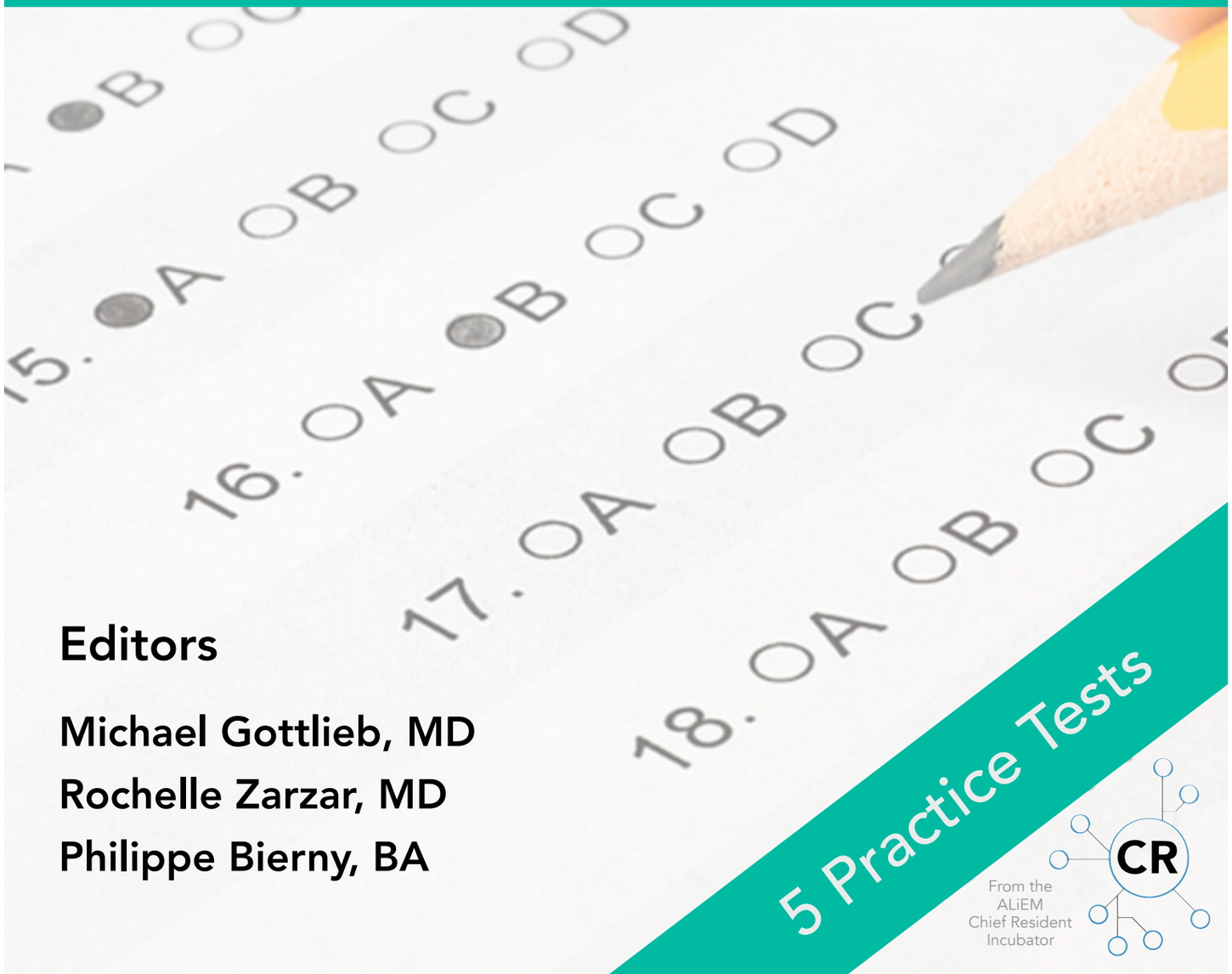
ALiEM Academic Life in Emergency Medicine

In-Training Exam Prep

Emergency Medicine

Question Sets #1-5

Second Edition



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5 Practice Tests

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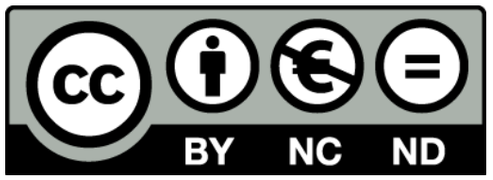

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Foreword

We would like to thank the many medical students, residents, and attending physicians for their contributions to this book. We would also like to thank the Academic Life in Emergency Medicine group with special thanks to Derek Sifford for their support and assistance with the creation of this book. Finally, we would like to thank Dorothy Habrat, Margaret Sheehy, Samuel Zidovetzki, and Adaira Chou for all of their efforts in editing the first edition of this book.

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Board Review Questions

Practice Test #1

1. A 28-year-old female presents with lateral knee pain. She has no past medical history and runs 20 miles per week. She has never had pain like this before. On exam, there is no medial or lateral joint line tenderness, however Ober's test is positive. Her knee x-rays are normal. Which of the following is the most likely diagnosis?

A. Baker's cyst

B. Iliotibial band syndrome

C. Lateral meniscal injury

D. Pes anserine bursitis

E. Popliteus tendonitis

Click here for the correct answer.

2. Which of the following populations is INCORRECTLY paired with its most likely infectious cause of osteomyelitis?

A. Children - *Staphylococcus aureus*

B. Patients in developing countries - *Mycobacterium tuberculosis*

C. Patients with diabetes mellitus - *Staphylococcal* and *Streptococcal* species

D. Patients with human bite wounds - *Streptococcal* and anaerobic species

E. Patients with sickle cell disease - *Streptococcal* species

Click here for the correct answer.

3. A 22-year-old female presents to the Emergency Department complaining of dizziness for one day. She endorses three days of nasal congestion and rhinorrhea. This morning she awoke with constant, severe dizziness and decreased hearing in the left ear. She has never experienced anything like this before. Her vital signs are unremarkable. Physical examination reveals normal tympanic membranes without evidence of infection. Her neurologic examination is significant only for rightward-directed horizontal nystagmus. What is the most likely diagnosis?

A. Acoustic neuroma

B. Benign paroxysmal positional vertigo

C. Cerebellar infarct

D. Labyrinthitis

E. Meniere's disease

Click here for the correct answer.

4. Which of the following is a component of the correct management of acute pancreatitis?

A. Give an H2 blocker to decrease secretin release by inhibition of gastric acid

B. Give glucagon in severe pancreatitis to directly suppress pancreatic exocrine secretion

C. Keep the patient nothing by mouth for at least 48 hours before starting a clear liquid diet

D. Place the patient on an insulin drip for severe hyperglycemia

E. Replace calcium with calcium gluconate if ionized calcium is low

Click here for the correct answer.

5. A 46-year-old female with past medical history of renal transplant presents with progressively worsening fatigue x 3 days. The transplant was performed two months prior. The patient has been doing well since the transplant until the onset of fatigue three days ago. Her vital signs are within normal limits. Her physical exam is remarkable for bi-basilar rales and a well-healed incision site without erythema or fluctuance. The laboratory findings are provided below.

	Today	**Two weeks ago**
WBC	9.8	8.3
Hgb	9.7	10.1
Plt	143	132
Na	140	142
Cl	102	104
K	4.9	4.2
CO2	22	22
BUN	33	24
Cr	2.8	2.0

Urinalysis with microscopy is positive for mild proteinuria but negative for leukocyte esterase, nitrites, or bacteria. Immunosuppressant levels are normal. In addition to consulting the patient's transplant team, what is the next best step in the evaluation or management of this patient?

A. Blood cultures and broad-spectrum antibiotics

B. Doppler ultrasound of the kidney

C. High-dose glucocorticoids

D. Intravenous fluids

E. Renal biopsy of donor kidney

Click here for the correct answer.

6. A 42-year-old female with hypertension, hyperlipidemia, migraines, and anxiety presents to the emergency department with fever, diarrhea, and a headache. On physical examination, she is agitated, diaphoretic, and tachycardic. Her vital signs are otherwise normal. Her neurological exam reveals hyperreflexia and rhythmic muscle spasms without rigidity. CT head and lumbar puncture are unremarkable. What is the most likely diagnosis?

A. Bacterial meningitis

B. Malignant hyperthermia

C. Neuroleptic malignant syndrome

D. Serotonin syndrome

E. Substance abuse

Click here for the correct answer.

7. A 29-year-old male presents with dental pain and facial redness for the past 4 days. Today, he began to notice double vision. On exam, he has extensive erythema along his right face, as well as ipsilateral facial asymmetry and a cranial nerve 3 palsy. Which of the following is the most likely etiology of his exam findings?

A. Cavernous sinus thrombosis

B. Diabetic neuropathy

C. Ludwig's angina

D. Optic neuritis

E. Vestibular abscess

Click here for the correct answer.

8. A 5-year-old girl with a history of congenital hydrocephalus and a ventriculoperitoneal (VP) shunt presents with irritability, nausea and severe headache. The shunt was placed 3 years ago and has not been revised since. Her vital signs are unremarkable, and her physical examination is unrevealing. While awaiting neurosurgical consultation, what is the next most appropriate step in the management of this patient?

A. Administration of empiric antibiotics for presumed infection

B. Discharge home with outpatient neurosurgery follow up

C. Emergent operative exploration of the shunt system and revision

D. Order advanced neuroimaging of the brain with a x-ray shunt series

E. Perform a shunt tap for measurement of her intracranial pressure (ICP) and evaluation of her cerebrospinal fluid (CSF)

Click here for the correct answer.

