nose, and nonproductive cough), and a normal chest X-ray. In cases of 'dry' pleurisy, the chest X-ray is typically normal, as seen here. The patient is hemodynamically stable with normal vital signs (pulse 65/min, respirations 14/min, and oxygen saturation 99%), which further points away from more severe diagnoses like a large pulmonary embolism (PE) or pneumonia. Although the patient is taking oral contraceptives, which is a risk factor for PE, her Wells score is 0 (low clinical probability), and her PERC (Pulmonary Embolism Rule-out Criteria) is only positive due to the hormone use. In such a low-risk patient with a clear alternative diagnosis (viral pleuritis), the most appropriate next step is symptomatic management. Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, are the first-line treatment for pleuritic pain as they reduce pleural inflammation and provide analgesia. Other options like CT angiography (B) are not indicated as the initial step given the low clinical suspicion for PE. Azithromycin (A) is inappropriate as there is no evidence of a bacterial infection. Prednisone (E) is not first-line for viral pleuritis, and echocardiography (F) or ECG (C) are not prioritized when the clinical picture strongly suggests a benign, self-limiting pleural process.

## Question 69.1

A 30-year-old nulligravid woman, who is a military veteran, comes to the office because she has not had a menstrual period for the past year. She has not had nausea, vomiting, or night sweats. Menses previously occurred at regular 28-day intervals. She is sexually active with one male partner and uses condoms consistently. Three weeks ago, she returned from a 1-year deployment in the Middle East, where she worked as an army combat medic. She resumed work as a teacher 2 weeks ago. She appears tearful but otherwise in no distress. Temperature is 37.1°C (98.7°F), pulse is 88/min, respirations are 16/min, and blood pressure is 116/72 mm Hg. Physical examination, including pelvic examination, shows no abnormalities. Serum studies show:

Thyroid-stimulating hormone: 2  $\mu$ U/mL

Follicle-stimulating hormone: 7 mIU/mL

Luteinizing hormone: 10 mIU/mL

Prolactin: 10 ng/mL

$\beta$ -hCG: negative

Which of the following is the most likely cause of this patient's amenorrhea?

- (A) Gonadal dysgenesis 45,X (Turner syndrome)
- (B) Hypothalamic hypogonadism
- (C) Polycystic ovarian syndrome
- (D) Premature ovarian failure
- (E) Prolactinoma

**Correct Answer:**



## (B) Hypothalamic hypogonadism

### Neural Consult Response and Explanation:

**Answer:** B

**Explanation:** The patient presents with secondary amenorrhea, defined as the absence of menses for more than 6 months in a woman with previously regular cycles. The diagnostic evaluation for secondary amenorrhea begins with ruling out pregnancy ( $\beta$ -hCG is negative), followed by assessing TSH, prolactin, and FSH. In this patient, TSH and prolactin are normal, ruling out thyroid dysfunction and prolactinoma (Choice E). The FSH level is 7 mIU/mL, which is within the normal range; this effectively rules out premature ovarian failure (Choice D) and gonadal dysgenesis/Turner syndrome (Choice A), both of which would present with elevated FSH (hypergonadotropic hypogonadism) due to the lack of negative feedback from the ovaries. The clinical context is highly suggestive: the patient has experienced significant psychological and physical stress during a year-long deployment as a combat medic and appears tearful. Stress-induced suppression of the hypothalamic-pituitary-ovarian (HPO) axis leads to Functional Hypothalamic Amenorrhea (a form of hypothalamic hypogonadism). In this condition, GnRH pulsatility is disrupted, leading to low or 'inappropriately normal' levels of LH and FSH, which are insufficient to stimulate follicular development and ovulation. Polycystic ovarian syndrome (Choice C) is less likely as the patient lacks clinical signs of hyperandrogenism (e.g., hirsutism, acne) and has a clear environmental trigger for hypothalamic suppression.

### Question 70.1

A 45-year-old woman comes to the office because she has not had a menstrual period for 1 year. Menses previously occurred at regular 30-day intervals. She feels well, has no history of serious illness, and takes no medications. She has smoked one-half pack of cigarettes daily for 20 years. She is sexually active with one male partner and uses condoms consistently. She is 163 cm (5 ft 4 in) tall and weighs 63 kg (140 lb); BMI is 24 kg/m<sup>2</sup>. Vital signs are within normal limits. Physical examination, including pelvic examination, shows no abnormalities. Measurement of which of the following serum concentrations is most likely to confirm the diagnosis?

- (A) Estradiol
- (B) Follicle-stimulating hormone
- (C)  $\beta$ -hCG
- (D) Luteinizing hormone
- (E) Progesterone

**Correct Answer:**

- (B) Follicle-stimulating hormone

### Neural Consult Response and Explanation:



**Answer: B**

**Explanation:** The patient is a 45-year-old woman presenting with 12 consecutive months of amenorrhea, which meets the clinical definition of menopause. In women over the age of 45 with a consistent history of amenorrhea for 12 months, menopause is primarily a clinical diagnosis. However, when laboratory confirmation of the menopausal state (ovarian failure) is sought, the measurement of serum Follicle-Stimulating Hormone (FSH) is the most reliable marker. As ovarian follicles are depleted, there is a significant decrease in the production of estrogen and inhibin B. The loss of negative feedback from these hormones on the anterior pituitary leads to a compensatory and sustained increase in FSH levels. An FSH level typically greater than 30-40 mIU/mL is considered diagnostic of menopause. While Estradiol (A) levels do decrease, they can fluctuate significantly during the perimenopausal transition and are not used for confirmation.  $\beta$ -hCG (C) is used to diagnose pregnancy; however, the 12-month duration of amenorrhea and the normal physical examination make pregnancy an impossible explanation for the entire duration of her symptoms. Luteinizing hormone (D) also rises in menopause, but FSH is the more sensitive and standard diagnostic marker for the depletion of the ovarian reserve. Progesterone (E) levels are useful for confirming ovulation but do not serve as a diagnostic tool for menopause.

## Question 71.1

A 2-month-old girl is brought to the office by her mother for a routine examination. Newborn screening electrophoresis showed hemoglobin FS. The mother says her daughter has not had fever or pallor. The patient is feeding well and gaining weight appropriately. She receives no medications. She appears well. She is at the 35th percentile for length and weight. Temperature is 37.0°C (98.6°F), pulse is 158/min, and respirations are 28/min. Examination shows no abnormalities. All routine immunizations are administered. In addition to routine anticipatory guidance about feeding and development, the mother is instructed to observe the patient for pallor and fever and to palpate for an enlarged spleen. Which of the following is most appropriate to prevent complications in this patient?

- (A) Amoxicillin as needed for febrile illness
- (B) Instructions for the parents to palpate the long bones routinely
- (C) Instructions for the parents to take and record the patient's pulse daily
- (D) Low-dose aspirin therapy
- (E) Oral prophylactic penicillin therapy

**Correct Answer:**

- (E) Oral prophylactic penicillin therapy

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient's newborn screening result of 'FS' (fetal and sickle hemoglobin, with no adult hemoglobin A) is diagnostic of sickle cell disease (SCD), most likely homozygous sickle cell anemia (HbSS). Children with SCD develop functional asplenia early in life, often beginning within the first few months. This makes them highly susceptible to life-threatening infections from encapsulated organisms, particularly *Streptococcus pneumoniae*. Clinical trials have demonstrated that oral penicillin prophylaxis significantly reduces the incidence of pneumococcal sepsis and associated mortality in these patients. Current guidelines recommend initiating daily oral penicillin prophylaxis by 2 months of age and continuing it until at least age 5. Option A is incorrect because management of febrile illness in SCD requires urgent medical evaluation and parenteral antibiotics rather than 'as needed' oral amoxicillin. Options B and C are not standard components of SCD management or prevention. Option D is incorrect as aspirin is not used for prophylaxis against the primary complications of SCD in infants.

## Question 72.1

A 3-week-old boy is brought to the physician by his mother because of a 5-day history of yellow eyes and skin and white stools. Pregnancy and delivery were uncomplicated. The patient's temperature is 37.1°C (98.8°F), pulse is 160/min, respirations are 40/min, and blood pressure is 85/50 mm Hg. Examination shows diffuse jaundice. Cardiopulmonary examination shows no abnormalities. The abdomen is nontender. The liver edge is palpated 4 cm below the right costal margin. The spleen tip is palpated 3 cm below the left costal margin. Laboratory studies show:

Leukocyte count: 10,000/mm<sup>3</sup>  
Serum Bilirubin, total: 16 mg/dL  
Direct: 12 mg/dL  
AST: 800 U/L  
ALT: 500 U/L  
Amylase: 100 U/L

Which of the following is the most appropriate next step in diagnosis?

- (A) Air-contrast enema
- (B) Ultrasonography of the abdomen
- (C) Upper gastrointestinal series
- (D) Colonoscopy
- (E) Esophagogastroduodenoscopy

**Correct Answer:**

(B) Ultrasonography of the abdomen

**Neural Consult Response and Explanation:**



**Answer:** B

**Explanation:** The patient presents with neonatal cholestasis, characterized by conjugated hyperbilirubinemia (direct bilirubin 12 mg/dL, which is >20% of the total bilirubin), jaundice, and acholic (white) stools. In a 3-week-old infant, this presentation is highly concerning for biliary atresia, a condition where the extrahepatic bile ducts become fibrotic and obstructed. Other differentials include a choledochal cyst or neonatal hepatitis. The most appropriate next step in the diagnostic workup of neonatal cholestasis is an abdominal ultrasonography. Ultrasound is a non-invasive initial imaging modality used to evaluate the biliary anatomy. It can identify a choledochal cyst or suggest biliary atresia by the absence or small size of the gallbladder and the presence of the 'triangular cord sign' (a cone-shaped fibrotic mass at the bifurcation of the portal vein). While a liver biopsy or intraoperative cholangiogram may be required for a definitive diagnosis of biliary atresia, ultrasound is the standard first-line imaging study. Options A (air-contrast enema) and C (upper gastrointestinal series) are used for intestinal obstructions like intussusception or malrotation, respectively. Options D (colonoscopy) and E (EGD) are endoscopic procedures used to evaluate the lumen of the gastrointestinal tract and are not indicated in the initial evaluation of neonatal jaundice.

### Question 73.1

A 52-year-old woman comes to the physician for a follow-up examination. She received the diagnosis of hypertension 3 weeks ago, and lisinopril therapy was begun at that time. She has had a constant, nonproductive, hacking cough for 2 weeks but has not had any other problems. She has no history of serious illness and takes no other medications. She does not smoke. She drinks one to two glasses of wine daily. She does aerobic exercise for 30 minutes four to five times weekly. Her blood pressure has decreased from 164/92 mm Hg 3 weeks ago to 140/84 mm Hg today. Lungs are clear to auscultation. Which of the following is the most appropriate next step in management of this patient's cough?

- (A) Pulmonary function tests
- (B) CT scan of the chest
- (C) Course of prednisone
- (D) Discontinuation of lisinopril
- (E) Use of a cough suppressant
- (F) No change in management is indicated at this time

**Correct Answer:**

(D) Discontinuation of lisinopril

**Neural Consult Response and Explanation:**



**Answer:** D

**Explanation:** The patient's presentation is classic for an ACE inhibitor-induced cough. Lisinopril is an Angiotensin-Converting Enzyme (ACE) inhibitor, a common first-line treatment for hypertension. A well-known side effect of ACE inhibitors is a dry, nonproductive, hacking cough, which occurs in approximately 5% to 20% of patients. This side effect is thought to be caused by the accumulation of bradykinin, substance P, and prostaglandins in the upper airways, as ACE (also known as kininase II) is responsible for the degradation of these substances. The cough typically begins within days to weeks of starting the medication, as seen in this patient who developed symptoms one week after initiation. Physical examination, including lung auscultation, is typically normal in these cases. The most appropriate next step in management is to discontinue the lisinopril. Once the medication is stopped, the cough usually resolves within 1 to 4 weeks. If blood pressure control is still required, an Angiotensin II Receptor Blocker (ARB) is often substituted, as ARBs do not affect bradykinin metabolism and are not associated with this specific side effect. Options A and B (Pulmonary function tests and CT scan) are unnecessary diagnostic steps given the clear temporal relationship between the medication and the symptom. Option C (Prednisone) is not indicated for drug-induced cough. Option E (Cough suppressant) is generally ineffective for ACE inhibitor-induced cough and does not address the underlying cause. Option F is incorrect because the cough is a bothersome side effect that warrants a change in therapy to ensure patient comfort and long-term adherence.

### Question 74.1

A 27-year-old primigravid woman at 41 weeks' gestation is admitted to the hospital for induction of labor. She has received cervical ripening agents and is now receiving oxytocin. The cervix is 9 cm dilated and 100% effaced; the vertex is at 0 station. Fetal monitoring shows contractions every 3 minutes and a reassuring heart rate. She requests pain medication. Which of the following is the most likely adverse effect of an intravenous opioid in this patient?

- (A) Maternal fever
- (B) Maternal tachycardia
- (C) Neonatal acidosis
- (D) Neonatal arrhythmia
- (E) Neonatal respiratory depression

**Correct Answer:**

- (E) Neonatal respiratory depression

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient is in the late active phase of labor, currently 9 cm dilated and 100% effaced. At this stage, delivery is considered imminent, especially in a primigravid woman who has reached 9 cm. Intravenous opioids (such as fentanyl, morphine, or meperidine) are known to cross the placenta rapidly via passive diffusion. When administered shortly before birth, these medications can cause central nervous system depression in the neonate, leading to neonatal respiratory depression at delivery. This occurs because the neonate's liver is immature and less capable of metabolizing the drug, and the drug is no longer being cleared by the placenta once the cord is clamped. Maternal fever (A) is a known side effect of epidural anesthesia, not intravenous opioids. Maternal tachycardia (B) is not a standard side effect of opioids; they are more likely to cause sedation or mild respiratory depression in the mother. Neonatal acidosis (C) is typically a result of prolonged hypoxia or uteroplacental insufficiency rather than a direct effect of opioid administration. Neonatal arrhythmia (D) is not a recognized adverse effect of standard obstetric opioid analgesia.

## Question 75.1

A 7-year-old girl is brought to the clinic by her father because of behavior problems at school since she started second grade 6 months ago. Her teacher is concerned because she cannot sit still or complete tasks and is not learning at the same pace as her classmates. Psychoeducational testing shows normal intelligence. The father says his daughter's behavior problems have worsened since last year. She snores at night and wets the bed several nights weekly. She has no history of serious illness and receives no medications. She has been at the 25th percentile for height and weight for the past 3 years. Pulse is 105/min and regular, respirations are 22/min, and blood pressure is 105/65 mm Hg. The tonsils are 3+. Cardiopulmonary and abdominal examinations show no abnormalities. On neurologic examination, cranial nerves are intact. Deep tendon reflexes are 2+ in all extremities. Finger-nose testing shows no abnormalities. Romberg sign is absent. Her gait is normal. Which of the following is the most appropriate next step in diagnosis?

- (A) EEG
- (B) Karyotype analysis
- (C) MRI of the brain
- (D) Polysomnography
- (E) Thyroid function tests

**Correct Answer:**

- (D) Polysomnography

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient presents with behavioral and academic difficulties (inability to sit still, failure to complete tasks, and falling behind classmates) that are characteristic of Attention-Deficit/Hyperactivity Disorder (ADHD). However, her clinical history also includes snoring, nocturnal enuresis (bedwetting), and physical findings of tonsillar hypertrophy (3+ tonsils). In pediatric patients, Obstructive Sleep Apnea (OSA) frequently presents with 'paradoxical' daytime symptoms such as hyperactivity, impulsivity, and inattention, mimicking ADHD. The chronic sleep fragmentation and intermittent hypoxia associated with OSA lead to these behavioral issues. Nocturnal enuresis is also a known association with pediatric OSA. Given the high clinical suspicion for OSA caused by adenotonsillar hypertrophy, the most appropriate next step in diagnosis is polysomnography (overnight sleep study), which is the gold standard for confirming the diagnosis and assessing the severity of the airway obstruction. Other options such as EEG (for seizures), MRI (for structural brain lesions), or thyroid function tests (for hypothyroidism) are less likely to explain the constellation of snoring, enlarged tonsils, and behavioral changes.

## Question 77.1

An 8-year-old boy is brought to the emergency department (ED) by ambulance 45 minutes after he was struck by a car while riding his bicycle. He did not lose consciousness but has multiple rib fractures with depression of the left anterior chest wall. His parents have been notified and are on their way to the hospital. On the patient's arrival to the ED, his temperature is 37.2°C (99.0°F), pulse is 180/min, respirations are 36/min, and blood pressure is 65/30 mm Hg. The abdomen is distended with exquisite tenderness to palpation. A rapid intravenous infusion of 0.9% saline is begun. CT scans are quickly obtained and show a disrupted spleen and an abdominal cavity filled with free fluid. The parents arrive at the hospital and are informed that their son needs an emergency laparotomy and splenectomy to control the internal bleeding. A saline infusion is continued to support the patient's blood pressure. The parents provide consent to proceed with the operation but refuse to consent to transfusion of blood or blood products, regardless of consequences, because of their religious beliefs. As the patient is transferred to the operating room, his pulse is 210/min and blood pressure is 50/20 mm Hg. Hemoglobin concentration is 3.8 g/dL. The surgeon agrees with the anesthesiologist that the patient will die without transfusion of blood and plasma. Which of the following is the most appropriate action?

- (A) Contact the national organization of the parents' religion and insist that the parents speak with a representative on the phone regarding the matter
- (B) Contact the parents' religious advisor to request help in acquiring consent for blood transfusion
- (C) Proceed with the blood transfusion while obtaining an emergency telephone court order
- (D) Proceed with the operation and abide by the parents' wishes that no blood products be used
- (E) Transfer the patient by ambulance immediately to a bloodless surgical center

**Correct Answer:**

(C) Proceed with the blood transfusion while obtaining an emergency telephone court order

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient is an 8-year-old child in Class IV hemorrhagic shock (pulse 210/min, BP 50/20 mm Hg, Hb 3.8 g/dL) following blunt trauma. This is a life-threatening emergency where the medical consensus is that the patient will die without immediate blood and plasma transfusion. While parents generally have the right to make medical decisions for their children, this authority is not absolute. In the United States, legal and ethical standards dictate that parents cannot refuse life-saving treatment for their minor children based on religious beliefs (the principle that 'parents may be free to become martyrs themselves, but they are not free... to make martyrs of their children'). In an emergency where there is no time for a full court hearing, the physician's primary duty is to preserve the life of the child. The standard procedure is to proceed with the necessary life-saving treatment while simultaneously seeking an emergency court order (often via telephone) to provide legal protection for the hospital and staff. Option (A) and (B) are inappropriate because the patient is in extremis and there is no time for religious mediation. Option (D) would result in the preventable death of a minor, which is ethically and legally unacceptable. Option (E) is incorrect because the patient is hemodynamically unstable and would almost certainly die during transport.

## Question 78.1

A female newborn has the onset of tachypnea 4 hours after birth. She was delivered at term to a 24-year-old woman following an uncomplicated pregnancy and delivery. Apgar scores were 9 and 9 at 1 and 5 minutes, respectively. Her parents had refused prenatal screening. The patient's temperature is 37.2°C (99.0°F), pulse is 150/min, respirations are 60/min, and blood pressure is 55/35 mm Hg. On cardiac examination, a single, loud S<sub>2</sub> is heard. The liver edge is palpated 3 cm below the right costal margin. Capillary refill time is 6 seconds. Peripheral pulses are difficult to palpate in all extremities. Arterial blood gas analysis on room air shows:

pH: 7.24 PCO<sub>2</sub>: 35 mm Hg (N=27–40) PO<sub>2</sub>: 68 mm Hg  
HCO<sub>3</sub><sup>-</sup>: 15 mEq/L

Chest x-ray shows increased pulmonary haziness and vascular markings suggestive of bilateral pulmonary edema. The most appropriate next step in management is administration of which of the following?

- (A) Bolus of 0.9% saline
- (B) Bolus of sodium bicarbonate
- (C) Intravenous alprostadil (prostaglandin E<sub>1</sub>)
- (D) Intravenous digoxin
- (E) Intravenous dopamine

**Correct Answer:**

(C) Intravenous alprostadil (prostaglandin E<sub>1</sub>)

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The clinical presentation of this 4-hour-old newborn is highly suggestive of a ductal-dependent congenital heart defect causing cardiogenic shock. Key findings include tachypnea, hypotension (55/35 mm Hg), prolonged capillary refill (6 seconds), hepatomegaly (liver edge 3 cm below the costal margin), and metabolic acidosis (pH 7.24,  $\text{HCO}_3^-$  15 mEq/L). The chest X-ray findings of pulmonary edema (increased vascular markings and haziness) and the cardiac exam showing a single, loud  $\text{S}_2$  further support a severe left-sided obstructive lesion, such as hypoplastic left heart syndrome (HLHS) or critical aortic stenosis. In these conditions, systemic blood flow depends on the right-to-left shunting of blood through the ductus arteriosus. As the ductus begins to close shortly after birth, systemic perfusion fails, leading to the rapid onset of shock and pulmonary venous congestion. The most appropriate and immediate next step in management is the administration of intravenous alprostadil (prostaglandin  $\text{E}_1$ ) to maintain or reopen the ductus arteriosus, thereby restoring systemic circulation and stabilizing the infant for further diagnostic evaluation (e.g., echocardiography) and surgical intervention. (A) A saline bolus is contraindicated in the setting of cardiogenic shock with pulmonary edema, as it can worsen fluid overload. (B) Sodium bicarbonate does not address the underlying anatomical obstruction. (D) Digoxin is not indicated for acute stabilization in this setting. (E) While dopamine may be used as an adjunct for hemodynamic support, it does not address the primary issue of ductal closure in a ductal-dependent lesion.

## Question 79.1

A 43-year-old woman comes to the office for a follow-up examination 1 week after she was discharged from the hospital following an overnight admission for an episode of crushing, aching chest pain. The pain was located behind her sternum and radiated to her left jaw and shoulder. She also had shortness of breath, palpitations, and nausea. Initial ECG obtained on admission showed ST-segment depressions in leads  $\text{V}_3$  through  $\text{V}_6$ . Nitroglycerin was administered, and the chest pain resolved. Follow-up serial ECGs disclosed no abnormalities and serum troponin concentrations were within the reference ranges. Cardiac catheterization obtained the next morning showed no substantial narrowing of the coronary arteries. At discharge, the patient declined medication to prevent recurrence of pain. The patient reports that since discharge, she has had two episodes of chest discomfort lasting 2 to 4 minutes, similar in location and quality to the pain precipitating her hospitalization. Medical history otherwise is unremarkable and she takes no routine medications. Vital signs are within normal limits. Physical examination discloses no abnormalities. Which of the following is the most appropriate pharmacotherapy to prescribe at this time?

- (A) Diltiazem
- (B) Lisinopril
- (C) Propranolol
- (D) Warfarin
- (E) No pharmacotherapy is indicated at this time

**Correct Answer:**

- (A) Diltiazem



## Neural Consult Response and Explanation:

**Answer:** A

**Explanation:** The patient's clinical presentation is consistent with vasospastic angina (also known as Prinzmetal angina). Key indicators include episodes of crushing chest pain at rest, transient ST-segment changes on ECG (in this case, ST-segment depressions), prompt relief with nitroglycerin, and coronary catheterization showing no significant obstructive coronary artery disease. In patients with vasospastic angina, the primary goal of therapy is to prevent coronary artery spasm. Calcium channel blockers (CCBs), such as diltiazem, are the first-line pharmacotherapy for this condition as they promote coronary vasodilation. Propranolol (C) and other non-selective beta-blockers are contraindicated in vasospastic angina because they can lead to unopposed alpha-adrenergic-mediated vasoconstriction, potentially worsening the spasms. Lisinopril (B) and warfarin (D) have no established role in the management of coronary artery spasm. Given that the patient is experiencing recurrent symptoms (two episodes since discharge), 'no pharmacotherapy' (E) is inappropriate, as untreated vasospastic angina carries a risk of myocardial infarction and life-threatening arrhythmias.

## Question 81.1

A 35-year-old woman is brought to the emergency department by police after they found her wandering the streets and appearing intoxicated. On arrival, she is tremulous and appears distressed. She says she moved out of her abusive boyfriend's apartment 1 week ago because she was afraid he would kill her. She has no financial or emotional family support. She worked at a grocery store until 1 month ago when she was fired for missing four shifts during the course of 1 week. During the past week, she has slept less than 4 hours nightly because she has slept on the streets or in shelters. She has panic disorder treated with fluoxetine. She takes no other medications. Ten years ago, she underwent 6 months of psychotherapy for dependent personality disorder. During the past year, she has drunk four or more glasses of wine and other alcoholic beverages nightly. She tried to quit drinking alcohol twice during the past year but was unsuccessful. Her last alcoholic drink was 24 hours ago. Pulse is 90/min and blood pressure is 140/90 mm Hg. Physical examination shows resting hand tremors and delayed reflexes. Mental status examination shows slurred speech. She has an irritable mood and anxious affect. Blood alcohol concentration is 140 mg/dL. Which of the following is the strongest predisposing risk factor for suicide in this patient?

- (A) Adjustment disorder with depressed mood
- (B) Alcohol use disorder
- (C) Dependent personality disorder
- (D) History of physical abuse
- (E) Panic disorder

**Correct Answer:**

(B) Alcohol use disorder

## Neural Consult Response and Explanation:



**Answer:** B

**Explanation:** The patient's strongest predisposing risk factor for suicide among the choices provided is Alcohol Use Disorder (AUD). In the assessment of suicide risk, psychiatric disorders are among the most significant predisposing factors. After mood disorders (such as Major Depressive Disorder or Bipolar Disorder), Substance Use Disorders—specifically Alcohol Use Disorder—are the most common psychiatric conditions associated with both suicide attempts and completed suicides. This patient meets several DSM-5 criteria for severe AUD, including drinking larger amounts than intended, unsuccessful attempts to cut down, failure to fulfill major role obligations (losing her job), and physiological evidence of tolerance and withdrawal (tremors and slurred speech despite a significant blood alcohol concentration of 140 mg/dL). Alcohol increases suicide risk by increasing impulsivity, impairing judgment, and exacerbating depressive symptoms. While the other options are also recognized risk factors—panic disorder (E), personality disorders (C), and a history of physical abuse (D)—none carry the same statistically high risk for completed suicide as Alcohol Use Disorder in the context of an acute crisis. History of physical abuse is a significant distal risk factor, but AUD is a more potent and proximal predisposing psychiatric condition. Adjustment disorder (A) is less severe and typically not ranked as a 'strongest' risk factor when a major substance use disorder is present.

## Question 82.1

A 76-year-old woman, who is receiving home hospice care because of end-stage metastatic lung cancer diagnosed 1 month ago, is examined at home at the request of her family because of a 3-hour history of labored breathing despite receiving 100% oxygen at 5 L/min via face mask. Pulse is 92/min, respirations are 18/min, and blood pressure is 105/62 mm Hg. Pulse oximetry on 100% oxygen via face mask shows an oxygen saturation of 85%. The patient appears cachectic and is in mild distress, showing increased work of breathing with prominent sternocleidomastoid muscles and intermittent agonal respirations. Which of the following is the most appropriate next step in management?

- (A) Administer intravenous morphine
- (B) Admit the patient to the hospital for further evaluation
- (C) Initiate a propofol infusion
- (D) Transition the patient to noninvasive positive pressure ventilation
- (E) No further action is indicated

**Correct Answer:**

- (A) Administer intravenous morphine

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The patient is a 76-year-old woman with end-stage metastatic lung cancer currently receiving home hospice care. Her clinical presentation—labored breathing, use of accessory muscles (sternocleidomastoid), and agonal respirations despite supplemental oxygen—indicates refractory dyspnea in the terminal phase of her illness. In the context of hospice and palliative care, the primary goal of management is the relief of suffering and symptom control. Opioids, specifically morphine, are the gold standard and first-line treatment for the management of dyspnea in terminally ill patients. Morphine works by reducing the central perception of breathlessness, decreasing the work of breathing, and reducing the associated anxiety. (B) Admitting the patient to the hospital for further evaluation contradicts the goals of home hospice care and focuses on diagnostic workup rather than comfort. (C) Propofol is used for palliative sedation in cases of refractory symptoms that do not respond to standard treatments, but it is not the first-line agent for dyspnea and typically requires more intensive monitoring. (D) Noninvasive positive pressure ventilation (NIPPV) is generally considered a life-prolonging or aggressive intervention that can be uncomfortable and is often inconsistent with hospice goals focused on comfort. (E) 'No further action' is inappropriate as the patient is in visible distress and requires active symptom management to ensure a comfortable death.