9. A 55-year-old male presents to the emergency department complaining of bilateral weakness with associated paresthesias of his arms for the past 2 weeks. The weakness is progressively worsening, and now he is having trouble gripping objects. The patient had diarrhea one month prior, which took a week to resolve. On physical exam, the patient is afebrile, with a respiratory rate of 22 breaths per minute. He has 3 out of 5 strength in his bilateral upper extremities with decreased upper extremity sensation and 1+ brachioradialis reflexes bilaterally. What is the next appropriate management of this patient?

A. Administer intravenous immunoglobulin

B. Administer intravenous methylprednisolone 250 mg

C. Administer oral prednisone 60 mg per day

D. Perform a lumbar puncture

E. Perform pulmonary function tests

Click here for the correct answer.

10. Which of the following anti-epileptic medications could most safely be continued throughout the pregnancy of a woman with an underlying seizure disorder?

A. Carbamazepine

B. Levetiracetam

C. Phenytoin

D. Topiramate

E. Valproic acid

Click here for the correct answer.

11. What is the maximum numbers of days after unprotected sexual activity that emergency contraception effective?

A. One day

B. Two days

C. Five days

D. Seven days

E. No limit

Click here for the correct answer.

12. You are performing a bimanual examination of a 37-week-pregnant woman in active labor. While performing the exam you palpate a pulsatile tubular structure. No bleeding is present. Which of the following is the correct order of actions that you should perform next?

A. Remove examiner's hand → place speculum in the vaginal canal to obtain a better view of tubular pulsating structure → remove speculum → call Obstetrics → have Obstetrics deliver infant

B. Remove examiner's hand → have nurse place hand in vagina and elevate presenting fetal part → physician to call for emergent Obstetrics C-section → Obstetrics to perform C-section → delivery of infant

C. Use examiner's hand to elevate fetal part → try and replace the tubular structure back through the cervix to reduce the cord → proceed to deliver the infant in the emergency department normally

D. Use examiner's hand to elevate fetal part → obtain two clamps and clamp the cord in two spots → cut between the clamps → then proceed to deliver the infant in the emergency department

E. Use examiner's hand to elevate fetal part → leave examiner's hand in place and call for emergent Obstetrics C-section → transport patient to operating room → Obstetrics to perform C-section → delivery of infant

Click here for the correct answer.

13. Which of the following is true regarding diabetes in pregnancy?

A. Diabetic ketoacidosis occurs at lower serum glucose levels during pregnancy

B. Euglycemic goals during pregnancy are a fasting glucose < 126 mg/dL

C. Most gestational diabetics require insulin

D. The incidence of diabetic ketoacidosis decreases during pregnancy

E. The need for insulin for pregnant women with type 1 diabetes decreases during the course of the pregnancy

Click here for the correct answer.

14. Hypercalcemia is seen in 30% of patients with advanced cancer. Which of the following is true?

A. Clinical symptoms of hypercalcemia are most correlated with the rate of rise in the serum calcium level

B. Clinical symptoms of hypercalcemia are most correlated with the actual calcium level

C. Intravascular fluid restoration with intravenous saline is no longer recommended as an initial therapy for tumor induced hypercalcemia

D. Local bone destruction is associated with osteoblast activating factors

E. Solid tumors produce hypercalcemia by activating thyroid hormone-related peptide

Click here for the correct answer.

15. Which of the following most accurately describes symptoms consistent with spinal stenosis?

A. Acute onset low back pain after lifting a heavy object

B. Chronic low back pain that improves throughout the day with movement

C. Chronic low back pain that is persistent throughout the day even with rest and worse at night

D. Chronic low back pain that is relieved with rest and extension and worse with forward flexion of the spine

E. Chronic low back pain that is relieved with rest and forward flexion and worse with extension of the spine

Click here for the correct answer.

16. A 36-year-old male is bitten by the snake shown below. Which of the following symptoms is the patient MOST likely to experience?

(Courtesy of Goldman LC; US Fish and Wildlife Service; via WikiMedia Commons)

A. Altered mental status

B. Ecchymoses

C. Hepatitis

D. Leukopenia

E. Severe pain and swelling at the envenomation site

Click here for the correct answer.

17. A 4-year-old boy with a past medical history significant for hemophilia A presents after a fall from his bunk bed. The patient was playing with his older brothers when he fell off of the top bunk and onto the carpeted floor. The mother did not witness the fall but immediately heard a loud noise and crying. There was no loss of consciousness and he has no complaints. The mother believes the patient is acting normal. He has not had any vomiting. Physical exam reveals a 3 cm forehead hematoma without other traumatic findings. What is the next appropriate step in the work up for this patient?

A. Administer empiric Factor VIII replacement and discharge home with pediatrician follow up in the morning

B. Admit for 24 hour of observation

C. Discharge home with pediatrician follow up in the morning

D. Head CT scan without contrast

E. Observe for 6 hours in the emergency department and discharge home if stable

Click here for the correct answer.

18. Which of the following is NOT a common pulmonary complication seen in acute pancreatitis?

A. Acute Respiratory Distress Syndrome (ARDS)

B. Atelectasis causing hypoxia

C. Chylothorax

D. Hypoventilation and pulmonary shunting

E. Surfactant degradation

Click here for the correct answer.

19. Which of the following is true regarding diaphragmatic hernias?

A. Abdominal and chest CT can detect all diaphragmatic hernias

B. Delayed symptoms include chest pain and coughing

C. Mortality rate is low with congenital diaphragmatic hernias

D. They are more common on the right side

E. They are more likely with lower abdominal trauma than with upper abdominal trauma

Click here for the correct answer.

20. An 18-year-old male with no past medical history presents to the emergency department via ambulance after suffering a stab wound to the left upper quadrant and the left lower quadrant. Vital signs are heart rate 115, respiratory rate 20, blood pressure 95/55, and oxygen saturation of 98% on room air. The FAST exam is negative. Abdominal CT with intravenous contrast reveals a 2 centimeter laceration of the spleen with 30% subcapsular hematoma. What is the NEXT step in management?

A. Admit for serial abdominal examinations

B. Angiographic embolization

C. Discharge home with outpatient surgical follow up

D. Emergent surgical intervention

E. Observe in emergency department for 4 hours and discharge home

Click here for the correct answer.

21. A 75-year-old woman who is at the bedside of her critically ill husband in the emergency department reports sudden onset of chest pain and dyspnea. She has no prior medical history. ECG shows ST elevations in precordial leads without reciprocal depressions. Laboratory data is notable for high levels of circulating catecholamines, elevated brain natriuretic peptide, and a minor increase in troponin. Transthoracic echocardiogram shows severe apical ventricular dysfunction in several vascular territories. Which of the following statements is true regarding her underlying condition?

A. Coronary angiography typically shows no evidence of obstructive coronary disease

B. ECG can reliably diagnose this condition

C. ECG typically shows ST elevations in precordial leads without reciprocal changes

D. Both A and B are correct

E. Both A and C are correct

Click here for the correct answer.

22. Which of the following pairings is INCORRECT?

A. Direct hernia: lateral to the inferior epigastric vessels

B. Femoral hernia: more common in women

C. Hernia detection: increased by having the patient cough or strain while examining the suspected site

D. Indirect inguinal hernia: more likely to be felt in the scrotum

E. Umbilical hernias: more common in pregnancy

Click here for the correct answer.

23. Which of the following courses is most consistent with inhalational anthrax?

A. Beginning 1-2 days after exposure, patients develop non-specific symptoms (such as nausea or malaise) along with a darkening skin lesion, which eventually necroses into an eschar.

B. Beginning 2-3 days after exposure, patients develop fever and tender, enlarged lymph nodes, followed by septicemia and death.

C. Beginning 2-10 days after exposure, patients develop a flu-like illness, followed by rapid deterioration into worsening dyspnea, sepsis, mediastinitis, and death.

D. Beginning 7-10 days after exposure, patients develop diffuse lesions to the skin and mucus membranes. Lesions progress through several stages, including vesicles, pustules, and scabs.

E. Beginning up to 21 days after exposure, patients develop fever, headache, myalgias, diarrhea, and generalized weakness.

Click here for the correct answer.

24. Which of the following is true for cryptococcal meningoencephalitis?

A. Incidence of HIV-associated cryptococcal meningitis is not affected by CD4 counts

B. Intracranial pressure is usually normal

C. Meningismus is a common finding

D. Patients with cryptococcal meningoencephalitis may be treated as outpatients with oral anti-fungals

E. The initial presentation may be subtle

Click here for the correct answer.

25. An 88-year-old man presents with sudden onset of painless vision loss. The patient was reading in bed when he was suddenly unable to see out of his right eye. On physical exam, the patient has a right-sided afferent pupillary defect. Visual acuity is light perception on the right and 20/30 on the left. Your fundoscopic exam demonstrates a cherry red spot on the macula and the bedside ultrasound exam demonstrates no vitreous hemorrhage or retinal detachment. Which of the following is the appropriate treatment for this patient?

A. Laser photocoagulation

B. Ocular massage

C. Oral acetazolamide

D. Therapeutic lumbar puncture

E. Timolol eye drops

Click here for the correct answer.