### Question 83.1

A 42-year-old woman comes to the physician because of a 1-month history of moderate constant abdominal pain. She was evaluated in the emergency department 6 weeks ago for renal calculi and was told that her serum calcium concentration was increased. She has labile hypertension treated with hydrochlorothiazide and enalapril. Two brothers have hyperparathyroidism, and one sister has an adrenal tumor. The patient's temperature is 37.0°C (98.6°F), pulse is 80/min, respirations are 12/min, and blood pressure is 182/98 mm Hg. Funduscopic examination shows arteriovenous nicking. There is mild, diffuse tenderness to palpation of the abdomen. The remainder of the examination shows no abnormalities. Serum calcium concentration is 13.2 mg/dL. Urine metanephrine concentration is 4000 µg/24 h (N=140–785). This patient is most likely at risk for which of the following conditions?

- (A) Carcinoid syndrome
- (B) Chronic autoimmune (Hashimoto) thyroiditis
- (C) Familial hypocalciuric hypercalcemia
- (D) Medullary thyroid carcinoma
- (E) Parathyroid carcinoma

**Correct Answer:**

(D) Medullary thyroid carcinoma

**Neural Consult Response and Explanation:**



**Answer:** D

**Explanation:** The patient's clinical presentation and family history are highly suggestive of Multiple Endocrine Neoplasia type 2A (MEN 2A). This diagnosis is supported by three key findings: 1) Primary hyperparathyroidism, evidenced by her hypercalcemia (13.2 mg/dL), history of renal calculi, and two brothers with hyperparathyroidism; 2) Pheochromocytoma, evidenced by her labile hypertension and markedly elevated 24-hour urine metanephrines (4000 µg/24 h, which is >5 times the upper limit of normal), as well as a sister with an adrenal tumor; and 3) The autosomal dominant inheritance pattern suggested by the family history. MEN 2A is characterized by the triad of medullary thyroid carcinoma (MTC), pheochromocytoma, and parathyroid hyperplasia/adenoma. Since the patient already demonstrates features of both primary hyperparathyroidism and pheochromocytoma, she is at an extremely high risk (approaching 100%) for developing medullary thyroid carcinoma, which is the most common and often the most life-threatening component of the syndrome. Carcinoid syndrome (A) and Hashimoto thyroiditis (B) are not associated with MEN syndromes. Familial hypocalciuric hypercalcemia (C) causes hypercalcemia but does not involve pheochromocytomas or the specific familial tumor pattern seen here. Parathyroid carcinoma (E) is a very rare cause of hyperparathyroidism and is not the typical finding in MEN 2A, which usually presents with parathyroid hyperplasia.

## Question 84.1

A 26-year-old woman with common variable immunodeficiency comes to the office because of a 2-month history of night sweats. She also has had a 10-kg (22-lb) weight loss during the past 3 months despite no change in appetite. She has a 15-year history of recurrent sinusitis and otitis media. Her only medication is intravenous immune globulin. She is 163 cm (5 ft 4 in) tall and weighs 54 kg (120 lb); BMI is 21 kg/m<sup>2</sup>. Vital signs are within normal limits. Examination shows cervical and epitrochlear lymphadenopathy. Which of the following is the most appropriate next step in management?

- (A) Lymph node biopsy
- (B) Methylprednisolone therapy
- (C) Penicillin therapy
- (D) Plasmapheresis
- (E) Trimethoprim-sulfamethoxazole therapy

**Correct Answer:**

- (A) Lymph node biopsy

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The patient's clinical presentation is highly concerning for malignancy, specifically non-Hodgkin lymphoma (NHL), which is a well-documented complication of common variable immunodeficiency (CVID). CVID is characterized by impaired B-cell differentiation and hypogammaglobulinemia, leading to recurrent sinopulmonary infections. Beyond infections, patients with CVID have a significantly increased risk (up to 10-30 times higher than the general population) of developing autoimmune disorders and malignancies, with NHL being the most common cancer. This patient presents with 'B symptoms' (significant weight loss and night sweats) and generalized lymphadenopathy (cervical and epitrochlear), which are classic indicators of lymphoma. An excisional lymph node biopsy is the most appropriate next step to establish a definitive diagnosis, as it allows for the evaluation of tissue architecture, which is necessary to distinguish between lymphoma, granulomatous disease, and benign lymphoid hyperplasia. Methylprednisolone (B) might be used for granulomatous complications of CVID but only after malignancy is ruled out. Antibiotics like penicillin (C) or trimethoprim-sulfamethoxazole (E) are used for acute infections or prophylaxis but do not address the systemic symptoms and lymphadenopathy seen here. Plasmapheresis (D) has no role in the diagnostic workup of suspected lymphoma in a CVID patient.

## Question 85.1

A 9-month-old boy is brought to the office by his mother because of a 6-hour history of persistent fussiness and decreased appetite. Two weeks ago, he was diagnosed with an upper respiratory tract infection. The symptoms have since resolved. He lives with his parents and a pet lizard. His diet consists of cow milk-based formula, baby food, and some solid foods. He has no history of serious illness and receives no medications. Immunizations are up-to-date. Today, he is inconsolable. He is at the 50th percentile for length and weight. Examination shows multiple flaccid bullae on an erythematous base over the buttocks. The mother says she had no knowledge of these findings. Which of the following is the most appropriate next step in management?

- (A) Abdominal ultrasonography
- (B) Anti-*Saccharomyces cerevisiae* antibody testing
- (C) Nitroblue tetrazolium testing
- (D) Rectal swab for group B streptococcus
- (E) Skeletal survey
- (F) Stool culture for *Salmonella enteritidis*

**Correct Answer:**

(E) Skeletal survey

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The clinical presentation of an inconsolable 9-month-old with 'multiple flaccid bullae on an erythematous base over the buttocks' is highly suspicious for child abuse or neglect, particularly because the mother claims she was unaware of the lesions. In a 9-month-old infant who is still in diapers, a caregiver must regularly see the buttocks during diaper changes. A mother's lack of awareness of significant skin lesions in this area is a major red flag for neglect or physical abuse. While the description of 'flaccid bullae' is classic for bullous impetigo (caused by *Staphylococcus aureus*), these lesions can also be mistaken for or coexist with inflicted burns (such as cigarette or scald burns). In any case where child abuse is suspected in a child under the age of 2, the most appropriate next step in management is to perform a skeletal survey to identify any other occult injuries, such as fractures in different stages of healing. The 'pet lizard' and 'URI 2 weeks ago' are classic distractors intended to lead the clinician toward *Salmonella* infection or Staphylococcal Scalded Skin Syndrome (SSSS), respectively. However, the absence of fever, diarrhea, or a more generalized rash makes those diagnoses less likely than the social red flag of a caregiver's ignorance of obvious physical findings in a child in pain.

## Question 86.1

A 62-year-old woman is admitted to the hospital because of an 8-hour history of severe right upper abdominal pain, nausea, and fever that began after she ate fried fish and potatoes. During the past 3 years, she has had 12 episodes of similar pain after meals, but it has not lasted as long or been as severe as this episode. She has hypertension, hyperlipidemia, and alcohol use disorder. Her medications are amlodipine, benazepril, and simvastatin. She drinks one 12-oz beer daily. She is 163 cm (5 ft 4 in) tall and weighs 86 kg (190 lb); BMI is 33 kg/m<sup>2</sup>. Temperature is 38.5°C (101.3°F), pulse is 120/min, respirations are 28/min, and blood pressure is 100/68 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 98%. On abdominal examination, there is diffuse tenderness to palpation, rebound, and guarding. Bowel sounds are decreased. Laboratory studies show:

Hematocrit: 35%

Leukocyte count: 16,000/mm<sup>3</sup>

Serum Ca<sup>2+</sup>: 7.9 mg/dL

Urea nitrogen: 26 mg/dL

Glucose: 200 mg/dL

Creatinine: 2 mg/dL

Triglycerides: 180 mg/dL

AST: 162 U/L

ALT: 98 U/L

Amylase: 682 U/L

Lipase: 515 U/L (N=14-60)

Serum electrolyte concentrations and lactate dehydrogenase activities are within the reference ranges. Which of the Following is the most appropriate next step in diagnosis?

- (A) CT scan of the abdomen
- (B) Endoscopic retrograde cholangiopancreatography



- (C) MR cholangiopancreatography
- (D) MRI of the pancreas
- (E) Ultrasonography of the right upper abdominal quadrant

**Correct Answer:**

- (E) Ultrasonography of the right upper abdominal quadrant

**Neural Consult Response and Explanation:**

**Answer:** E

**Explanation:** The patient presents with classic signs and symptoms of acute pancreatitis (AP): severe epigastric/RUQ pain and a serum lipase level (515 U/L) that is more than eight times the upper limit of normal (60 U/L). According to the Revised Atlanta Classification, the diagnosis of acute pancreatitis requires at least two of the following three criteria: (1) characteristic abdominal pain, (2) serum lipase or amylase  $\geq 3$  times the upper limit of normal, and (3) characteristic findings on cross-sectional imaging. This patient already meets the first two criteria, so the diagnosis of AP is established. Once AP is diagnosed, the most important next step is to determine the etiology to guide management and prevent recurrence. The most common causes are gallstones and alcohol. This patient's history of recurrent postprandial RUQ pain (biliary colic) strongly suggests a biliary etiology (gallstone pancreatitis). Clinical guidelines (e.g., ACG, AGA) recommend that all patients with acute pancreatitis undergo a transabdominal right upper quadrant ultrasound (RUQ US) to evaluate for gallstones and/or biliary ductal dilation. CT scan (A) is not recommended as an initial diagnostic step unless the diagnosis is uncertain or to evaluate for complications (like necrosis) typically 48–72 hours after symptom onset. ERCP (B) is a therapeutic, not diagnostic, procedure and is reserved for patients with concurrent acute cholangitis or persistent biliary obstruction. MRCP (C) and MRI (D) are more sensitive for detecting choledocholithiasis but are not the first-line screening tools for gallstones in the setting of acute pancreatitis.

**Question 88.1**

A 63-year-old man with chronic obstructive pulmonary disease comes to the urgent treatment center because of a 4-day history of worsening shortness of breath. Use of his albuterol rescue inhaler has provided no improvement in his symptoms. Medical history otherwise is unremarkable. Additional medications are formoterol, budesonide, and tiotropium. The patient smoked two packs of cigarettes daily for 45 years but currently smokes only three to four cigarettes daily and says he is trying hard to quit. He appears anxious. He is 175 cm (5 ft 9 in) tall and weighs 100 kg (220 lb); BMI is 33 kg/m<sup>2</sup>. Temperature is 37.2°C (99.0°F), pulse is 96/min, respirations are 26/min, and blood pressure is 128/76 mm Hg. Pulse oximetry on room air discloses an oxygen saturation of 85%. Mild cyanosis is noted, but there is no clubbing or edema of the extremities. Auscultation of the lungs discloses diffuse expiratory wheezes. Cardiac examination discloses distant but regular heart sounds. Results of arterial blood gas analysis on room air are shown:

PO<sub>2</sub>: 48 mm Hg  
PCO<sub>2</sub>: 55 mm Hg



pH: 7.36

After an albuterol nebulizer treatment is administered, the patient reports feeling somewhat better but says he is feeling "jittery" and is starting to have a mild tremor. In addition to providing smoking cessation counseling and prescribing antibiotic and corticosteroid therapy, which of the following is the most appropriate next step in management?

- (A) Continuous nebulized albuterol therapy
- (B) CT scan of the chest without contrast
- (C) Intravenous aminophylline therapy
- (D) Pulmonary function testing
- (E) Pulmonary rehabilitation
- (F) Titrated oxygen therapy

**Correct Answer:**

- (F) Titrated oxygen therapy

**Neural Consult Response and Explanation:**

**Answer:** F

**Explanation:** The patient is presenting with an acute exacerbation of chronic obstructive pulmonary disease (AECOPD), characterized by worsening dyspnea, wheezing, and significant hypoxemia (SpO<sub>2</sub> 85%, PaO<sub>2</sub> 48 mm Hg). The arterial blood gas (ABG) shows a PaCO<sub>2</sub> of 55 mm Hg with a pH of 7.36, indicating a compensated respiratory acidosis, which is common in chronic CO<sub>2</sub> retainers. The most immediate and appropriate next step in management for a patient with severe hypoxemia is the administration of supplemental oxygen. In patients with COPD, oxygen therapy must be 'titrated' to a target oxygen saturation of 88-92%. This specific range is targeted to prevent worsening hypercapnia, which can occur due to the Haldane effect (displacing CO<sub>2</sub> from hemoglobin), the reversal of hypoxic pulmonary vasoconstriction (increasing dead space/V/Q mismatch), and, to a lesser extent, a decrease in the respiratory drive. (A) Continuous nebulized albuterol is incorrect because the patient is already experiencing side effects (jitteriness, tremor) from the initial treatment, and correcting hypoxemia takes priority. (B) CT scan is not indicated for the initial management of a standard AECOPD unless a pulmonary embolism or other complication is suspected. (C) Intravenous aminophylline is no longer recommended for AECOPD due to its narrow therapeutic index and significant side-effect profile. (D) Pulmonary function testing is used for the diagnosis and staging of stable COPD but is unreliable and potentially harmful during an acute exacerbation. (E) Pulmonary rehabilitation is a long-term management strategy for stable COPD and is not appropriate in the acute setting.

**Question 89.1**

A 49-year-old man returns to the office for follow-up 2 weeks after he was evaluated for a 4-month history of intermittent diarrhea associated with cramping abdominal pain, urgency, and fecal incontinence. Since the onset of these symptoms, he has had four to five bowel movements daily that



contain blood and mucus. Endoscopy done 1 week ago showed erythematous, inflamed mucosa of the rectum and sigmoid colon; there were no abnormalities of the ileum. He also had an episode of uveitis treated with intraocular corticosteroids 3 months ago. He takes no routine medications. He is 185 cm (6 ft 1 in) tall and weighs 77 kg (170 lb); BMI is 22 kg/m<sup>2</sup>. Vital signs are temperature 37.3°C (99.2°F), pulse 88/min, respirations 18/min, and blood pressure 128/80 mm Hg. Skin examination shows raised, tender nodules that are 2 to 3 cm in diameter on the anterior surfaces of both lower extremities. Palpation of the abdomen discloses mild tenderness. Rectal examination discloses no fissures or ulcers. Test of the stool for occult blood is trace positive. This patient should be counseled that he is at greatest risk for which of the following?

- (A) Adenocarcinoma of the colon
- (B) Cholelithiasis
- (C) Nephrolithiasis
- (D) Primary biliary cirrhosis
- (E) Spontaneous bacterial peritonitis

**Correct Answer:**

- (A) Adenocarcinoma of the colon

**Neural Consult Response and Explanation:**

**Answer:** A

**Explanation:** The patient's clinical presentation is classic for Ulcerative Colitis (UC). Key diagnostic features include a 4-month history of bloody diarrhea with mucus, urgency, and fecal incontinence, combined with endoscopic findings of continuous, erythematous, and inflamed mucosa starting from the rectum and extending to the sigmoid colon (proctosigmoiditis), with a normal ileum. Furthermore, the patient exhibits extraintestinal manifestations of inflammatory bowel disease, specifically uveitis and erythema nodosum (tender, raised nodules on the anterior lower extremities). Patients with long-standing UC are at a significantly increased risk for developing adenocarcinoma of the colon; this risk correlates with the duration of the disease and the extent of colonic involvement, necessitating regular surveillance colonoscopies. Regarding the other options: (B) Cholelithiasis and (C) Nephrolithiasis are more commonly associated with Crohn's disease due to ileal involvement leading to bile acid malabsorption and increased oxalate absorption, respectively. (D) Primary biliary cirrhosis (now called Primary Biliary Cholangitis) is not associated with UC; however, Primary Sclerosing Cholangitis (PSC) is strongly associated with UC. (E) Spontaneous bacterial peritonitis is a complication seen in patients with cirrhosis and ascites, not UC.

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**Question 90.1**

A 27-year-old man is examined in the intensive care unit 1 day after he sustained a closed head injury, liver laceration, and pelvic fracture in a motor vehicle collision. He is intubated and mechanically ventilated. He is receiving intravenous midazolam and 5% dextrose in lactated Ringer solution. Temperature is 37.8°C (100.0°F), pulse is 95/min, and blood pressure is 100/70 mm Hg. Cardiopulmonary examination shows no abnormalities. The abdomen is soft. He withdraws appropriately to painful stimuli. Laboratory studies show:



Hematocrit: 28%  
Leukocyte count: 13,000/mm<sup>3</sup>  
Serum Na<sup>+</sup>: 138 mEq/L  
K<sup>+</sup>: 3.5 mEq/L  
Cl<sup>-</sup>: 102 mEq/L  
HCO<sub>3</sub><sup>-</sup>: 24 mEq/L  
Urea nitrogen: 20 mg/dL  
Glucose: 220 mg/dL  
Creatinine: 1 mg/dL

Which of the following is the most likely mechanism of these laboratory findings?

- (A) Decreased uptake of glucose by insulin-sensitive tissues
- (B) Exogenous production of glucose by bacteria
- (C) Impaired excretion of glucose by the kidneys
- (D) Increased infusion of intravenous glucose
- (E) Insulin deficiency

**Correct Answer:**

- (A) Decreased uptake of glucose by insulin-sensitive tissues

**Neural Consult Response and Explanation:**

**Answer:** A

**Explanation:** The patient is exhibiting stress-induced hyperglycemia (glucose of 220 mg/dL) following severe trauma (closed head injury, liver laceration, and pelvic fracture). In response to severe physiological stress, the body releases high levels of counter-regulatory hormones, including cortisol, catecholamines (epinephrine and norepinephrine), glucagon, and growth hormone. These hormones collectively work to increase blood glucose levels to ensure a steady energy supply for the brain and vital organs. The primary mechanisms for this hyperglycemia are twofold: 1) increased hepatic glucose production through gluconeogenesis and glycogenolysis, and 2) peripheral insulin resistance. Specifically, cortisol and catecholamines antagonize the effects of insulin, leading to decreased translocation of glucose transporter 4 (GLUT<sub>4</sub>) to the cell membranes of insulin-sensitive tissues such as skeletal muscle and adipose tissue. This results in decreased uptake of glucose by these tissues. While the patient is receiving 5% dextrose (D<sub>5</sub>), a healthy individual would typically maintain normal blood glucose levels under such a load; the elevation to 220 mg/dL is driven by the underlying metabolic stress response. Therefore, 'decreased uptake of glucose by insulin-sensitive tissues' is the most accurate description of the physiological mechanism provided in the options. Option (E) is incorrect because stress hyperglycemia is characterized by insulin resistance rather than an absolute insulin deficiency. Option (C) is incorrect as the patient has normal renal function (Creatinine 1 mg/dL), and impaired excretion is not a cause of hyperglycemia. Option (B) is medically implausible.



## Question 91.1

A 72-year-old woman is evaluated in the acute rehabilitation facility where she has been receiving physical therapy since sustaining a stroke 2 weeks ago that resulted in moderate left hemiparesis. A swallowing study obtained on admission to the facility showed no abnormalities and she has been progressing well with her rehabilitation. She is able to walk with the aid of a walker and assistant, has no speech impairment, and tolerates a regular diet. Medical history also is notable for well-controlled hypertension and hyperlipidemia. Medications are lisinopril, simvastatin, and daily aspirin. Temperature is 37.0°C (98.6°F), pulse is 72/min and regular, respirations are 12/min, and blood pressure is 130/80 mm Hg. Cardiopulmonary examination shows no abnormalities. Cranial nerves are intact. Muscle strength in the extremities is 4/5 on the left and 5/5 on the right. Sensation is intact bilaterally. Standardized assessment of cognitive function shows no abnormalities. For the past 2 days, the patient has insisted that she is well enough to go home despite not being fully cleared to do so by her physical therapist and physiatrist, who want her to stay for 1 more week to try to advance from the walker to a cane. The patient lives with her daughter, son-in-law, and grandson, and has a bedroom on the main floor of the house with no need to use stairs. The daughter works as a stay-at-home mother. Which of the following is the most appropriate next step in management?

- (A) Discharge the patient with a plan for home health care and physical therapy
- (B) Inform the patient that she would need to sign out against medical advice
- (C) Inform the patient that transfer to a long-term care facility is most suitable for her
- (D) Request psychiatric evaluation of the patient's decision-making capacity

### Correct Answer:

- (A) Discharge the patient with a plan for home health care and physical therapy

### Neural Consult Response and Explanation:

**Answer:** A

**Explanation:** The most appropriate next step in management is to discharge the patient with a plan for home health care and physical therapy. This approach prioritizes patient autonomy and shared decision-making. The patient is 72 years old and has been recovering well from a stroke; she is medically stable, tolerating a regular diet, and has shown significant improvement in mobility (walking with a walker). Crucially, the prompt states that her standardized cognitive assessment shows no abnormalities, meaning she has the capacity to make her own medical decisions. While the medical team (physiatrist and physical therapist) suggests staying one more week to transition from a walker to a cane, this is an optimization of her rehabilitation rather than a critical safety requirement. Her home environment is highly supportive: she lives on the main floor (no stairs) and has a stay-at-home daughter to assist her. Therefore, her request to return home is reasonable and safe. Option (B) is incorrect because 'Against Medical Advice' (AMA) is an adversarial designation that should be avoided when a safe and medically sound alternative plan (like home health care) can be established. Option (C) is incorrect as she does not require long-term care given her progress and home support. Option (D) is incorrect because a psychiatric evaluation for capacity is not indicated when a patient is cognitively intact and making a rational, safe decision that simply differs from the physician's preferred timeline.



## Question 92.1

A 46-year-old woman comes to the office for an annual health maintenance examination. She reports a 6-week history of fatigue, which she attributes to working full time and caring for her three children. Her blood pressure has been consistently high as measured at home with her husband's automated cuff, with many readings greater than 150/90 mm Hg. Medical history is unremarkable and routine preventive screenings, including mammography and Pap smear, have shown no abnormalities. Her only medications are a daily multivitamin and ibuprofen as needed. She is 165 cm (5 ft 5 in) tall and weighs 72 kg (158 lb); BMI is 26 kg/m<sup>2</sup>. Pulse is 84/min, and blood pressure is 152/98 mm Hg. Physical examination shows trace edema of the ankles but no other abnormalities. Results of serum studies are shown:

Urea nitrogen: 12 mg/dL

Creatinine: 0.9 mg/dL

Na<sup>+</sup>: 141 mEq/L

K<sup>+</sup>: 3.1 mEq/L

Cl<sup>-</sup>: 100 mEq/L

HCO<sub>3</sub><sup>-</sup>: 23 mEq/L

Which of the following is the most likely explanation for this patient's increased blood pressure?

- (A) Cushing syndrome
- (B) Fibromuscular dysplasia
- (C) Hyperaldosteronism
- (D) Hypothyroidism
- (E) Obstructive sleep apnea

**Correct Answer:**

(C) Hyperaldosteronism

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient's clinical presentation of hypertension (152/98 mm Hg) and hypokalemia (potassium 3.1 mEq/L) is a classic indicator of hyperaldosteronism. In this condition, excess aldosterone acts on the mineralocorticoid receptors in the distal tubule and collecting duct of the kidney, leading to increased sodium reabsorption and increased potassium and hydrogen ion secretion. The resulting sodium retention causes volume expansion and hypertension, while the potassium loss leads to hypokalemia. Fatigue is a common symptom of hypokalemia. Primary hyperaldosteronism is the most common endocrine cause of secondary hypertension. While fibromuscular dysplasia (Option B) can cause secondary hyperaldosteronism via the activation of the renin-angiotensin-aldosterone system, it is statistically less common than primary hyperaldosteronism and typically presents with a renal artery bruit or more severe, resistant hypertension. Cushing syndrome (Option A) can cause hypertension and hypokalemia but is usually accompanied by distinct physical findings such as central obesity, moon facies, and purple striae, which are absent here. Hypothyroidism (Option D) and obstructive sleep apnea (Option E) are common causes of secondary hypertension but do not explain the electrolyte abnormality of hypokalemia.

### Question 93.1

A 50-year-old woman is brought to the emergency department because of a 3-day history of severely painful lesions over her right leg and temperatures to 38.7°C (101.7°F). She has a 12-year history of type 2 diabetes mellitus. Her only medication is insulin. On arrival, temperature is 39.3°C (102.8°F). Examination of the right lower extremity shows exquisite tenderness to palpation, edema, and warmth. The extremity appears shiny and diffusely erythematous without sharp margins. The subcutaneous tissue is firm, and there are areas of notable skin breakdown with bullae containing thick purple fluid. Examination of the left lower extremity shows no abnormalities. Which of the following is the most likely diagnosis?

- (A) Cellulitis
- (B) Dermatophytosis
- (C) Erysipelas
- (D) Erythema nodosum
- (E) Herpes zoster
- (F) Necrotizing fasciitis

**Correct Answer:**

(F) Necrotizing fasciitis

**Neural Consult Response and Explanation:**



**Answer:** F

**Explanation:** The patient's clinical presentation is highly suggestive of necrotizing fasciitis (NF), a life-threatening, rapidly progressive infection of the deep fascia and subcutaneous tissues. Several key features point toward this diagnosis over simpler skin infections: 1) Exquisite tenderness to palpation: This is often described as 'pain out of proportion' to the visible skin findings and is a hallmark early sign of NF. 2) Systemic toxicity: The patient has a high fever (39.3°C), indicating a severe systemic inflammatory response. 3) Skin findings: The presence of bullae containing 'thick purple fluid' (hemorrhagic bullae) and skin breakdown indicates underlying tissue necrosis, which is not typical for cellulitis. 4) Subcutaneous tissue firmness: The 'firm' nature of the subcutaneous tissue (often described as woody induration) suggests deep-seated involvement. 5) Risk factors: Her 12-year history of diabetes mellitus is a significant risk factor for polymicrobial (Type I) necrotizing fasciitis. While cellulitis (A) and erysipelas (C) present with erythema and warmth, they typically lack the hemorrhagic bullae, exquisite tenderness, and deep tissue induration seen here. Erysipelas is also characterized by sharply demarcated margins, which are absent in this case. Dermatophytosis (B), erythema nodosum (D), and herpes zoster (E) do not present with this level of systemic toxicity or the specific necrotic skin changes described.

## Question 94.1

A 37-year-old woman comes to the office for a routine health maintenance examination. For the past 6 years, she has worked in a paper mill factory that uses liquid chlorine to bleach the paper. The patient is concerned about her exposure to toxic substances. Vital signs are within normal limits. Examination shows no abnormalities. Which of the following is the most appropriate recommendation to address this patient's concerns?

- (A) Corticosteroid therapy
- (B) Taking frequent breaks from the paper-bleaching area
- (C) Undergoing monthly pulmonary function testing
- (D) Using a respirator at work
- (E) Washing daily after work with a chlorhexidine-based solution

**Correct Answer:**

- (D) Using a respirator at work

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient is concerned about chronic occupational exposure to chlorine, a highly water-soluble gas used in the paper-bleaching process. Chlorine acts as a potent pulmonary irritant that primarily affects the upper and lower respiratory tract by causing direct mucosal damage upon inhalation. In an asymptomatic patient seeking to minimize the risk of toxic exposure, the most appropriate recommendation is primary prevention. Using a respirator at work (Option D) is the standard personal protective equipment (PPE) recommended to prevent the inhalation of toxic gases and vapors when engineering controls (like ventilation) are insufficient or as an added layer of safety. Corticosteroid therapy (Option A) is indicated for treating inflammatory airway responses following acute exposure but has no role in prevention for an asymptomatic individual. Taking frequent breaks (Option B) may slightly reduce the total dose of exposure but does not provide the consistent protection offered by a respirator. Monthly pulmonary function testing (Option C) is a method of monitoring for the development of obstructive or restrictive lung disease but does not prevent the exposure itself; furthermore, monthly testing is unnecessarily frequent for an asymptomatic worker. Washing with chlorhexidine (Option E) is inappropriate because chlorine exposure in this context is primarily an inhalational hazard, not a dermal one, and chlorhexidine is an antiseptic rather than a neutralizing agent for chlorine.