26. What vector transfers a protozoan disease that is known to cause heart failure, megacolon, and achalasia?

A. Deer tick

B. Mosquito

C. Reduviid bug

D. Sand fly

E. Tsetse fly

Click here for the correct answer.

27. A 45-year-old woman with no past medical history presents after an acute exposure to chlorine gas at a public swimming pool. She complains of shortness of breath and has diffuse expiratory wheezes. She is mildly tachypneic and has a heart rate of 109 bpm. She complains that her eyes are minimally irritated. What should her care include?

A. Antibiotics

B. Beta-2 agonists

C. Cyanocobalamin

D. Inhalational steroids

E. Intravenous sodium bicarbonate

Click here for the correct answer.

28. A 67-year-old male with prostate cancer, undergoing radiation therapy, presents with severe lower back pain that woke him up at night, and is newly incontinent of urine. What is the next management step?

A. Intravenous steroid therapy

B. Obtain a bone scan of the spine

C. Obtain a non-contrast CT scan of the spine

D. Obtain x-rays of thoracolumbar spine

E. Radiation therapy

Click here for the correct answer.

29. A 77-year-old male with a history of chronic obstructive pulmonary disease (COPD) presents in cardiac arrest. Emergency medical services was dispatched for respiratory distress. His presenting rhythm is pulseless electrical activity (PEA). In addition to establishing an airway, continuous cardiopulmonary resuscitation (CPR), and intravenous epinephrine, which of the following should be performed next?

A. Administration of intravenous amiodarone

B. Administration of nebulized ipratropium

C. Bilateral needle thoracostomy

D. Focused assessment with sonography in trauma (FAST) exam

E. Pericardiocentesis

Click here for the correct answer.

30. An 80-year-old man presents with low back pain that has been worsening over the past few months. He denies recent trauma, neurologic deficits, bowel or bladder incontinence, saddle anesthesia, intravenous drug use, recent spinal procedures, or dysuria. His vital signs are within normal limits. His exam is significant for midline tenderness to palpation with a normal neurologic exam, good rectal tone, an enlarged, smooth prostate, and negative stool guaiac testing. His labs are significant for a hemoglobin of 8.2 g/dL, white blood cell count of 9.8 x 10^9/L, platelet count of 200 x 10^9/L, and calcium of 10.7 mg/dL. Lumbosacral radiographs are obtained and demonstrate multiple lytic lesions. What is the most likely diagnosis?

A. Multiple myeloma

B. Prostate cancer metastases

C. Pyelonephritis

D. Sciatica

E. Spinal epidural abscess

Click here for the correct answer.

31. A 58-year-old male with history of laryngeal cancer and recent tracheostomy placement two weeks prior presents with bleeding from his tracheostomy site for the past hour. He has had no bleeding prior to today. As you are examining the patient, he begins to have brisk bleeding from the tracheostomy that is not relieved by simple pressure. What is the next most important step in management?

A. Apply bilateral neck pressure

B. Hyper-inflate the cuff and continue external pressure

C. Obtain an urgent otolaryngology consult

D. Order a type and screen

E. Perform orotracheal intubation

Click here for the correct answer.

32. Which of the following should NOT be performed in a patient in whom premature rupture of membranes is suspected?

A. Fluid pH testing

B. Sterile speculum exam

C. Sterile digital exam

D. Ultrasound

E. Transfer to OB-GYN center

Click here for the correct answer.

33. An 8-year-old girl with a family history of hereditary spherocytosis, who recently immigrated from Scandinavia, presents with rhinorrhea and nasal congestion that began last week. Three days ago she appeared flushed in the cheeks, as if she had been "slapped". Now she has an erythematous maculopapular rash on the trunk and extremities. Labs reveal a white blood cell count of 3.6 x 10^9/L, hemoglobin 6.8 g/dL, platelets 110 x 10^9/L, and reticulocyte count 0.7%. What is the NEXT step in management?

A. Admit for blood transfusion

B. Admit for isolation and IV antibiotics

C. Admit for splenectomy

D. Intravenous fluids and discharge home with antibiotics

E. Supportive treatment and discharge home

Click here for the correct answer.

34. Which of the following physiological changes in pregnancy is not normal?

A. Decreased central venous pressure

B. Decreased oxygen reserve

C. Increased cardiac output

D. Increased heart rate

E. Increased hematocrit

Click here for the correct answer.

35. Which of the following parasitic infections is an important cause of bladder cancer worldwide?

A. Ascariasis

B. Cysticercosis

C. Filariasis

D. Onchocerciasis

E. Schistosomiasis

Click here for the correct answer.

36. Emergency medicine physicians have a very high risk of chemical dependence. Healthcare professionals in general also have a high recovery rate. Why is the recovery rate so high?

A. Access to experimental medications for addiction and withdrawal

B. Access to the best private treatment facilities due to high pay grade and insurance coverage

C. Monitored recovery programs and continued aftercare programs

D. Strict inpatient recovery programs that last up to three times longer than a typical program

E. Strong and dedicated personality that allows for conquering of addiction and for full recovery

Click here for the correct answer.

37. Which of the following potential bioterrorism agents is considered MOST transmissible from person-to-person?

A. Botulism (*Clostridium botulinum*)

B. Bubonic plague (*Yersinia pestis*)

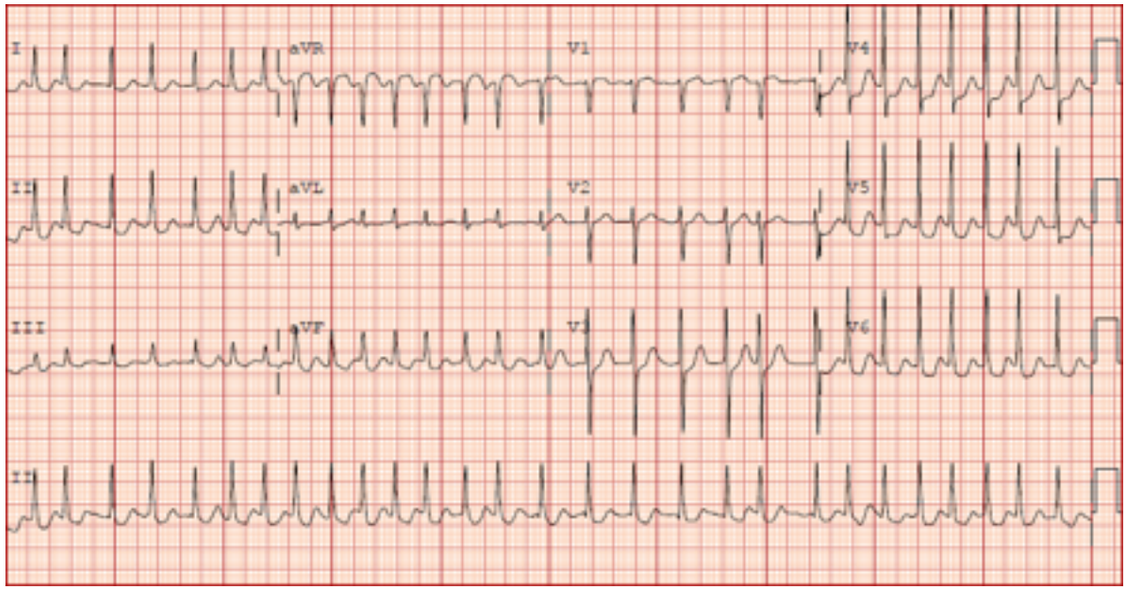
C. Inhalational anthrax (*Bacillus anthracis*)

D. Smallpox (*Variola major*)

E. Tularemia (*Francisella tularensis*)

Click here for the correct answer.

38. A 90-year-old female presents with the complaint of feeling “an elephant on my chest.” Her ECG is shown. During your assessment, the patient becomes unresponsive. She has a rapid palpable pulse. Which of the following is the best immediate course of action?



A. 6 milligrams intravenous adenosine

B. 10 milligrams intravenous push diltiazem

C. Begin chest compressions

D. Defibrillate with 200 Joules

E. Synchronized cardioversion

Click here for the correct answer.

39. A 6-year-old male with sickle cell disease presents to the emergency department with one month of an aching pain in his right hip and groin. His parents do not recall any specific trauma, but admit that he tends to be a "rough and tumble kid," especially with the family dog. On exam, the patient's right hip has decreased range of motion with internal rotation and abduction. Which one of the following would you NOT expect to see on an x-ray of the patient's hip?

A. Bilateral hip abnormalities

B. “Crescent sign” at the epiphysis

C. Increased radiodensity of the epiphysis

D. Medial joint space widening

E. Stippled calcification of the epiphysis

Click here for the correct answer.

40. A 35-year-old female with a past medical history of von Willebrand disease presents with epistaxis. The patient reports being hit in the nose with a football two hours prior to arrival. Despite constant pressure, she is unable to stop the bleeding. What medication is appropriate for this patient?

A. Cryoprecipitate

B. Desmopressin nasal spray

C. Factor VIII concentrate

D. Factor IX concentrate

E. Platelet transfusion

Click here for the correct answer.

41. Within the disease of chemical dependence, what is the principal symptom displayed by impaired medical professionals?

A. Aggression

B. Denial

C. Excessive tardiness

D. Obsessive/compulsive patterns of behavior

E. Relapse

Click here for the correct answer.

42. A 38-year-old male with no past medical history presents with altered mental status. His wife reports that he had a fever and headache for the preceding two days. Today, he became more agitated and then had two brief episodes where he was unresponsive and would stare blankly. He is currently alert and oriented to person and place only. He has no focal neurologic deficits on examination. A head CT was normal. A lumbar puncture was performed with the cerebrospinal fluid showing 100 white blood cells with a mononuclear pleocytosis, 50 red blood cells, 105 mg/dL of protein, and a normal glucose. What is the most appropriate treatment for this patient?

A. Acyclovir, ceftriaxone, and vancomycin

B. Ampicillin, ceftriaxone, and vancomycin

C. Ceftriaxone, vancomycin, and vidarabine

D. Ceftriaxone and vancomycin only

E. Supportive care

Click here for the correct answer.

43. Which of the following monitoring methods correlates best with the adequacy of chest compressions and CPR?

A. Arterial blood gases

B. Carotid and femoral pulses

C. End tidal CO_2

D. Pulse oximetry

E. Transthoracic echocardiography

Click here for the correct answer.

44. A 45-year-old male presents to the emergency department with worsening weakness of both his legs, accompanied by occasional muscle spasms. In addition, the patient complains of a shocking sensation that radiates to his back and shoulders. On physical exam, the patient's patellar reflexes is 3+ bilaterally, and the patient has a positive Babinski sign bilaterally. A brain MRI shows high intensity lesions of the corpus callosum, suggestive of multiple sclerosis (MS). Which one of the following statements is FALSE regarding multiple sclerosis?

A. Lhermitte's sign is an electric-like feeling down the shoulders and thighs upon flexion of the neck.

B. Lumbar puncture with CSF evaluation is the gold standard diagnostic test.

C. Optic neuritis is the most common initial presentation of MS.

D. The incidence of MS is 2-3 times higher in women than men.

E. The most common clinical course in MS is relapsing-remitting.

Click here for the correct answer.

45. A 55-year-old male with a history of epilepsy, hypertension, depression and atrial fibrillation presents to the emergency department with a 3-week history of fatigue, as well as easy bruising and frequent episodes of epistaxis. His complete blood count shows pancytopenia with moderate depression of all three cell lines. Which of the following medications is the most likely cause of his pancytopenia?

A. Amlodipine

B. Fluoxetine

C. Lisinopril

D. Phenytoin

E. Warfarin

Click here for the correct answer.

46. A 42-year-old female presents to the emergency department with right eye pain and decreased vision. She was about to attend an event at a local theatre when the pain began suddenly and she had several episodes of vomiting. On physical exam, the cornea is cloudy. The pupils are mid-dilated and non-reactive. There is significant ocular chemosis. The eye is firm to palpation. Visual acuity is 20/200 on the right and 20/20 on the left. Which of the following is the appropriate sequence of treatments for this condition?

A. Laser iridotomy → topical timolol → topical pilocarpine → oral acetazolamide

B. Oral acetazolamide → topical pilocarpine → topical timolol → laser iridotomy

C. Topical pilocarpine → oral acetazolamide → laser iridotomy → topical timolol

D. Topical timolol → laser iridotomy → oral acetazolamide → topical pilocarpine

E. Topical timolol → oral acetazolamide → topical pilocarpine → laser iridotomy

Click here for the correct answer.

47. A 65-year-old male with an unknown medical history is brought in by ambulance with altered mental status after being found unconscious in his parked car on a hot summer day. You note that he appears very dry and his skin is warm to the touch. His initial vital signs include a blood pressure of 105/75, heart rate of 122, respiratory rate of 24, and oxygen saturation of 96%. A rectal temperature is obtained and measures 40.5 degrees Celsius. What is the most rapid method of cooling this patient?

A. Acetaminophen

B. Dantrolene

C. Evaporative cooling

D. Ice packs to the axillae and groin

E. Immersive cooling

Click here for the correct answer.

48. A 14-year-old male presents to the emergency department with pain and swelling of his right knee. He otherwise feels well without fevers, chills, or weight loss. The patient has had this pain for several months, which his parents had told him was "growing pains." An x-ray is obtained. What is the most likely diagnosis?

A. Chondrosarcoma

B. Ewing's sarcoma

C. Lymphoma

D. Osteomyelitis

E. Osteosarcoma

Click here for the correct answer.

49. A 74-year-old female presents with a left-sided headache and vision loss in the left eye. She states that she has had intermittent bilateral temporal headaches for several months as well as jaw pain with chewing food. She also notes pain in her shoulders with prolonged overhead tasks. On physical examination, there is tenderness to the left temporal region. Visual acuity is light perception on the left and 20/40 on the right. The remainder of her neurological exam is unremarkable. Which of the following is the most appropriate next step in diagnosis or management?

A. Administer broad spectrum antibiotics

B. Administer high-dose corticosteroids

C. Order a MRI/MRV of the brain

D. Perform a dilated fundoscopic exam

E. Perform a temporal artery biopsy

Click here for the correct answer.

50. A 20-year-old male presents with rectal pain, tenesmus, and yellow discharge per rectum. He states he practices receptive anal intercourse with male partners. Which of the following is the most appropriate treatment?

A. Azithromycin 500 mg the first day, 250 mg daily for 4 days

B. Azithromycin 1 g and metronidazole 500 mg three times daily for 7 days

C. Azithromycin 1 g and ceftriaxone 1 g

D. Ceftriaxone 250 mg and doxycycline 100 mg twice daily for 7 days

E. Ciprofloxacin 500 mg daily and metronidazole 500 mg three times daily for 7 days

Click here for the correct answer.

Practice Test #2

1. A 28-year-old male with a history of intravenous drug use and type I diabetes mellitus presents with low back pain for 7 days. He is tender along his lumbar spine on exam. His neurologic exam is normal. You suspect a spinal infection, such as a spinal epidural abscess. Which of the following serum tests is most likely to be elevated in this patient?

A. Erythrocyte sedimentation rate

B. Hemoglobin

C. Hemoglobin A1c

D. Neutrophils

E. White blood cell count

Click here for the correct answer.

2. You are the emergency physician taking care of a patient, who may be presenting with new onset myasthenia gravis. You plan to perform a Tensilon (edrophonium) test to help aid in your diagnosis. What other medication should you have at bedside when giving the edrophonium intravenously?

A. Adenosine

B. Atropine

C. Lorazepam

D. Magnesium

E. Succinylcholine

Click here for the correct answer.

3. After experiencing intermittent episodes of headaches, palpitations, and anxiety, a 44-year-old female with no past medical history presents to the emergency department for evaluation. These bouts are also associated with profound sweating and occasional diarrhea. Though she was normotensive and asymptomatic at presentation, during the exam the patient begins to develop flushing and palpitations. Her vital signs show a blood pressure of 215/120 and a heart rate of 145. Though she is afebrile, she is significantly diaphoretic and agitated. After obtaining a negative drug screen, medication should be given to target which of the following?

A. Acetylcholinesterase

B. Catecholamines

C. Dopamine

D. Serotonin

E. Thyroid hormone

Click here for the correct answer.

4. A 60-year-old woman with acute myeloblastic leukemia currently undergoing chemotherapy presents with chest pain and confusion. She is tachycardic and hypotensive with clear lungs. Her EKG shows a regular, narrow complex tachycardia with low voltage. The patient is on warfarin for a prior deep venous thrombosis and her INR level is therapeutic. A portable chest radiograph is significant for cardiomegaly. Which of the following is the most appropriate next step in management?

A. Bedside ultrasound

B. Consult oncology

C. Initiate broad spectrum antibiotics

D. Obtain CT pulmonary angiogram

E. Start vasopressors and admit to the intensive care unit

Click here for the correct answer.

5. A patient receiving a transfusion of fresh frozen plasma (FFP) becomes short of breath. Which of the following is most accurate regarding transfusion-related acute lung injury?

A. Changes on chest x-ray typically do not occur until after the first 12 hours of symptoms

B. It is commonly a fatal reaction

C. Pulmonary infiltrates on chest x-ray are classically bilateral

D. Treatment involves aggressive diuresis

E. Treatment involves broad spectrum antibiotics

Click here for the correct answer.

6. A 20-year-old woman presents to the emergency department complaining of dysuria and abnormal vaginal discharge. She is sexually active and states she "usually uses condoms." Exam reveals a well-appearing female patient in no acute distress. The pelvic exam reveals a moderate amount of purulent vaginal discharge. There is no cervical motion or adnexal tenderness. The urine pregnancy test is negative. Which of the following statements is FALSE regarding the diagnosis of sexually transmitted infections?

A. Nucleic acid amplification techniques (NAATs) can be used on both cervical swabs and urine

B. NAATs are less sensitive than culture for the diagnosis of chlamydia and gonorrhea

C. NAATs have a high specificity for diagnosis of chlamydial or gonorrheal infection

D. Only a minority of women infected with chlamydia present with symptoms

E. Patients who complete an appropriate course of antibiotics for treatment of chlamydia do not need follow-up testing for cure, unless they develop symptoms or there is suspected reinfection

Click here for the correct answer.

7. Unlike Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), Middle East Respiratory Syndrome Coronavirus (MERS-CoV) affects which of the following people more?

A. Farmers

B. Healthcare workers

C. Healthy, young people

D. Older people with medical comorbidities

E. Restaurant workers

Click here for the correct answer.

8. A 23-year-old male presents with a fever and rash for the past two days. He endorses a palmar rash, fever, and generalized malaise. He admits to recently hiking the Appalachian Trail with a group of friends. He denies any headache, neck pain, nausea, vomiting, cough, or dyspnea. He is febrile to 101.2 degrees Fahrenheit, but the remainder of his vitals are within normal limits. His physical exam is significant for a rash to his bilateral palms and wrists, but is otherwise unremarkable. Which of the following treatments is most appropriate in this patient?