## Question 95.1

A 57-year-old man with alcohol use disorder comes to the emergency department because of a 3-day history of worsening abdominal pain and distention. Medical history is remarkable for alcoholic cirrhosis, hypertension, hyperlipidemia, and a laparoscopic cholecystectomy 10 years ago. The patient also has had several previous hospital admissions for similar episodes of abdominal pain and distention. The patient takes no medications but has been prescribed medications for hypertension in the past. He recently participated in an alcohol rehabilitation program but began drinking alcohol again 1 week ago. During the past 5 days, he has drunk 1 L of vodka daily. Pulse is 100/min, respirations are 16/min, and blood pressure is 165/85 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 100%. The patient appears jaundiced. Cardiopulmonary examination discloses no abnormalities. The abdomen is large, distended, and tense; a fluid wave is present. Palpation of the abdomen discloses a 2-cm–wide reducible umbilical hernia and diffuse tenderness without guarding. There is no tenderness to percussion. In addition to large-volume paracentesis and furosemide therapy, initiation of which of the following pharmacotherapies is most appropriate?

- (A) Enalapril
- (B) Metoprolol
- (C) Propranolol
- (D) Spironolactone
- (E) Valsartan

**Correct Answer:**

- (D) Spironolactone

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient presents with decompensated alcoholic cirrhosis, evidenced by jaundice and tense ascites (abdominal distention, fluid wave). The management of cirrhotic ascites involves dietary sodium restriction and diuretic therapy. The standard diuretic regimen for managing ascites in cirrhosis is a combination of a loop diuretic (such as furosemide) and an aldosterone antagonist (such as spironolactone). This combination is preferred because cirrhosis is characterized by secondary hyperaldosteronism, where the renin-angiotensin-aldosterone system (RAAS) is highly activated due to splanchnic vasodilation and decreased effective arterial blood volume. Spironolactone directly counteracts the effects of elevated aldosterone on the distal tubule and collecting duct. A standard ratio of 100 mg of spironolactone to 40 mg of furosemide is typically used to maintain potassium balance. While the patient has hypertension, ACE inhibitors (Enalapril) and ARBs (Valsartan) are generally avoided in patients with cirrhosis and ascites because they can cause profound hypotension and precipitate acute kidney injury or hepatorenal syndrome by blocking the compensatory RAAS activation required to maintain systemic blood pressure. Propranolol (a non-selective beta-blocker) is used for the prophylaxis of variceal bleeding but is not a treatment for ascites itself; furthermore, it may be detrimental in patients with severe or refractory ascites. Metoprolol is a selective beta-1 blocker and has no role in the management of portal hypertension or ascites. Therefore, adding spironolactone to the patient's current furosemide therapy is the most appropriate next step.

## Question 96.1

A 48-year-old man is admitted to the hospital 2 hours after the onset of severe abdominal pain, nausea, and vomiting. The pain radiates to the back but improves when he bends forward. He has no history of serious illness and takes no medications. He does not smoke cigarettes. He drinks two 12-oz beers weekly. He appears restless. He is 173 cm (5 ft 8 in) tall and weighs 90 kg (198 lb); BMI is  $30 \text{ kg/m}^2$ . Temperature is  $38.0^\circ\text{C}$  ( $100.4^\circ\text{F}$ ), pulse is 110/min, respirations are 20/min, and blood pressure is 110/60 mm Hg. On pulmonary examination, decreased breath sounds are heard at the lung bases; there is dullness to percussion. Abdominal examination shows distention and severe tenderness to palpation of the epigastrium and left upper quadrant. Laboratory studies show:

Hemoglobin: 13.5 g/dL

Serum Urea nitrogen: 30 mg/dL

Glucose: 120 mg/dL

Creatinine: 1.2 mg/dL

Cholesterol: 300 mg/dL

Triglycerides: 1500 mg/dL

Total bilirubin: 1.1 mg/dL

Amylase: 300 U/L

Administration of intravenous fluids and analgesics is begun. The patient's abdominal pain, nausea, and vomiting decrease. Which of the following is the most appropriate next step in management? Choose one among the choices below.

(A) Apheresis



- (B) Ezetimibe therapy
- (C) Gemfibrozil therapy
- (D) Metformin therapy
- (E) Recommendation for weight loss

**Correct Answer:**

- (C) Gemfibrozil therapy

**Neural Consult Response and Explanation:**

**Answer:** C

**Explanation:** The patient presents with clinical and laboratory evidence of acute pancreatitis (severe epigastric pain radiating to the back, nausea, vomiting, and an elevated amylase level). The most likely etiology is severe hypertriglyceridemia, as his triglyceride level is 1500 mg/dL (levels >1000 mg/dL are a well-established cause of acute pancreatitis). In hypertriglyceridemia-induced pancreatitis, amylase levels may sometimes be only mildly elevated due to interference with the assay, but the clinical picture remains diagnostic. After initial stabilization with intravenous fluids and analgesia, the management must focus on lowering the triglyceride levels to prevent recurrence. Fibrates, such as gemfibrozil, are the first-line pharmacologic therapy for severe hypertriglyceridemia (TG >500 mg/dL). Apheresis (Option A) is typically reserved for patients with triglyceride levels >1000 mg/dL who also exhibit signs of severe pancreatitis, such as organ failure, hypocalcemia, or worsening systemic inflammation; since this patient is improving with conservative management, apheresis is not indicated. Ezetimibe (Option B) is primarily used for lowering LDL cholesterol and is not a first-line agent for severe hypertriglyceridemia. Metformin (Option D) and weight loss (Option E) are important for long-term management of metabolic syndrome and glycemic control but are not the most appropriate next steps for the acute reduction of severely elevated triglycerides to prevent recurrent pancreatitis.

**Question 97.1**

A 57-year-old man is admitted to the hospital 30 minutes after he was found wandering in the streets. Fingerstick blood glucose concentration obtained by paramedics prior to transport was 68 mg/dL. The patient's medical history is unknown. Temperature is 35.8°C (96.5°F), pulse is 80/min, respirations are 16/min, and blood pressure is 106/70 mm Hg. The patient appears disheveled and is not oriented to person, place, or time. Physical examination shows mild conjunctival icterus. Cardiopulmonary examination discloses no abnormalities. Abdominal examination discloses a small fluid wave. There is palmar erythema and 1+ pitting edema of the lower extremities. Gait is broad based and ataxic. The patient is unable to cooperate with ocular or neurologic examinations. ECG shows a regular sinus rhythm and no acute abnormalities. Results of toxicology screening are pending. The most appropriate initial step in management is to administer which of the following?

- (A) Glucose
- (B) Vitamin B<sub>1</sub> (thiamine)
- (C) Vitamin B<sub>2</sub> (riboflavin)



- (D) Vitamin B<sub>6</sub> (pyridoxine)
- (E) Vitamin B<sub>12</sub> (cyanocobalamin)

**Correct Answer:**

- (B) Vitamin B<sub>1</sub> (thiamine)

**Neural Consult Response and Explanation:**

**Answer:** B

**Explanation:** The patient presents with a classic clinical picture of Wernicke Encephalopathy (WE), characterized by the triad of encephalopathy (disorientation), gait ataxia (broad-based gait), and oculomotor dysfunction (though the latter was not fully assessable here). The physical findings of conjunctival icterus, palmar erythema, and a fluid wave (ascites) strongly suggest chronic liver disease, most likely secondary to chronic alcohol use disorder, which is the most common cause of thiamine (Vitamin B<sub>1</sub>) deficiency. In patients with suspected thiamine deficiency, it is critical to administer thiamine before or concurrently with glucose. Thiamine is a necessary cofactor for key enzymes in the glucose metabolic pathway, specifically pyruvate dehydrogenase and alpha-ketoglutarate dehydrogenase. Administering a glucose load (Option A) to a thiamine-deficient patient can acutely deplete remaining thiamine stores, potentially precipitating or irreversibly worsening Wernicke Encephalopathy. While the patient's blood glucose is 68 mg/dL (low-normal), the risk of neurological damage from untreated WE outweighs the risk of delaying glucose for the few minutes it takes to administer thiamine. Vitamins B<sub>2</sub> (C), B<sub>6</sub> (D), and B<sub>12</sub> (E) are not the appropriate initial treatments for this acute neurological presentation.

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**Question 98.1**

Three days after an operation for uterine cancer, a hospitalized 67-year-old woman develops edema of the right lower extremity. Doppler ultrasonography shows a deep venous thrombosis (DVT). Review of the patient's record indicates that no DVT prophylaxis was initiated perioperatively. Which of the following is the best approach to prevent a similar adverse event in the future?

- (A) Conduct a nursing in-service regarding DVT prophylaxis
- (B) Develop an institutional policy with standardized orders for DVT prophylaxis
- (C) Encourage early ambulation during the postoperative period
- (D) Prescribe low-molecular-weight heparin for all postoperative patients
- (E) No intervention indicated because this is an isolated case and does not occur frequently

**Correct Answer:**

- (B) Develop an institutional policy with standardized orders for DVT prophylaxis

**Neural Consult Response and Explanation:**



**Answer: B**

**Explanation:** The clinical scenario describes a systemic failure in providing standard-of-care venous thromboembolism (VTE) prophylaxis to a high-risk patient (67 years old, major surgery for malignancy). In the field of patient safety and quality improvement, the most effective way to prevent the recurrence of such 'omission errors' is to implement systems-level changes rather than relying on individual memory or education alone. Option (B), developing an institutional policy with standardized orders (often called 'order sets'), acts as a 'forcing function' or a decision-support tool that ensures every surgical patient is evaluated for VTE risk and that appropriate prophylaxis is ordered as a routine part of the perioperative process. Option (A) is less effective because education alone does not change workflow or guarantee compliance. Option (C) is a component of prophylaxis but is insufficient as a standalone measure for a high-risk cancer surgery patient. Option (D) is incorrect because prophylaxis must be tailored to the individual's risk of thrombosis versus their risk of bleeding; a blanket prescription for all patients without risk stratification is clinically inappropriate. Option (E) is incorrect because VTE is a leading cause of preventable hospital death, and a single failure indicates a need for process improvement.

## Question 99.1

A clinical trial is performed to assess the efficacy of aspirin in decreasing the risk for myocardial infarction. Twenty-two thousand male physicians with no history of coronary artery disease are randomly assigned to receive aspirin (325 mg/d) or a placebo. After following the subjects for 5 years, results show that the incidence of myocardial infarction is 1.2% in the aspirin group and 2.2% in the placebo group. The reduction in incidence is statistically significant. Which of the following is the most accurate interpretation of these results?

- (A) Absolute risk reduction is 1%
- (B) Absolute risk reduction is 10%
- (C) Number needed to treat is 4
- (D) Number needed to treat is 25
- (E) Relative risk reduction is 25%
- (F) Relative risk reduction is 75%

**Correct Answer:**

- (A) Absolute risk reduction is 1%

**Neural Consult Response and Explanation:**



**Answer: A**

**Explanation:** To determine the correct interpretation of the clinical trial results, we must calculate the key epidemiological metrics: Absolute Risk Reduction (ARR), Relative Risk Reduction (RRR), and Number Needed to Treat (NNT).

1. **Absolute Risk Reduction (ARR)**: This is the difference between the incidence rate in the control (placebo) group and the incidence rate in the treatment (aspirin) group.

$$\text{ARR} = \text{Incidence}(\text{placebo}) - \text{Incidence}(\text{aspirin}) = 2.2\% - 1.2\% = 1.0\%.$$

2. **Relative Risk Reduction (RRR)**: This is the proportion of risk reduced in the treatment group compared to the control group.

$$\text{RRR} = (\text{Incidence}(\text{placebo}) - \text{Incidence}(\text{aspirin})) / \text{Incidence}(\text{placebo}) = \text{ARR} / \text{Incidence}(\text{placebo}) = 1.0\% / 2.2\% \approx 45.45\%.$$

3. **Number Needed to Treat (NNT)**: This is the number of patients who need to be treated to prevent one additional bad outcome. It is the inverse of the ARR (expressed as a decimal).

$$\text{NNT} = 1 / \text{ARR} = 1 / 0.01 = 100.$$

Evaluating the options:

(A) Absolute risk reduction is 1%: This matches our calculation ( $2.2\% - 1.2\% = 1.0\%$ ).

(B) Absolute risk reduction is 10%: Incorrect calculation.

(C) Number needed to treat is 4: Incorrect; NNT is 100.

(D) Number needed to treat is 25: Incorrect; NNT is 100.

(E) Relative risk reduction is 25%: Incorrect; RRR is approximately 45.5%.

(F) Relative risk reduction is 75%: Incorrect; RRR is approximately 45.5%.

Therefore, the most accurate interpretation is that the absolute risk reduction is 1%.

## Question 100.1

An 18-year-old man is being prepared to undergo left temporal craniotomy for meningioma. General anesthesia has been administered. The surgeon reviews the patient's most recent MRI findings, which are hanging on a view box in the operating room, and prepares to clip the hair from the patient's right scalp. The circulating nurse is concerned because the signed operative consent form indicates a left temporal craniotomy. Which of the following is the most appropriate course of action for the circulating nurse?

(A) No action is required

(B) Review the MRI to determine the correct operative site

(C) Ask the surgeon to continue the operation only after the discrepancy is resolved

(D) Change the operative consent to match the surgeon's actions

(E) Call the waiting room to confirm the correct operative site with the patient's parents

(F) Write a postoperative incident report only

**Correct Answer:**



(C) Ask the surgeon to continue the operation only after the discrepancy is resolved

### Neural Consult Response and Explanation:

**Answer:** C

**Explanation:** The scenario describes a critical discrepancy between the signed operative consent (left temporal craniotomy) and the surgeon's intended action (preparing the right scalp). This situation represents a potential 'never event'—wrong-site surgery. According to the Universal Protocol established by The Joint Commission, any member of the surgical team who identifies a discrepancy regarding the patient, procedure, or site must speak up and ensure that the procedure does not proceed until the conflict is resolved. The circulating nurse, acting as the patient's advocate, must intervene immediately to halt the preparation and ensure a formal 'time-out' or verification process occurs to reconcile the consent form, the imaging, and the surgical plan. Option (A) is incorrect as it ignores a major safety risk. Option (B) is incorrect because, while imaging is part of the verification, the nurse cannot unilaterally decide the site based on imaging alone when it contradicts the legal consent. Option (D) is illegal and unethical. Option (E) may be a step in the resolution process but is not the immediate priority over stopping the surgeon. Option (F) is reactive rather than preventive, failing to protect the patient from harm.

### Question 101.1

A 52-year-old man is brought to the emergency department because of a 2-day history of severe, progressive shortness of breath associated with exacerbation of his chronic cough. He has a 6-week history of pneumonia, which has responded slowly to treatment. Prior to the onset of his current symptoms, he had minimally productive cough and mild shortness of breath after walking one or two blocks. He also has had a low-grade fever for 6 days. He has no other history of serious illness. Current medications are erythromycin and an over-the-counter cough suppressant. He has smoked one pack of cigarettes daily for 20 years. On arrival, he appears ill. He is diaphoretic and in severe respiratory distress. Temperature is 38.1°C (100.6°F), pulse is 110/min, respirations are 36/min and shallow, and blood pressure is 70/50 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 83%. Examination shows perioral cyanosis. There is no jugular venous distention. Diffuse crackles and wheezes are heard throughout the lungs. Heart sounds are normal. While a blood sample is being taken, the patient's blood pressure decreases, and he stops breathing. He is intubated, and mechanical ventilation is begun. Laboratory studies show:

Hematocrit: 42%

Leukocyte count: 16,000/mm<sup>3</sup>

Segmented neutrophils: 85%

Lymphocytes: 15%

Platelet count: 200,000/mm<sup>3</sup>

Arterial blood gas analysis on an FIO<sub>2</sub> of 1.0 shows:

pH: 7.35 PCO<sub>2</sub>: 42 mm Hg

PO<sub>2</sub>: 55 mm Hg



Chest x-ray shows diffuse alveolar infiltrates bilaterally and no cardiomegaly. Following intravenous administration of fluids, his blood pressure increases to 118/80 mm Hg. Which of the following is the most appropriate next step in management?

- (A) Continuation of mechanical ventilation at the current setting
- (B) Administration of cyclophosphamide
- (C) Administration of dexamethasone
- (D) Extracorporeal membrane oxygenation
- (E) Application of positive end-expiratory pressure

**Correct Answer:**

- (E) Application of positive end-expiratory pressure

**Neural Consult Response and Explanation:**

**Answer:** E

**Explanation:** The patient presents with acute respiratory failure following a 6-week history of pneumonia, characterized by severe hypoxemia ( $\text{PaO}_2$  55 mmHg on  $\text{FiO}_2$  1.0), bilateral diffuse alveolar infiltrates on chest X-ray, and no evidence of cardiogenic pulmonary edema (normal heart sounds, no cardiomegaly, no jugular venous distention). These findings meet the Berlin criteria for severe Acute Respiratory Distress Syndrome (ARDS), defined by a  $\text{PaO}_2/\text{FiO}_2$  ratio  $\leq 100$  mmHg (this patient's ratio is 55). The primary goal in managing ARDS is lung-protective ventilation. While the patient has been intubated, the current arterial blood gas shows that oxygenation is still critically low despite 100% oxygen. Positive end-expiratory pressure (PEEP) is the most appropriate next step because it improves oxygenation by recruiting collapsed alveoli, increasing the functional residual capacity, and reducing intrapulmonary shunting. (A) is incorrect because the current settings are failing to provide adequate oxygenation. (B) is not a standard treatment for ARDS or pneumonia. (C) Dexamethasone may be used as an adjunctive therapy in ARDS, but optimizing ventilator settings to address life-threatening hypoxemia is the immediate priority. (D) ECMO is a rescue therapy reserved for patients who remain refractory to optimized conventional mechanical ventilation and prone positioning.

**Question 102.1**

A 14-year-old boy is brought to the emergency department by his parents 30 minutes after the sudden onset of confusion, sweating, and pallor. He has enuresis treated with imipramine. His parents refilled his prescription for imipramine 3 days ago and noted today that the bottle is empty. On arrival, the patient is awake but confused. Temperature is 37.0°C (98.6°F), pulse is 80/min, respirations are 8/min, and blood pressure is 100/60 mm Hg. Examination shows dilated pupils and flushed skin. In addition to ensuring an adequate airway and establishing intravenous access, which of the following is the most appropriate initial step in management?

- (A) Cardiac monitoring



- (B) Chest x-ray
- (C) Echocardiography
- (D) EEG
- (E) Measurement of serum imipramine concentration

**Correct Answer:**

- (A) Cardiac monitoring

**Neural Consult Response and Explanation:**

**Answer:** A

**Explanation:** The patient's presentation—confusion, dilated pupils, flushed skin, and a history of an empty imipramine bottle—is highly suggestive of a tricyclic antidepressant (TCA) overdose. TCAs like imipramine cause toxicity through several mechanisms: anticholinergic effects, alpha-1 adrenergic blockade, and, most critically, blockade of cardiac sodium channels and potassium channels. Sodium channel blockade leads to QRS interval prolongation, which can progress to life-threatening ventricular arrhythmias (such as ventricular tachycardia) and cardiac arrest. Potassium channel blockade can lead to QT prolongation and Torsades de Pointes. Therefore, after stabilizing the airway and establishing intravenous access, the most appropriate initial step is continuous cardiac monitoring to detect early signs of cardiotoxicity (specifically QRS widening >100 ms), which would necessitate treatment with intravenous sodium bicarbonate. Measurement of serum imipramine concentration (E) is not useful for acute management as levels do not correlate well with the severity of toxicity and the results are not immediately available. EEG (D) and echocardiography (C) are not part of the initial stabilization phase. A chest x-ray (B) is not indicated unless there is a specific concern for aspiration or pulmonary edema, which are not the primary concerns in the immediate management of TCA toxicity.

**Question 103.1**

A 65-year-old man with mild hypertension comes to the veterans' administration outpatient clinic because he is concerned about having an abdominal aortic aneurysm. He says he feels well. His medications are metoprolol and lisinopril. His older brother, who was "seemingly in good health," recently underwent emergency repair of a ruptured abdominal aortic aneurysm that had not been diagnosed previously. The patient retired from the military 15 years ago. He smoked one-half pack of cigarettes daily for 20 years but quit 20 years ago. He is 183 cm (6 ft 0 in) tall and weighs 84 kg (185 lb); BMI is 25 kg/m<sup>2</sup>. Pulse is 72/min and regular, and blood pressure is 140/85 mm Hg. Abdominal examination shows no organomegaly or tenderness to palpation. The aortic pulsation is estimated at 3 cm in width. A midepigastric bruit is heard. The remainder of the examination shows no abnormalities. Which of the following is the most appropriate next step in diagnosis?

- (A) CT scan of the abdomen and pelvis
- (B) Digital angiography of the aorta
- (C) Duplex ultrasonography of the abdomen
- (D) X-ray of the abdomen



(E) No diagnostic imaging is indicated

**Correct Answer:**

(C) Duplex ultrasonography of the abdomen

**Neural Consult Response and Explanation:**

**Answer:** C

**Explanation:** The patient is a 65-year-old male who is a former smoker and has a significant family history of abdominal aortic aneurysm (AAA) in a first-degree relative. According to the United States Preventive Services Task Force (USPSTF) guidelines, one-time screening for AAA with ultrasonography is recommended for men aged 65 to 75 years who have ever smoked (Grade B recommendation). Furthermore, the Society for Vascular Surgery (SVS) recommends screening for any male over 65, and for those with a family history of AAA. On physical examination, the patient has a palpable aortic pulsation estimated at 3 cm and a midepigastriic bruit, both of which increase the clinical suspicion of an aneurysm. Abdominal ultrasonography is the preferred initial diagnostic and screening tool because it is non-invasive, cost-effective, lacks radiation exposure, and has high sensitivity (95%) and specificity (nearly 100%) for detecting AAA. While CT (Option A) provides more anatomical detail, it is generally reserved for preoperative planning or evaluating symptomatic patients (e.g., suspected rupture). Angiography (Option B) is an invasive procedure used during intervention, not for initial diagnosis. X-ray (Option D) is insensitive for AAA diagnosis. Option E is incorrect because the patient meets multiple criteria for indicated screening.

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**Question 104.1**

A 57-year-old man comes to the physician because of a 1-month history of fatigue and moderate low back pain. He also has had a mildly decreased appetite resulting in a 1.8-kg (4-lb) weight loss during this period. He has a 1-week history of headache. He has had no fever, sweating, or chills. He has hypertension well controlled with triamterene-hydrochlorothiazide. Other medications include 81-mg aspirin, ibuprofen, and a daily multivitamin. He appears tired. Examination shows slightly pale conjunctivae. A grade 2/6 systolic flow murmur is heard best at the lower left sternal border. The remainder of the examination shows no abnormalities. Test of the stool for occult blood is negative. Laboratory studies show:

Hematocrit: 32%

Mean corpuscular volume:  $102 \mu\text{m}^3$  Leukocyte count :9200/mm<sup>3</sup>

Segmented neutrophils: 66%

Bands: 3%

Lymphocytes: 31%

Platelet count: 325,000/mm<sup>3</sup> Red cell distribution width: 15.6% (N=13%–15%) Serum Ca<sup>2+</sup>: 10.8 mg/dL

Urea nitrogen: 18 mg/dL

Glucose: 108 mg/dL



Creatinine: 1.5 mg/dL  
Albumin: 3 g/dL

X-rays of the lumbosacral spine show mild osteopenia. Which of the following is the most appropriate next step in diagnosis?

- (A) Serum protein electrophoresis
- (B) Echocardiography
- (C) Bone scan
- (D) Colonoscopy
- (E) Esophagogastroduodenoscopy

**Correct Answer:**

(A) Serum protein electrophoresis

**Neural Consult Response and Explanation:**

**Answer:** A

**Explanation:** The patient's clinical presentation is highly suggestive of multiple myeloma (MM), characterized by the 'CRAB' criteria: hypercalcemia, renal insufficiency, anemia, and bone lesions. Specifically, this 57-year-old man has low back pain and osteopenia (Bone), a corrected calcium of 11.6 mg/dL (calculated as  $10.8 + 0.8 * [4.0 - 3.0]$ ) (Calcium), a hematocrit of 32% with pale conjunctivae and a flow murmur (Anemia), and a creatinine of 1.5 mg/dL, which is elevated for his age (Renal). The most appropriate next step to screen for multiple myeloma is a serum protein electrophoresis (SPEP) to look for a monoclonal (M) protein spike. Other options are less appropriate: (B) Echocardiography is unnecessary as the murmur is likely a flow murmur from anemia. (C) Bone scan (technetium-99m) is insensitive for multiple myeloma because it detects osteoblastic activity, whereas myeloma lesions are primarily osteolytic and often appear 'cold' on a bone scan. (D) and (E) Colonoscopy and EGD are used to evaluate for gastrointestinal malignancies; however, the negative stool occult blood and the presence of hypercalcemia and bone pain make a plasma cell dyscrasia much more likely.

**Question 105.1**

A 38-year-old woman, gravida 1, para 1, comes to the office because she has been unable to conceive for the past year. She and her husband have had unprotected sexual intercourse three times weekly during this time. They have a 6-year-old daughter. During the past year, menses have occurred at irregular 90- to 120-day intervals. Her last menstrual period was 2 months ago. Menses previously occurred at regular 30-day intervals. She used an oral contraceptive for 4 years after the birth of her daughter but discontinued it 14 months ago. She has no history of serious illness and takes no medications. The patient appears well. She is 163 cm (5 ft 4 in) tall and weighs 63 kg (140 lb); BMI is  $24 \text{ kg/m}^2$ . Vital signs are within normal limits. Examination shows no abnormalities. Results of serum studies are shown:



Thyroid-stimulating hormone: 3  $\mu$ U/mL  
Follicle-stimulating hormone: 100 mIU/mL  
Prolactin: 10 ng/mL  
 $\beta$ -hCG: negative

This patient's diagnosis puts her at risk for which of the following?

- (A) Breast cancer
- (B) Endometrial cancer
- (C) Obesity
- (D) Osteoporosis
- (E) Unplanned pregnancy

**Correct Answer:**

(D) Osteoporosis

### Neural Consult Response and Explanation:

**Answer:** D

**Explanation:** The patient's clinical presentation is diagnostic of Primary Ovarian Insufficiency (POI). This diagnosis is based on her age (< 40 years), the presence of oligomenorrhea (menses at 90- to 120-day intervals), and a significantly elevated follicle-stimulating hormone (FSH) level (100 mIU/mL, which is well above the menopausal threshold of >25-40 mIU/mL). POI results in a state of profound hypoestrogenism. Estrogen plays a critical role in bone metabolism by inhibiting osteoclast-mediated bone resorption. Consequently, chronic estrogen deficiency leads to accelerated bone loss and a significantly increased risk of developing osteopenia and osteoporosis, which can lead to fragility fractures. While other risks associated with POI include cardiovascular disease and psychological distress, osteoporosis is a classic and major long-term sequela. Regarding the other options: (A) Breast cancer risk is actually decreased in women with POI due to reduced lifetime exposure to estrogen. (B) Endometrial cancer is typically associated with excess unopposed estrogen (e.g., PCOS or obesity), whereas POI is a low-estrogen state. (C) Obesity is not a direct consequence of POI. (E) Unplanned pregnancy is possible because 5-10% of women with POI may experience spontaneous ovulation and conception; however, it is not considered a primary pathological risk or a long-term health complication of the diagnosis itself, especially in a patient actively seeking to conceive.

### Question 106.1

A 27-year-old man comes to the physician because of a 1-month history of progressive fatigue and episodes of moderate abdominal pain. He has a 4-year history of recurrent nosebleeds that have increased in frequency despite undergoing cauterization of the nasal mucosa 6 months ago. He takes no medications. His sister has anemia associated with recurrent nosebleeds and heavy menstrual periods; she also had postpartum hemorrhage that required transfusion. The patient's vital signs are within normal limits. Examination shows pallor; no other abnormalities are noted. Laboratory studies



show:

Hemoglobin: 7.1 g/dL

Erythrocyte count: 2.1 million/mm<sup>3</sup>

Leukocyte count: 13,500/mm<sup>3</sup>

Platelet count: 250,000/mm<sup>3</sup>

Prothrombin time: 12 sec (INR=1) Partial thromboplastin time: 45 sec

Which of the following is the most likely diagnosis?