A. Doxycycline

B. High dose aspirin

C. Levofloxacin

D. Penicillin

E. Plasma exchange

Click here for the correct answer.

9. What is the best initial therapy to reduce blood pressure and shearing forces in a patient with acute aortic dissection?

A. Esmolol

B. Hydralazine

C. Nicardipine

D. Nitroglycerin

E. Sodium nitroprusside

Click here for the correct answer.

10. A 56-year-old woman presents with a hard painless nodule located by her right jaw that she first noticed this evening. She is unsure how long it has been there. It is not painful and she denies any recent infections. Her vital signs are within normal limits. On physical exam, she has a fixed, palpable, non-tender, 2 cm nodule located in her right submandibular area. No erythema or fluctuance is appreciable. What is the next step in evaluation of this nodule?

A. CT with contrast of neck and close otolaryngology follow up

B. Discharge with clindamycin

C. Incision and drainage

D. Needle aspiration

E. Trial of warm compresses

Click here for the correct answer.

11. Which of the following is considered a hard sign of vascular trauma?

A. Absent distal pulses

B. Complex fracture

C. Peripheral nerve deficit

D. Proximity of the injury to major vascular structures

E. Unexplained hypotension

Click here for the correct answer.

12. An 84-year-old woman is brought to the emergency department by her two daughters and found to have a urinary tract infection. The elder daughter is also concerned because for the past couple of days she has noticed that their mother is extremely agitated and hallucinates. The mother has no problems during the day-time and remains calm, oriented, and sleeps for most of the day. The patient's vital signs are BP 110/80, HR 106, RR 14, SpO2 99% on room air. Serum lab results include hemoglobin 13.9 g/dL, white blood cell count 14 x 10^9/L, platelets 310 x10^9/L. What is the most likely cause of this patient's condition?

A. Alzheimer's disease

B. Failure of neurons in the reticular activating system

C. Parkinson's disease

D. Underlying psychiatric disorder

E. Urosepsis

Click here for the correct answer.

13. An 18-year-old girl presents to your New Jersey emergency department with left-sided facial weakness for one day. She has had one week of headache and lethargy with an intermittent fever at home. She denies having any sick contacts. On exam, the patient is afebrile with normal vital signs and appears fatigued. You note mild pharyngeal erythema, right-sided facial weakness, and neck pain with flexion. There is no rash and the rest of the exam is normal. What are the most likely cerebrospinal fluid (CSF) findings?

A. Increased white blood cells, increased protein, decreased glucose, positive gram stain

B. Increased white blood cells, increased protein, normal glucose, negative PCR

C. Increased white blood cells, increased protein, normal glucose, positive PCR

D. Normal white blood cells, decreased protein, normal glucose, positive PCR

E. Normal white blood cells, increased protein, normal glucose, negative gram stain

Click here for the correct answer.

14. A 61-year-old woman with hypertension and tobacco use presents to the emergency department with headache, nausea, and vomiting. The headache started suddenly 10 hours ago at work and reached maximal intensity within seconds. On exam, she is hypertensive with a blood pressure of 156/100 mmHg and a left third nerve palsy. A non-contrast head CT scan is normal. What is the next appropriate management step?

A. Administer a nitroprusside drip for blood pressure control

B. Admit the patient for observation and repeat imaging

C. Consult neurosurgery

D. Order a CT angiography of the brain

E. Perform a lumbar puncture

Click here for the correct answer.

15. A previously healthy 35-year-old man presents for a sprained ankle. His blood pressure is found to be 150/90 mmHg. Besides mild ankle pain, he is asymptomatic. What is the best way to address his elevated blood pressure?

A. Admit for further work up of hypertension

B. Check lab work, urinalysis, and send home on hydrochlorothiazide

C. Check a urinalysis and start hydrochlorothiazide

D. Follow up for repeat blood pressure check

E. Start hydrochlorothiazide without further testing

Click here for the correct answer.

16. A 5-year-old male presents to the emergency department with his mother, complaining of mild headache and trouble opening his right eye since yesterday. She hasn't taken his temperature but states he felt hot at home that morning. His mother says that the headache is "off and on". The patient recently returned from a summer camping trip with grandparents in Delaware. On exam, the patient is afebrile with normal vital signs and appears well. You note right-sided facial weakness and no signs of meningeal irritation. There is no rash and the rest of the exam is normal. What is the most appropriate treatment?

A. Amoxicillin 30 mg/kg/day for 28 days

B. Ceftriaxone 80 mg/kg/day for 21 days

C. Doxycycline 5 mg/kg/day for 28 days

D. Erythromycin at 5 mg/kg/day for 21 days

E. Penicillin G 300,000 units/kg/day for 14 days

Click here for the correct answer.

17. Which of the following is NOT a U.S. Food and Drug Administration (FDA) approved indication for hyperbaric oxygen?

A. Arterial gas embolism

B. Carbon monoxide poisoning

C. Clostridial myonecrosis

D. Decompression sickness

E. Methemoglobinemia

Click here for the correct answer.

18. A 33-year-old postpartum female presents with an acute headache and first time seizure. Her blood pressure is 122/70. Her physical exam is significant for bilateral papilledema. Which of the following diagnostic modalities is MOST likely to provide the definitive diagnosis?

A. CT brain with intravenous contrast

B. CT brain without intravenous contrast

C. Electroencephalogram (EEG)

D. Lumbar puncture

E. MRI brain angiography and venogram

Click here for the correct answer.

19. A 35-year-old female with a history of Graves' disease undergoes radioactive iodine therapy. What kind of radiation is this therapy an example of?

A. Alpha radiation

B. Beta radiation

C. Gamma radiation

D. Omega radiation

E. X radiation

Click here for the correct answer.

20. A 76-year-old man with a history of hypertension, atrial fibrillation on warfarin, and smoking presents to the emergency department with diffuse abdominal pain. His vital signs are as follows: blood pressure 76/42, heart rate 82, respiratory rate 20, oxygen saturation 99% on room air. He appears uncomfortable on exam with a mildly distended abdomen that is diffusely tender. Which of the following diagnostic tests is the most appropriate?

A. Bedside abdominal ultrasound

B. CT scan of the abdomen and pelvis

C. MRI of the abdomen and pelvis

D. Portable chest x-ray

E. Portable supine abdominal x-ray

Click here for the correct answer.

21. Which of the following treatments is MOST helpful in a patient who presents 12 hours after a prolonged deep sea dive with knee pain and a headache?

A. Analgesics and close observation

B. CT brain

C. Hyperbaric oxygen

D. Intravenous 5% dextrose in 0.45% normal saline

E. Knee arthrocentesis

Click here for the correct answer.

22. When should oral iodine be used in the sequence of treatment for thyroid storm?

A. At least one hour before the initiation of propylthiouracil or methimazole therapy

B. At least one hour after the initiation of propylthiouracil or methimazole therapy

C. At least one hour before the initiation of beta blocker therapy

D. At least one hour after the initiation of beta blocker therapy

E. Simultaneously with propylthiouracil or methimazole and a beta blocker

Click here for the correct answer.

23. Which of the following is true regarding aspiration pneumonia?

A. Atypical bacteria including mycoplasma and legionella are most common

B. Chest x-ray usually shows bilateral consolidations in the non-dependent regions of the lungs

C. Highest incidence occurs in patients with dementia or stroke

D. If a patient is upright, left lower lobe is a common area of consolidation

E. Nursing home patients who aspirate and present to the ED asymptomatic may be sent back to their facility

Click here for the correct answer.

24. A 60-year-old female with Crohn's disease who follows a vegan diet presents to the emergency department after a ground level fall. The patient says 'my legs gave out on me'. For the past two years, she has been having paresthesias of her extremities. Two weeks ago, she started having weakness of her legs. On physical exam, there is loss of vibration sense and proprioception of her feet and hands. Patient also demonstrates an ataxic gait. Which vitamin deficiency may be causing this patient's symptoms?

A. Vitamin B1 (thiamine)

B. Vitamin B3 (niacin)

C. Vitamin B6 (pyridoxine)

D. Vitamin B12 (cyanocobalamin)

E. Zinc

Click here for the correct answer.

25. Which of the following is a cause of exudative pleural effusion?

A. Cirrhosis

B. Congestive heart failure

C. Glomerulonephritis

D. Peritoneal dialysis

E. Rheumatoid arthritis

Click here for the correct answer.

26. A 32-year-old male with no significant past medical history presents with 10 days of fever and sore throat. His vital signs are significant for a temperature of 100.3º Fahrenheit. His exam is significant for mild erythema to the oropharynx and both anterior cervical and inguinal lymphadenopathy. A point-of-care strep screen and an anti-heterophile antibody test are both negative. Upon further questioning, the patient reveals that he had unprotected receptive anal intercourse with a stranger 6 weeks prior. The patient consents to human immunodeficiency virus (HIV) testing. Which test is recommended to detect the early stage of HIV infection?

A. CD4+ level

B. Combination p24 antigen and antibody test

C. Enzyme-linked immunosorbent assay (ELISA)

D. No test can reliably detect the early stage of HIV infection

E. Western blot

Click here for the correct answer.