- (A) Bernard-Soulier syndrome
- (B) Glanzmann thrombasthenia
- (C) Hemophilia A
- (D) Hereditary hemorrhagic telangiectasia
- (E) von Willebrand disease

**Correct Answer:**

(E) von Willebrand disease

**Neural Consult Response and Explanation:**

**Answer:** E

**Explanation:** The patient's clinical presentation and laboratory findings are most consistent with von Willebrand disease (VWD). VWD is the most common inherited bleeding disorder and typically presents with mucocutaneous bleeding, such as the recurrent epistaxis (nosebleeds) seen in this patient and the menorrhagia and postpartum hemorrhage described in his sister. VWD is usually inherited in an autosomal dominant fashion, which explains why both the male patient and his female sibling are affected. Laboratory studies in VWD typically show a normal platelet count and a normal prothrombin time (PT). The partial thromboplastin time (aPTT) may be prolonged because von Willebrand factor (VWF) serves as a carrier protein for Factor VIII, protecting it from proteolytic degradation. A deficiency in VWF leads to a secondary decrease in Factor VIII levels, thereby prolonging the aPTT. The patient's severe anemia (Hb 7.1 g/dL) and abdominal pain suggest chronic gastrointestinal blood loss, which is a known complication of VWD. (A) Bernard-Soulier syndrome involves a deficiency in GP Ib-IX-V and typically presents with thrombocytopenia and large platelets. (B) Glanzmann thrombasthenia involves a deficiency in GP IIb/IIIa; while it causes mucocutaneous bleeding and a normal platelet count, the aPTT is typically normal. (C) Hemophilia A is an X-linked recessive deficiency of Factor VIII that primarily causes deep tissue bleeding (e.g., hemarthrosis) rather than mucocutaneous bleeding and would be unlikely to cause severe symptoms in a female sibling. (D) Hereditary hemorrhagic telangiectasia causes epistaxis and GI bleeding but does not typically result in a prolonged aPTT.

**Question 108.1**

A 37-year-old woman comes to the office for a follow-up examination 3 weeks after testing confirmed a mass in her left breast to be benign. She says that despite the test results, she has had anxiety,



insomnia, and a preoccupation with cancer since noticing the lump. Two weeks ago, she had a 20-minute episode of markedly intense anxiety characterized by heart palpitations and the fear that she was dying. She says she has always been a tense, nervous person and is uncomfortable in social situations. She says she frequently worries and is fearful of the future and apprehensive of dying. She has no other history of panic episodes, traumatic events, or serious illness and takes no medications. She does not drink alcohol or use illicit drugs. Physical examination shows a 2-cm mass in the left breast. On mental status examination, she is cooperative but worried. Her thought processes are linear, and content focuses on possible negative eventualities. Which of the following is the most likely diagnosis?

- (A) Avoidant personality disorder
- (B) Generalized anxiety disorder
- (C) Illness anxiety disorder (hypochondriasis)
- (D) Persistent depressive disorder (dysthymia)
- (E) Social anxiety disorder (social phobia)

**Correct Answer:**

- (B) Generalized anxiety disorder

**Neural Consult Response and Explanation:**

**Answer:** B

**Explanation:** The patient's clinical presentation is most consistent with Generalized Anxiety Disorder (GAD). According to the DSM-5, GAD is characterized by excessive anxiety and worry about a variety of events or activities (such as health, future events, or social situations) occurring more days than not for at least 6 months. This patient describes herself as having 'always been a tense, nervous person' who 'frequently worries' and is 'fearful of the future,' indicating a long-standing, pervasive pattern of anxiety across multiple domains. Her current preoccupation with cancer, despite a benign biopsy, is a manifestation of this underlying generalized anxiety rather than a primary illness anxiety disorder. While she experienced a single panic attack, she does not meet the criteria for Panic Disorder, which requires recurrent, unexpected attacks and persistent concern about future attacks. Illness Anxiety Disorder (C) is less likely because her anxiety is not limited to health concerns; she also worries about the future and social situations. Social Anxiety Disorder (E) is also less likely because her social discomfort is part of a broader pattern of generalized worry rather than a specific, isolated fear of social scrutiny. Avoidant Personality Disorder (A) involves a pervasive pattern of social inhibition and feelings of inadequacy, which is not the primary focus here. Persistent Depressive Disorder (D) requires a chronic depressed mood, which is not described.

**Question 109.1**

A 55-year-old man comes to the emergency department because of a 6-hour history of diffuse abdominal pain and subjective fever. His most recent bowel movement 4 hours ago was loose but not bloody. He reports no chills or urinary symptoms. Medical history is remarkable for gastroesophageal reflux disease and alcoholic cirrhosis. Medications are furosemide, spironolactone, lactulose, and



pantoprazole. The patient appears uncomfortable. Temperature is 37.8°C (100.0°F), pulse is 88/min, respirations are 14/min, and blood pressure is 104/66 mm Hg. Physical examination shows conjunctival icterus and abdominal distention. Bowel sounds are normal. There is moderate diffuse abdominal tenderness with mild guarding but no rebound tenderness. Results of laboratory studies are shown:

Serum ALT: 70 U/L

AST: 85 U/L

Alkaline phosphatase: 66 U/L

Total bilirubin: 3.5 mg/dL

Creatinine: 0.6 mg/dL

Blood Hematocrit: 39%

Hemoglobin: 13.0 g/dL

Leukocyte count: 11,300/mm<sup>3</sup>

Platelet count: 66,000/mm<sup>3</sup>

Partial thromboplastin time: 39 seconds Prothrombin time: 17.2 seconds

Abdominal paracentesis is done, and analysis of the ascitic fluid shows a segmented neutrophil cell count of 288 cells/mm<sup>3</sup>. Results of blood and ascitic fluid cultures are pending. Which of the following is the most appropriate pharmacotherapy at this time?

- (A) Cefotaxime
- (B) Clindamycin
- (C) Metronidazole
- (D) Oxacillin
- (E) Vancomycin
- (F) No pharmacotherapy is indicated at this time

**Correct Answer:**

(A) Cefotaxime

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The patient's clinical presentation and laboratory findings are diagnostic of Spontaneous Bacterial Peritonitis (SBP). SBP is a common and serious complication of cirrhosis with ascites. The diagnosis is established by an ascitic fluid absolute neutrophil count (ANC), also known as the polymorphonuclear (PMN) cell count, of  $\geq 250$  cells/mm<sup>3</sup>. This patient's ascitic fluid analysis shows a segmented neutrophil count of 288 cells/mm<sup>3</sup>, meeting the diagnostic criteria. The most common causative organisms for SBP are Gram-negative enteric bacteria (such as *Escherichia coli* and *Klebsiella pneumoniae*) and Gram-positive cocci (such as *Streptococcus* species). The standard-of-care empiric treatment for community-acquired SBP is a third-generation cephalosporin, such as cefotaxime or ceftriaxone, which provides excellent coverage for these pathogens. (B) Clindamycin and (C) Metronidazole are primarily used for anaerobic infections, which are rare in SBP. (D) Oxacillin and (E) Vancomycin target Gram-positive organisms like *Staphylococcus aureus*, which are not the primary concern in community-acquired SBP. (F) No pharmacotherapy is incorrect because the PMN count exceeds the threshold for initiating immediate empiric antibiotic therapy to prevent complications such as sepsis or hepatorenal syndrome.

## Question 110.1

A 45-year-old man is brought to the emergency department because of moderate chest pain after a generalized tonic-clonic seizure 30 minutes ago. He has seizure disorder for which he has taken carbamazepine and phenobarbital for the past 20 years. X-ray of the chest shows generalized osteopenia with several rib fractures. Which of the following is the most likely nutritional deficiency?

- (A) Folic acid
- (B) Iron
- (C) Magnesium
- (D) Vitamin B<sub>2</sub> (riboflavin)
- (E) Vitamin D
- (F) Zinc

**Correct Answer:**

(E) Vitamin D

**Neural Consult Response and Explanation:**



**Answer:** E

**Explanation:** The patient's clinical presentation of generalized osteopenia and rib fractures after a seizure, combined with a 20-year history of taking carbamazepine and phenobarbital, strongly indicates a vitamin D deficiency. Both carbamazepine and phenobarbital are potent inducers of the cytochrome P<sub>450</sub> (CYP<sub>450</sub>) enzyme system in the liver. Chronic induction of these enzymes accelerates the catabolism of vitamin D (specifically 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D) into inactive metabolites. This leads to a state of vitamin D deficiency, which impairs intestinal calcium absorption and results in secondary hyperparathyroidism. The resulting increase in bone resorption and defective mineralization of the bone matrix (osteomalacia in adults) manifests radiographically as generalized osteopenia and increases the risk of fragility fractures, such as the rib fractures seen here. While some anticonvulsants (like carbamazepine or phenytoin) can also affect folic acid levels (Choice A), this would typically present as megaloblastic anemia rather than bone pathology. The other options (Iron, Magnesium, Vitamin B<sub>2</sub>, and Zinc) are not classically associated with the use of enzyme-inducing antiepileptic drugs or the specific bone findings described.

## Question 111.1

A 32-year-old man comes to the office because of a 2-day history of redness of the right eye. He has not had sensitivity to light or the sensation of a foreign body in the eye. He has no history of serious illness and takes no medications. Examination of the right eye shows erythema and clear discharge. Examination of the left eye shows no abnormalities. The physician prescribes ketorolac ophthalmic solution. Which of the following is the most appropriate way for the physician to write the prescription?

- (A) Ketorolac 0.5% solution, 1 drop in right eye, four times daily
- (B) Ketorolac .5% solution, 1 drop in right eye QID
- (C) Ketorolac 0.5% solution, 1 drop OD four times daily
- (D) Ketorolac 0.5% solution, 1 drop OD, QID

**Correct Answer:**

- (A) Ketorolac 0.5% solution, 1 drop in right eye, four times daily

**Neural Consult Response and Explanation:**



**Answer:** A

**Explanation:** The most appropriate way to write a prescription is to follow safety guidelines established by organizations like the Institute for Safe Medication Practices (ISMP) and The Joint Commission (TJC) to minimize the risk of medication errors. Option (A) adheres to these safety standards in three ways: 1) Use of a leading zero: A leading zero (0.5% instead of .5%) is required to prevent the decimal point from being overlooked, which could result in a ten-fold dosing error. 2) Avoiding ocular abbreviations: Abbreviations such as OD (oculus dexter), OS (oculus sinister), and OU (oculus uterque) are frequently confused with one another or with ear abbreviations (AD, AS, AU). Writing out 'right eye' eliminates this ambiguity. 3) Avoiding frequency abbreviations: While 'QID' is common, writing out 'four times daily' is preferred to prevent misinterpretation or confusion with other shorthand. Option (B) is incorrect because it lacks a leading zero and uses 'QID'. Option (C) is incorrect because it uses the abbreviation 'OD'. Option (D) is incorrect because it uses both 'OD' and 'QID'.

## Question 112.1

A 14-year-old girl is brought to the physician by her mother for a well-child examination. Vital signs are within normal limits. On breast examination, the areolae are 3 cm in diameter and form a secondary mound bilaterally. Cardiopulmonary and abdominal examinations show no abnormalities. Pelvic examination shows dark, curly, coarse hair that spreads sparsely over the pubic area but not over the thighs. Which of the following is the most accurate assessment of this patient's development?

- (A) Pubic Hair Development: Delayed; Breast Development: delayed
- (B) Pubic Hair Development: Delayed; Breast Development: normal
- (C) Pubic Hair Development: Normal; Breast Development: delayed
- (D) Pubic Hair Development: Normal; Breast Development: normal

### Correct Answer:

- (D) Pubic Hair Development: Normal; Breast Development: normal

### Neural Consult Response and Explanation:



**Answer:** D

**Explanation:** To determine if the patient's development is normal or delayed, we must first identify her Tanner stage (Sexual Maturity Rating) based on the physical examination findings and then compare that stage to the expected development for a 14-year-old girl.

1. Breast Development: The examination describes the areolae forming a 'secondary mound' above the level of the breast. This is the classic definition of Tanner Stage 4 breast development. Tanner Stage 1 is preadolescent; Stage 2 involves breast budding; Stage 3 involves further enlargement without contour separation; and Stage 5 is the mature stage where the secondary mound recedes into the general contour of the breast.

2. Pubic Hair Development: The examination describes 'dark, curly, coarse hair' that is 'adult in type' but does 'not spread over the thighs.' This description corresponds to Tanner Stage 4 pubic hair development. Tanner Stage 2 involves sparse, downy hair; Stage 3 involves darker, coarser hair spreading over the pubic symphysis; and Stage 5 involves adult-type hair that spreads to the medial thighs.

3. Assessment of Timing: In girls, the normal onset of puberty (thelarche) occurs between ages 8 and 13. Delayed puberty is defined as the absence of breast development by age 13. Menarche typically occurs about 2 to 2.5 years after thelarche, often during Tanner Stage 4 breast development, with an average age of approximately 12.7 years. A 14-year-old girl at Tanner Stage 4 for both breast and pubic hair development is progressing perfectly within the normal expected timeframe. Therefore, both her breast and pubic hair development are normal.

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### Question 113.1

A healthy 19-year-old woman comes to the clinic requesting advice regarding contraception. Menses occur at regular 28-day intervals with heavy flow. She is sexually active and has had three lifetime male partners. She has smoked one-half pack of cigarettes daily for 2 years. She lives in a college dormitory and says that she often does not sleep in her own room and has trouble remembering to take medications regularly. Her only medication is a daily multivitamin. She is 163 cm (5 ft 4 in) tall and weighs 58 kg (128 lb); BMI is 22 kg/m<sup>2</sup>. Vital signs are within normal limits. Physical examination shows no abnormalities. Which of the following is the most appropriate recommendation regarding contraception for this patient?

- (A) Condoms with spermicidal foam
- (B) Diaphragm with spermicidal foam
- (C) Oral contraceptive therapy
- (D) Subdermal contraceptive implant
- (E) Vaginal contraceptive ring

**Correct Answer:**

- (D) Subdermal contraceptive implant



## Neural Consult Response and Explanation:

**Answer:** D

**Explanation:** The most appropriate recommendation for this patient is the subdermal contraceptive implant. The primary factor in this decision is the patient's self-reported difficulty with medication adherence ('trouble remembering to take medications regularly') and her transient lifestyle ('often does not sleep in her own room'). These factors make user-dependent methods, such as oral contraceptive therapy (Option C), which requires daily administration, and the vaginal contraceptive ring (Option E), which requires monthly attention, less reliable and more prone to failure. Barrier methods like condoms (Option A) and diaphragms (Option B) are also highly user-dependent and have significantly higher typical-use failure rates compared to Long-Acting Reversible Contraception (LARC). The subdermal implant is a LARC that provides highly effective contraception (failure rate <0.05%) for up to three years without requiring any daily or monthly action from the patient, directly addressing her adherence concerns. Additionally, the patient is a smoker; while combined hormonal contraceptives (containing estrogen) are not strictly contraindicated in smokers under age 35, progestin-only methods like the subdermal implant are generally preferred to avoid any increased cardiovascular risk. Finally, the implant often leads to a reduction in menstrual flow or amenorrhea over time, which may provide a non-contraceptive benefit for this patient's heavy menses.

## Question 115.1

A previously healthy 17-year-old girl comes to the emergency department because of a 3-day history of moderate right lower quadrant pain, fever, and loss of appetite. She has not had abnormal vaginal discharge. Four months ago, she was treated with oral antibiotics for cystitis. She currently takes no medications. Menses occur at regular 28-day intervals. Her last menstrual period was 10 days ago. She has been sexually active with two male partners during the past 6 months and uses condoms inconsistently. Temperature is 38.5°C (101.3°F), pulse is 105/min, respirations are 14/min, and blood pressure is 127/82 mm Hg. Abdominal examination shows tenderness to palpation of the lower quadrants with rebound in the right lower quadrant; there is no distention. Bowel sounds are decreased. Pelvic examination shows blood-tinged discharge from the cervical os and cervical motion tenderness. There is a 5-cm mass in the right adnexal region. Which of the following is the most likely diagnosis?

- (A) Appendicitis
- (B) Ectopic pregnancy
- (C) Ovarian torsion
- (D) Pyelonephritis
- (E) Tubo-ovarian abscess

**Correct Answer:**

(E) Tubo-ovarian abscess

## Neural Consult Response and Explanation:



**Answer:** E

**Explanation:** The patient's clinical presentation is most consistent with a tubo-ovarian abscess (TOA). Key diagnostic features include her age and sexual history (multiple partners, inconsistent condom use), which are significant risk factors for pelvic inflammatory disease (PID). The physical examination reveals classic signs of PID: fever (38.5°C), lower abdominal pain with rebound tenderness, and cervical motion tenderness (the 'chandelier sign'). The presence of a 5-cm palpable mass in the right adnexal region in the context of these symptoms strongly indicates a TOA, which is an inflammatory mass involving the fallopian tube, ovary, and occasionally other adjacent pelvic organs. While appendicitis (A) can cause right lower quadrant pain, fever, and rebound tenderness, it does not typically cause cervical motion tenderness or blood-tinged cervical discharge. Ectopic pregnancy (B) is unlikely because her last menstrual period was only 10 days ago, and it would not typically present with a high fever. Ovarian torsion (C) usually presents with sudden-onset, severe pain and is less commonly associated with fever and cervical discharge. Pyelonephritis (D) typically presents with flank pain and costovertebral angle tenderness rather than an adnexal mass and cervical motion tenderness.

### Question 116.1

A 15-year-old girl is brought to the office because she has never had a menstrual period. She has no history of serious illness and receives no medications. Growth and development are appropriate for age. Breast development began at the age of 10 years. She has never been sexually active. She is at the 90th percentile for height, 75th percentile for weight, and 69th percentile for BMI. Sexual maturity rating is 4 for breast development. Pelvic examination shows a normal-appearing vagina; the cervix and uterus cannot be palpated. Her serum testosterone concentration is 340 ng/dL (N=5–40). Serum concentrations of luteinizing hormone, follicle-stimulating hormone, thyroid-stimulating hormone, 17 $\alpha$ -hydroxyprogesterone, and prolactin are within the reference ranges. Serum  $\beta$ -hCG testing is negative. Pelvic ultrasonography shows no uterus. Her karyotype is 46,XY. Which of the following is the most appropriate next step in management?

- (A) Estrogen and progestin therapy
- (B) Gonadectomy
- (C) Gonadotropin-releasing hormone agonist therapy
- (D) Progestin therapy only
- (E) No further management is indicated

**Correct Answer:**

- (B) Gonadectomy

**Neural Consult Response and Explanation:**



**Answer:** B

**Explanation:** The clinical presentation of this 15-year-old girl is classic for Complete Androgen Insensitivity Syndrome (CAIS). Key diagnostic features include: 1) Primary amenorrhea in a phenotypically female patient with normal breast development (Tanner stage 4). 2) A 46,XY karyotype. 3) Serum testosterone levels in the normal male range (340 ng/dL). 4) Absence of a uterus and cervix on physical examination and ultrasonography. In CAIS, the patient has functioning testes that produce testosterone and Anti-Müllerian Hormone (AMH). AMH causes regression of the Müllerian structures (uterus, cervix, and upper vagina), while the end-organ resistance to androgens prevents the development of male internal and external genitalia. The breast development occurs because the high levels of testosterone are peripherally aromatized into estrogen. The most appropriate next step in management for CAIS is gonadectomy. This is because the undescended testes in individuals with a Y chromosome carry a significantly increased risk of developing germ cell malignancies (such as gonadoblastoma or dysgerminoma). While gonadectomy is typically delayed until after puberty (around age 16-18) to allow for natural feminization and bone growth, this patient is 15 years old and has already reached Tanner stage 4, making gonadectomy the definitive next step. Option (A) is incorrect because progestin is not needed in the absence of a uterus. Option (C) is not indicated for CAIS. Option (D) is incorrect as progestin is used for endometrial protection, which is unnecessary here. Option (E) is incorrect due to the malignancy risk.

## Question 117.1

A 50-year-old man returns to the office for a follow-up examination. During the past 2 months, he has had increased blood pressure readings during several checks at the office and at home. He says he has felt well. He has major depressive disorder and gout. Medications are fluoxetine and allopurinol. His maternal grandfather had congestive heart failure and the patient's older brother has hypertension. The patient has smoked one-half pack of cigarettes daily for 32 years. He is 180 cm (5 ft 11 in) tall and weighs 95 kg (210 lb); BMI is 29 kg/m<sup>2</sup>. Pulse is 70/min and blood pressure is 152/90 mm Hg. Physical examination discloses no abnormalities. Which of the following medications is contraindicated in this patient?

- (A) Amlodipine
- (B) Doxazosin
- (C) Hydrochlorothiazide
- (D) Lisinopril
- (E) Metoprolol

**Correct Answer:**

(C) Hydrochlorothiazide

**Neural Consult Response and Explanation:**



**Answer: C**

**Explanation:** The patient has Stage 2 hypertension (152/90 mm Hg) and a significant history of gout, for which he is taking allopurinol. Hydrochlorothiazide (HCTZ), a thiazide diuretic, is generally contraindicated (or should be used with extreme caution) in patients with gout. Thiazide diuretics increase serum uric acid levels (hyperuricemia) through two primary mechanisms: (1) they cause volume contraction, which leads to increased uric acid reabsorption in the proximal convoluted tubule, and (2) they compete with uric acid for the organic anion transporter (OAT) in the proximal tubule, thereby decreasing uric acid secretion. This elevation in serum uric acid can precipitate an acute gouty arthritis flare. Furthermore, there is an increased risk of allopurinol hypersensitivity syndrome when allopurinol is used concomitantly with thiazide diuretics. While other options like Amlodipine (A), Doxazosin (B), and Lisinopril (D) are safe for use in patients with gout, and Metoprolol (E) is only a relative concern in patients with depression (and not a contraindication), Hydrochlorothiazide is the most clearly contraindicated medication in this clinical scenario due to the risk of exacerbating the patient's existing gout.

## Question 118.1

A 23-year-old woman is brought to the emergency department by her friends 30 minutes after the sudden onset of nausea, facial flushing, and chest pressure while eating at a Thai restaurant. She does not have any known allergies to foods or medications. She had asthma during childhood but has not required treatment for 5 years. On arrival, she is diaphoretic and appears anxious. Temperature is 37.1°C (98.8°F), pulse is 92/min, respirations are 20/min, and blood pressure is 126/68 mm Hg. Pulse oximetry on room air shows an oxygen saturation of 99%. Examination of the neck shows erythema; no masses or nodules are palpated. Cardiopulmonary examination shows no abnormalities. Which of the following is the most likely diagnosis?

- (A) Asthma exacerbation
- (B) Carcinoid syndrome
- (C) Panic attack
- (D) Reaction to food additive
- (E) Systemic mastocytosis
- (F) Thyrotoxicosis

**Correct Answer:**

- (D) Reaction to food additive

**Neural Consult Response and Explanation:**



**Answer: D**

**Explanation:** The patient's presentation of sudden-onset facial flushing, nausea, and chest pressure approximately 30 minutes after eating at a Thai restaurant is classic for a reaction to a food additive, specifically monosodium glutamate (MSG), sometimes referred to as 'MSG symptom complex.' This condition is characterized by a constellation of symptoms including flushing, sweating, chest tightness, and nausea following the ingestion of food containing high levels of MSG. (A) Asthma exacerbation is unlikely given the normal cardiopulmonary examination and 99% oxygen saturation. (B) Carcinoid syndrome can cause flushing and nausea but is typically associated with chronic diarrhea and would not be triggered by a single meal in this manner in a young, otherwise healthy individual. (C) Panic attack can cause chest pressure and anxiety, but the objective finding of neck erythema and the specific timing after a meal point toward a physiological reaction to an ingested substance. (E) Systemic mastocytosis is a rare, chronic condition involving mast cell proliferation that would typically present with more persistent symptoms or skin findings (like urticaria pigmentosa). (F) Thyrotoxicosis usually presents with a more chronic course of weight loss, heat intolerance, and tremors, rather than an acute reaction immediately following a meal.

## Question 119.1

A 45-year-old woman returns to the office to discuss results of a fine-needle aspiration biopsy of a 0.5-cm right breast mass obtained 1 week ago. She is unaccompanied. Medical history is unremarkable and she takes no medications. Her mother and maternal aunt were diagnosed with breast cancer at the ages of 45 and 52 years, respectively. Physical examination discloses no palpable axillary nodes. The biopsy specimen showed malignant cells. The patient is counseled that she has an excellent chance of cure with lumpectomy and radiation therapy. She adamantly refuses this treatment plan and states that she will try natural therapies, including megavitamins and herbal remedies instead. After exploring the reasons behind the patient's decision, which of the following is the most appropriate response?

- (A) Advise the patient that there is no proof that these alternative therapies work and that she is essentially throwing her life away
- (B) Agree to the alternative therapies and schedule a follow-up visit in 6 months
- (C) Ask the patient if she would be willing to return to the office in 2 weeks to discuss treatment options again
- (D) Inform the patient that she will be referred to another physician based on her treatment decision

### Correct Answer:

(C) Ask the patient if she would be willing to return to the office in 2 weeks to discuss treatment options again

### Neural Consult Response and Explanation:



**Answer: C**

**Explanation:** The patient has just received a diagnosis of breast cancer, a life-altering and emotionally traumatic event. Her refusal of standard, evidence-based therapy (lumpectomy and radiation) in favor of unproven alternative treatments (megavitamins and herbs) represents a significant conflict between the physician's duty of beneficence (acting in the patient's best interest) and the patient's right to autonomy (making her own healthcare decisions). According to the principles of patient-centered communication and medical ethics, when a patient refuses life-saving or highly effective treatment, the physician should first explore the patient's reasoning (which has been done) and then attempt to maintain the therapeutic alliance rather than abandoning the patient or immediately acquiescing to a dangerous plan. Option (C) is the most appropriate next step because it allows for a 'cooling-off' period. The shock of a cancer diagnosis can impair a patient's ability to process information and make rational decisions. By scheduling a follow-up in two weeks, the physician respects the patient's current stance while keeping the door open for further discussion, education, and persuasion once the initial emotional impact has lessened. Option (A) is paternalistic and judgmental, which likely destroys the physician-patient relationship. Option (B) is medically irresponsible, as 'agreeing' to ineffective therapy for a curable malignancy violates the standard of care. Option (D) constitutes premature abandonment of the patient before exhaustive efforts at communication and shared decision-making have been made.

## Question 120.1

A 47-year-old woman comes to the office because of a 2-month history of progressive weakness and numbness of her right leg. She has a 3-year history of type 2 diabetes mellitus treated with metformin. She has worked as a stock person in a storeroom for 12 years; she often moves and lifts heavy objects and sometimes crawls into tight spaces. On neurologic examination, muscle strength is 5-/5 in the hip extensor, thigh abductor, hamstring, and gastrocnemius muscles on the right and intact on the left. Muscle strength is intact in the iliopsoas, thigh adductor, quadriceps, and tibial anterior muscles bilaterally. Deep tendon reflexes are 1+ in the right ankle and 2+ in the left ankle. Sensation to light touch is mildly decreased over the lateral and inferior aspects of the right foot. Sensation otherwise is intact. Which of the following is the most likely diagnosis?

- (A) Common peroneal neuropathy
- (B) Femoral neuropathy
- (C) L<sub>2</sub> radiculopathy
- (D) L<sub>4</sub> radiculopathy
- (E) Obturator neuropathy
- (F) S<sub>1</sub> radiculopathy

**Correct Answer:**

- (F) S<sub>1</sub> radiculopathy

**Neural Consult Response and Explanation:**



**Answer:** F

**Explanation:** The patient's clinical presentation is most consistent with an S<sub>1</sub> radiculopathy. This is evidenced by the specific pattern of muscle weakness, reflex changes, and sensory loss. On examination, the patient has weakness in the hip extensors (gluteus maximus, primarily S<sub>1</sub>), hamstrings (L<sub>5</sub>-S<sub>2</sub>), and gastrocnemius (S<sub>1</sub>-S<sub>2</sub>). Crucially, the ankle reflex (Achilles reflex), which is primarily mediated by the S<sub>1</sub> nerve root, is diminished (1+) on the affected side. Furthermore, the sensory loss is localized to the lateral and inferior (plantar) aspects of the right foot, which corresponds to the S<sub>1</sub> dermatome. The preservation of strength in the iliopsoas (L<sub>2</sub>-L<sub>3</sub>), thigh adductors (L<sub>2</sub>-L<sub>4</sub>), quadriceps (L<sub>3</sub>-L<sub>4</sub>), and tibialis anterior (L<sub>4</sub>-L<sub>5</sub>) helps rule out higher lumbar radiculopathies (L<sub>2</sub>, L<sub>4</sub>) and other peripheral nerve palsies. Specifically, an L<sub>4</sub> radiculopathy (D) would typically present with weakness in the quadriceps and tibialis anterior, and a diminished knee-jerk reflex. Common peroneal neuropathy (A) would present with weakness in ankle dorsiflexion (tibialis anterior) and sensory loss on the dorsal aspect of the foot. Femoral (B) and obturator (E) neuropathies would involve hip flexion/knee extension and thigh adduction, respectively, all of which are intact in this patient. The patient's occupation involving heavy lifting and crawling into tight spaces is a known risk factor for lumbar disc herniation and subsequent radiculopathy.