27. A 45-year-old male presents to the emergency department with extreme pain to both his wrists. His pain increases with movement, particularly with flexion at the wrist. He explains that his body has been changing over the past few years, including a deepening of his voice and his hats and gloves no longer seem to fit. A diagnosis of acromegaly is made after receiving lab results and you place the patient on a medication that blocks growth hormone. What are some common side effects of this medication?

A. Abdominal cramps and diarrhea

B. Adrenal suppression

C. Epistaxis

D. Gout

E. Hirsutism

Click here for the correct answer.

28. A 35-year-old G4P3 female at 29 weeks gestation presents to your ED after being in a motor vehicle collision. She was a restrained driver when she was struck from the side while traveling 45 mph. Her airbag deployed and her windshield shattered. Upon arrival to your ED, her vital signs are HR of 95, BP of 70/40, RR of 24, SpO2 of 94% on room air, and fetal heart tones are 95. You order a trauma panel including a blood gas. What venous blood gas findings would worry you for fetal demise?

A. Bicarbonate of 32

B. pH of 7.50

C. pH of 7.15

D. Sodium of 127

E. None of the above

Click here for the correct answer.

29. A 28-year-old healthy female who recently moved to the United States from El Salvador presents to the emergency department with a headache over the past several days. She denies fevers but endorses intermittent nausea without vomiting. During your evaluation, she has a generalized tonic-clonic seizure which abates with intravenous lorazepam. A non-contrast head CT shows dilated lateral ventricles with multiple hyper-attenuating cyst-like structures. What is the next most appropriate step in management?

A. Administer acetazolamide and mannitol empirically

B. Administer praziquantel empirically

C. Emergent neurology consultation for a stat electroencephalogram

D. Emergent neurosurgical consultation

E. Perform a high-volume lumbar puncture

Click here for the correct answer.

30. A hypoxic 5-day-old male has presented to your emergency department. He appears ill. During your work-up, the patient fails a hyperoxia test. Which of the following is NOT a known side effect of the medication indicated for emergent use in this patient?

A. Apnea

B. Focal seizures

C. Hyperthermia

D. Hypotension

E. Tachycardia

Click here for the correct answer.

31. A 28-year-old male presents to the emergency department with complaints of dizziness and nausea that have been gradually increasing over the last few weeks. His symptoms are constant and not position-dependent. Cerebellar testing is normal and no nystagmus can be elicited. Visual eye testing reveals deficits in bilateral peripheral fields. After obtaining confirmatory lab testing, a diagnosis of prolactinoma is made. Medication related to which neurotransmitter can be given to shrink the tumor size?

A. Acetylcholine

B. Dopamine

C. GABA

D. Norepinephrine

E. Serotonin

Click here for the correct answer.

32. A 14-year-old female with previously repaired congenital heart disease, now with a bovine mitral valve, presents to your emergency department with a complaint of acute onset right sided weakness. This occurred about 30 minutes prior to arrival. She also reports fatigue and intermittent fevers for the past week. On exam, the patient has 3/5 strength in her right upper and lower extremities and you hear a low-grade systolic murmur. What is the recommended empiric antibiotic choice for this child?

A. Ceftriaxone

B. Gentamycin, nafcillin, and vancomycin

C. Gentamycin, rifampin, and vancomycin

D. Gentamycin and vancomycin

E. Piperacillin-tazobactam and vancomycin

Click here for the correct answer.

33. A 24-year-old male presents to the emergency department for a rash and diarrhea. He had a bone marrow transplant performed 3 months ago for acute lymphoblastic leukemia. Five days ago, he noticed a rash that began on his hands, which has spread to his arms and chest wall. The rash is pruritic, but not painful. This was followed by non-bloody diarrhea for the past 4 days. He denies any new medications or changes in his medication regimen. He is afebrile with a pulse of 78, blood pressure of 118/78, respiratory rate of 14, and oxygen saturation of 98%. Physical examination reveals a scattered macular and papular rash involving his palms, arms, and upper chest. The remainder of the examination is unremarkable. Laboratory work is non-contributory. What is the next best step in the treatment of this patient?

A. Cephalexin and trimethoprim-sulfamethoxazole

B. Diphenhydramine

C. Prednisone

D. Supportive care

E. Topical hydrocortisone

Click here for the correct answer.

34. Which of the following is FALSE with regards to preeclampsia and eclampsia?

A. Can present up to 4-6 weeks postpartum

B. Can present with eclampsia without ever having symptoms of preeclampsia

C. Can present prior to 20 weeks of pregnancy

D. Edema is a defining criterion

E. Failure to recognize preeclampsia can result in cerebral edema, kidney failure, pulmonary edema and disseminated intravascular coagulation

Click here for the correct answer.

35. Which of the following is true regarding aplastic anemia?

A. Drugs and chemical exposures are rarely implicated as the cause

B. It should be suspected in anemic patients with normal red blood cell indices and a low reticulocyte count

C. Making the diagnosis rarely requires bone marrow assessment

D. Parvovirus is a known cause of aplastic anemia

E. With proper supportive therapy most patients with severe aplastic anemia survive

Click here for the correct answer.

36. A 28-year-old college student presents to the emergency department after a tick bite. One week prior, he and a few friends hiked a portion of the Appalachian Trail. This morning, he found a tick attached to his left arm. Upon arrival, you note an engorged Ixodes tick. Which of the following statements is true regarding treatment for this patient?

A. Doxycycline 100 mg by mouth, twice daily for 14 days is the recommended regimen for prophylaxis

B. Doxycycline is the treatment of choice regardless of age or pregnancy status

C. Patients who have removed engorged ticks within the past 72 hours should receive treatment

D. Treatment is indicated for tick bites regardless of local infection rates

E. Treatment would be indicated if a tick had been attached for <36 hours

Click here for the correct answer.

37. A 37-year-old African-American female G1P0 at 38 weeks gestation with twins presents to the ED with gradually worsening dyspnea on exertion, symmetric lower extremity swelling, new two pillow orthopnea, and extreme fatigue for weeks. Past medical history is significant for hypertension. Exam is notable for pitting lower extremity edema extending to mid-calves bilaterally. The ECG is notable for poor R-wave progression in the precordial leads and it meets criteria for LVH. Chest x-ray shows cardiomegaly and cephalization. Brain Natriuretic Peptide (BNP) is elevated to 1200 ng/mL. Which of the following characteristics describe the underlying pathology?

A. The heart is large and all 4 chambers are dilated. Systolic and diastolic dysfunction is present. Ejection fraction of less than 40%.

B. The heart is stiff with normal ventricle size and bilateral dilated atria. Diastolic dysfunction is present. Ejection fraction of 45-90%.

C. The heart size is large and all 4 chambers are dilated. Diastolic dysfunction is present. Ejection fraction of 50-80%.

D. Marked hypertrophy of the myocardium, often more pronounced in the ventricular septum. Diastolic dysfunction is present. Ejection fraction of 50-80%.

E. Pericardial effusion with bowing of the right atrium in diastole.

Click here for the correct answer.

38. A previously healthy 7-year-old boy is brought into the emergency department by his mother. She states her son has been complaining of achy knees and elbows, as well as abdominal pain over the past 2 days. She also noted a rash on his lower extremities today. You are concerned about Henoch-Schönlein purpura (HSP). Assuming this is the correct diagnosis, what type of hypersensitivity is causing this patient's rash?

A. Type I hypersensitivity reaction

B. Type II hypersensitivity reaction

C. Type III hypersensitivity reaction

D. Type IV hypersensitivity reaction

E. Type V hypersensitivity reaction

Click here for the correct answer.

39. A nearby nuclear power plant incurs an explosion sending a significant amount of gamma radiation into the nearby community. Multiple patients present to your emergency department with concern for radiation poisoning. Which of the following patients is most critical?

A. A 17-year-old female who experiences vomiting, fatigue, and lassitude approximately 3 hours after the explosion.

B. A 31-year-old male who experiences vomiting approximately 20 minutes after the explosion.

C. A 45-year-old female who complains of a headache approximately 3 hours after the explosion.

D. A 56-year-old male who complains of fatigue approximately 2 hours after the explosion.

E. A 64-year-old female who experiences a cough and mild shortness of breath approximately 1 hour after the explosion.

Click here for the correct answer.

40. A patient with a history of end-stage renal disease presents to your emergency department in cardiac arrest. He is pulseless and the cardiac monitor reveals a wide rhythm. He has an interosseous line in place. In addition to airway management, CPR, defibrillation, and vasopressor therapy, which of the following is most appropriate?

A. 1 amp calcium chloride

B. 1 amp calcium gluconate

C. 1 amp D50W and 10 units regular insulin IV push

D. 1 amp sodium bicarbonate

E. 40 mEq potassium chloride

Click here for the correct answer.

41. A 26-year-old female presents to the emergency department with symptoms of gradual fatigue and decreased milk production after delivering a healthy baby over one month ago. She also complains of frequent episodes of tremors, sweating, and confusion. Initial examination reveals an agitated patient who appears somnolent and needs questions repeated frequently. Her vital signs are blood pressure 95/60, heart rate 58, respiratory rate 14, temperature 35.1 and blood sugar 54 mg/dL. You are suspicious for pituitary insufficiency and begin laboratory testing. Initial treatment should include which of the following?

A. Atropine

B. Blood transfusion

C. Glucose infusion

D. Hydrocortisone bolus

E. Vasopressors

Click here for the correct answer.

42. A pair of mountain climbers are 4 days into climbing Mount Everest. Both team members felt fine on Day 3. However, on Day 4, Climber A noticed that Climber B had difficulty sitting up straight during a water break, and looked off-balance and drowsy. Climber B was able to use a nearby rock to stand. While on the trail, Climber B staggers and falls directly backward, landing on his backpack, while walking over a smooth patch of terrain. Assuming Climber A has the capability of all the following interventions, what should Climber A do?

A. Give acetazolamide and descend immediately

B. Give acetazolamide and rest for a day, then try to climb again tomorrow

C. Give dexamethasone and descend immediately

D. Give dexamethasone and rest for a day, then try to climb again tomorrow

E. Give ibuprofen and encourage increased hydration

Click here for the correct answer.

43. A 65-year-old male with hypertension is brought to the emergency department (ED) by his daughter. Over the past 4 months, he has had periodic urinary incontinence, increased forgetfulness, and slowed thinking which was attributed to "old age." However, he has started to have several falls over the past month which prompted the ED visit. The physical exam is notable for normal use of language and a shuffling gait. Which of the following is the most likely cause of his disease process?

A. Alzheimer's disease

B. Normal pressure hydrocephalus

C. Parkinson's disease

D. Subdural hematoma

E. Wernicke's encephalopathy

Click here for the correct answer.

44. A 60-year-old male with a history of alcohol abuse presents with mid-epigastric abdominal pain. He is febrile to 39.3 degrees Celsius and has a blood pressure of 95/50. You suspect acute pancreatitis. Labs show a bedside glucose of 350 mg/dL, WBC 23 x 10^o9/L, AST 300 U/L, and ALT 230 U/L. What key initial lab result is missing to calculate Ranson's criteria at admission for pancreatitis-associated mortality?

A. Amylase

B. BUN

C. Hematocrit

D. Lipase

E. LDH

Click here for the correct answer.

45. A 57-year-old male presents to the emergency department feeling lightheaded with associated palpitations and nausea. His vital signs are as follows: Temperature 37.2° Celsius, blood pressure 67/29, and heart rate 145 beats/minute. The monitor displays a regular wide complex tachycardic rhythm. What is the next most appropriate treatment?

A. Adenosine 6 mg IV push

B. Adenosine 12 mg IV push

C. Amiodarone 3-5 mg/kg IV over minutes

D. Defibrillation

E. Synchronized cardioversion

Click here for the correct answer.

46. A 95-year-old male presents with rectal pain. Physical examination reveals rectal prolapse with edematous pink mucosa. Which of the following steps may help to facilitate reduction?

A. Anusol suppository

B. Application of topical granulated sugar

C. Hydrocortisone 1% ointment

D. Sitz bath

E. Topical calcium channel blocker

Click here for the correct answer.

47. A 53-year-old man with a past medical history of a liver transplant presents to the emergency department after being told his immunosuppressant level is high. His labs show a tacrolimus level of 27 ng/mL (reference range 5-20 ng/mL). What is the most common, clinically significant adverse effect of tacrolimus?

A. Bone marrow suppression

B. Hepatotoxicity

C. Hypertension

D. Nephrotoxicity

E. Neurotoxicity

Click here for the correct answer.

48. An 8-year-old girl presents to the pediatric emergency department for increased restlessness, irritability, and clumsiness for the past two days that has resulted in her being asked to leave class. She was previously healthy, except for a sore throat and rash that self-resolved last month. On examination, she appears restless and is having irregular, continuous involuntary movements that worsen with purposeful action. What is the most likely diagnosis?

A. Attention deficit hyperactivity disorder

B. Epilepsy

C. Multiple sclerosis

D. Rheumatic fever

E. Tourette's syndrome

Click here for the correct answer.

49. A thrombus in which of the following veins does not necessitate anticoagulation?

A. Common femoral vein

B. External iliac vein

C. Peroneal vein

D. Popliteal vein

E. Superficial femoral vein

Click here for the correct answer.

50. For a patient with severe rhabdomyolysis, fluid resuscitation should be titrated to a urine output goal rate of:

A. 0.5 mL/kg/hr

B. 1 mL/kg/hr

C. 2.5 mL/kg/hr

D. 10 mL/kg/hr

E. 100 mL/kg/hr

Click here for the correct answer.

Practice Test #3

1. All of the following are true regarding Bartholin gland abscesses EXCEPT:

A. Bartholin gland abscesses are most common in peri-menopausal women.

B. Bartholin glands are a pair of pea-sized glands in the labia minora.

C. Cephalexin and metronidazole are an appropriate choice if a sexually transmitted disease is not suspected.

D. Definitive treatment is marsupialization of the abscess to prevent recurrence.

E. Infections are polymicrobial.

Click here for the correct answer.

2. Which of the following signs on a fetal heart tracing is reassuring?

A. Decreased beat-to-beat variability

B. Decreased long-term variability

C. Early decelerations

D. Late decelerations

E. Variable decelerations

Click here for the correct answer.

3. A 67-year-old male presents to the emergency department because his hand tremor is preventing him from performing his job as a carpenter. He reports that his hands continue to shake, and nothing makes it better or worse. He has been doing research on the Internet and believes that there is a medication that can help his tremor, and hopes that you can prescribe it for him. He denies previous medical issues, alcohol use, illicit drug use.

   On physical exam, his vital signs include a blood pressure of 140/70, heart rate of 76, respiratory rate of 15, and temperature of 37 degrees Celsius. You are concerned for Parkinson's disease. All of the following support a diagnosis of Parkinson's disease or Parkinsonism EXCEPT:

A. Difficulty walking

B. Exacerbation of tremor by finger-to-nose test

C. Increased tone with passive limb movement

D. Manganese exposure

E. Slowness of voluntary movement

Click here for the correct answer.

4. A 53-year-old healthy woman presents with several years of progressive left-sided sensorineural hearing loss, which has now progressed to constant tinnitus. She endorses mild disequilibrium while walking, but denies true vertigo. Which test is most likely to lead to the correct diagnosis?

A. Audiogram

B. CT scan of the brain without contrast

C. Dix-Hallpike maneuver

D. Electronystagmography

E. Gadolinium-enhanced MRI of the brain

Click here for the correct answer.

5. A 52-year-old woman presents with right-sided shoulder pain for the past several weeks, which has acutely worsened. The patient is afebrile with normal labs. The patient reports that the pain is constant and severe. She has difficulty abducting her arm past 90 degrees because of intense pain. On exam, the shoulder is not erythematous or warm, but there is mild tenderness to palpation. Her x-ray shows calcification of the supraspinatus tendon with no other abnormalities. Which of the following is the next best step in management?

A. Aspirate the subacromial bursa and send the fluid for culture and gram stain

B. Consult the orthopedics service for evaluation of adhesive capsulitis

C. Immobilize the affected shoulder with a sling, treat the pain with NSAIDs, and discharge with close follow up

D. Immobilize the affected shoulder with a sling for 2-3 months to manage symptomatic calcific tendinopathy

E. Obtain a shoulder MRI to evaluate for an underlying tear of the supraspinatus tendon

Click here for the correct answer.

6. Which of the following statements about seizures is CORRECT?

A. For a patient with a known seizure disorder on an anti-epileptic medication that presents in the post-ictal phase after a recent seizure, emergency providers should immediately administer a loading dose of phenytoin or levetiracetam to prevent progression to status epilepticus.

B. Hypercalcemia (as may occur in a number of neoplastic conditions) reduces neuronal excitability and therefore rarely causes seizures. Hypocalcemia however, is a common cause of seizure.

C. In elderly patients, an ischemic or hemorrhagic stroke is an exceedingly rare cause for first-time seizures which present to the emergency department.

D. Patients with a complex partial seizure will manifest focal automatisms, but maintain intact sensorium and cognition in the ictus phase and an asymptomatic post-ictal phase.

E. Post-traumatic seizures commonly occur within seconds to minutes of a closed head injury.

Click here for the correct answer.

7. A 45-year-old Pennsylvanian man presents after receiving a snake bite to his right hand. He notes that the snake was brown and had a triangular head. He presents with pain and swelling of his right 2nd and 3rd fingers, as well as numbness to the area. On examination, there are ecchymosis visible on the right hand with difficulty extending and flexing his 2nd and 3rd digits due to the swelling. A CBC is significant for a platelet count of 45 x 10^9/L. What is the next appropriate treatment for the patient's condition?

A. CroFab administration

B. Emergent fasciotomy of the affected fingers

C. Hemodialysis

D. Incision and drainage of the affected fingers

E. Opiate analgesia, elevation, and observation

Click here for the correct answer.

8. A 46-year-old female with a history of Hodgkin's lymphoma, in remission, presents to the emergency department with 2 days of non-bloody diarrhea, rash, nausea, fatigue, fever, and chills. She had been in her usual state of health prior to this acute illness. The only recent medical care she received was 2 weeks prior when she received a blood transfusion for symptomatic anemia related to menorrhagia. Her labs are significant for severe pancytopenia, elevated liver enzymes, and elevated total bilirubin. The hematologist suspects her illness may be related to the blood transfusion she received 2 weeks prior. What is the most likely diagnosis and what step could have been taken to prevent this?

A. Acute hepatitis C infection, more sensitive screening of donor blood

B. Acute retroviral syndrome, more sensitive screening of donor blood

C. CMV infection, more sensitive screening of donor blood

D. Graft versus host disease, blood transfusion from a related donor

E. Graft versus host disease, irradiation of blood products

Click here for the correct answer.

9. Classic clinical features of myasthenia gravis can include all of the following EXCEPT:

A. Bulbar weakness

B. Diplopia

C. Disequilibrium

D. Proximal muscle weakness which worsens with activity

E. Ptosis

Click here for the correct answer.

10. A pregnant female in her first trimester presents to the emergency department with vomiting and the diagnosis of hyperemesis gravidarum is made. Which of the following findings suggest an alternate diagnosis?

A. Bilious vomiting

B. Hypokalemia and ketonuria

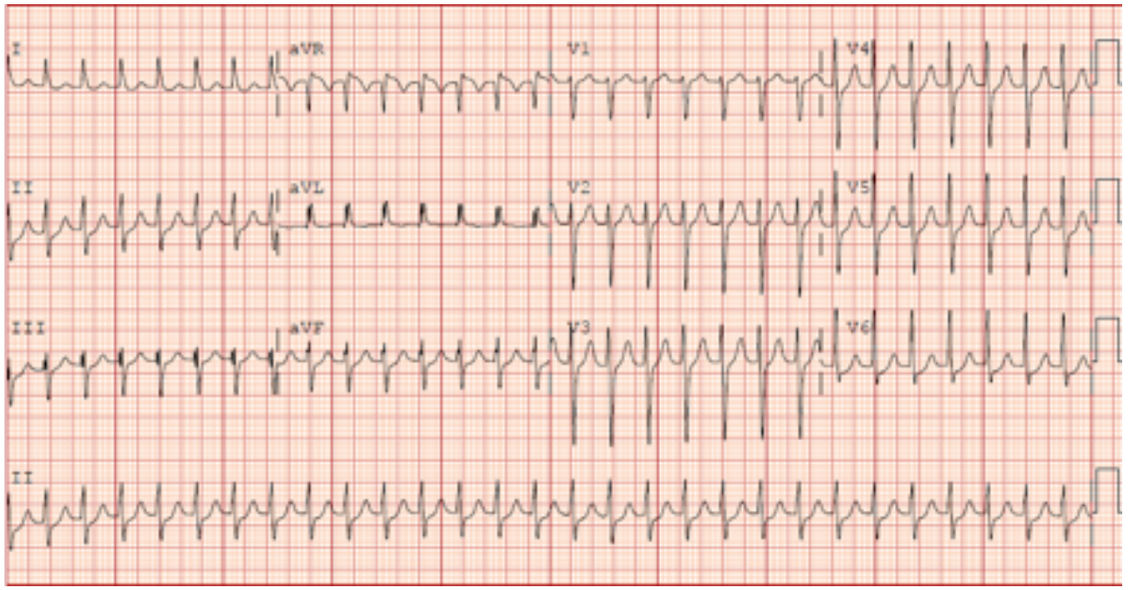
C. Severe abdominal pain

D. The patient requires intravenous fluids

E. The patient is in her first trimester of pregnancy

Click here for the correct answer.

11. An otherwise healthy 35-year-old female presents to the emergency department with complaint of palpitations. The patient is sitting up talking and appears comfortable. She has a strong palpable radial pulse. Her ECG is shown. Which of the following is best initial step in management?



A. Adenosine 1 mg intravenous push

B. Diltiazem 10 mg intravenous push

C. Attempt carotid massage

D. Defibrillate

E. Synchronized cardioversion

Click here for the correct answer.

12. Which of the following statements regarding anal fissures is correct?

A. An anal fissure is a superficial linear tear of the anal canal above the dentate line.

B. Midline anal fissures are concerning for a systemic illness.

C. Patients complain of significant rectal bleeding and minor pain with defecation.

D. The most common location for anal fissures is in the lateral position.

E. Untreated anal fissures can develop into deep ulcerations or pile formation.

Click here for the correct answer.

13. A 26-year-old woman is brought in by her family because of diffuse myalgias and altered mental status. They state that she began chemotherapy a few days prior for a newly diagnosed lymphoma. Since then, she has had vomiting, muscle aches, and worsening confusion. Her vital signs are significant for a temperature of 37 degrees Celsius, heart rate of 43, blood pressure of 90/50, respiratory rate of 16, and oxygen saturation of 99%. Her ECG demonstrates a wide complex bradycardia with a left bundle branch block and absent P waves. Her creatinine is 5.6 mg/dL. Which intervention will provide definitive treatment of her condition?

A. Allopurinol

B. Chemotherapy

C. Hemodialysis

D. Ondansetron

E. Sodium Bicarbonate

Click here for the correct answer.

14. Which of the following disorders will cause pancytopenia?

A. Glucose-6-phosphate dehydrogenase deficiency

B. Paroxysmal nocturnal hemoglobinuria

C. Parvovirus infection

D. Sickle cell disease

E. Thalassemia

Click here for the correct answer.

15. A 7-year-old boy with a past medical history significant for hemophilia A presents to the emergency department with complaint of joint swelling. The patient reports increasing swelling in his right knee after bumping it against the wall yesterday. His physical exam reveals a warm and swollen joint. What is the appropriate treatment?

A. 25 units/kg of Factor VIII followed by a repeat infusion in 12 hours

B. 50 units/kg of Factor IX followed by a repeat infusion in 24 hours

C. Arthrocentesis

D. Ibuprofen and rest

E. Warm compresses and hematology follow up

Click here for the correct answer.

16. Which of the following seen on a fetal cardiotocographic monitor is an indicator of fetal hypoxia?

A. Acceleration

B. Concurrent deceleration

C. Early deceleration

D. Late deceleration

E. Variable deceleration

Click here for the correct answer.

17. A staff member in your emergency department is exposed to secretions from a patient known to be human immunodeficiency virus (HIV) positive. Which of these exposures is the highest risk?

A. Cough from the patient directly into the provider's face

B. Direct exposure of the patient's sweat to an open cut on the provider

C. Finger stick with a needle used to draw blood from the patient

D. Finger stick with a suture needle used in a laceration repair

E. Saliva from the patient striking intact skin

Click here for the correct answer.

18. Of the following, which test is considered the most sensitive and specific for acute cholecystitis?

A. Abdominal ultrasound

B. Computed tomography

C. Endoscopic retrograde cholangiopancreatography (ERCP)

D. Hepatobiliary iminodiacetic acid cholescintigraphy (HIDA) scan

E. Upright and supine abdominal radiography

Click here for the correct answer.

19. A 42-year-old healthy male presents to the emergency department with 6 months of worsening left-sided hearing loss. The patient reports a constant buzzing sound from the left ear over the past month and new onset vertigo today. His vital signs are stable. His exam is unremarkable including otoscopy and neurologic exam. His non-contrast CT head is negative. The patient is given meclizine without improvement in symptoms. What is the next step in management?

A. Administer an oral benzodiazepine for symptomatic management

B. Discharge with ENT clinic follow up

C. Evaluate for salicylate toxicity

D. Order brain MRI

E. Start patient on a diuretic medication

Click here for the correct answer.

20. A 7-year-old male was exposed to anthrax. Which of the following antibiotics is used for prophylaxis?

A. Atovaquone-proguanil

B. Azithromycin

C. Cephalexin

D. Ciprofloxacin

E. Linezolid

Click here for the correct answer.

21. A 52-year-old female with a history of hypertension, gout, and rheumatoid arthritis presents to the emergency department with nausea, generalized weakness, and low grade fever. Her medications include lisinopril and prednisone. Initial vitals are temperature of 100.5°F, heart rate 112, blood pressure 76/40, respiratory rate 16, and oxygen saturation 98% on room air. After resuscitation is begun with 2 liters of normal saline and broad spectrum antibiotics, her blood pressure reads at 80/42. What is the next best step in management?

A. Give another 2 liters of normal saline and recheck blood pressure

B. Give fludrocortisone

C. Give hydrocortisone

D. Give phenylephrine

E. Give prednisone

Click here for the correct answer.

22. A 35-year-old male with a history of migraines presents to the emergency department because of the acute onset of uncontrolled head-turning to one side, ipsilateral shoulder elevation, and tongue protrusion. He was previously discharged from an emergency department the night prior after being treated for a migraine headache. He has no other medical problems and takes no medications at home. The patient's vitals are pertinent for tachycardia but otherwise unremarkable. He appears anxious and his head is turned at 55 degrees to the left with facial grimacing. His left shoulder is elevated, and his tongue is protruding from his mouth. He is unable to voluntarily move his head or shoulder. The rest of his examination is unremarkable. What is the best treatment for this patient?

A. Diphenhydramine

B. Haloperidol

C. Human tetanus immunoglobulin

D. Lorazepam

E. Phenobarbital

Click here for the correct answer.

23. A 68-year-old female presents with dark stools for three days and associated lightheadedness. She has a history of atrial fibrillation and takes warfarin. Her vital signs are as follows: temperature 37.4°C, heart rate 138, blood pressure 79/45, respiratory rate 22, oxygen saturation 97% on room air. She has a hematocrit of 18.7% (baseline 32%) and an INR of 5.9. Which of the following should be administered?

A. Fresh frozen plasma (FFP) only

B. Vitamin K intramuscularly and FFP

C. Vitamin K intravenously and FFP

D. Vitamin K orally and FFP

E. Vitamin K orally only

Click here for the correct answer.

24. A patient presents with possible Middle East Respiratory Syndrome (MERS). Which of the following symptoms would suggest an alternate etiology?

A. Cough

B. Fever

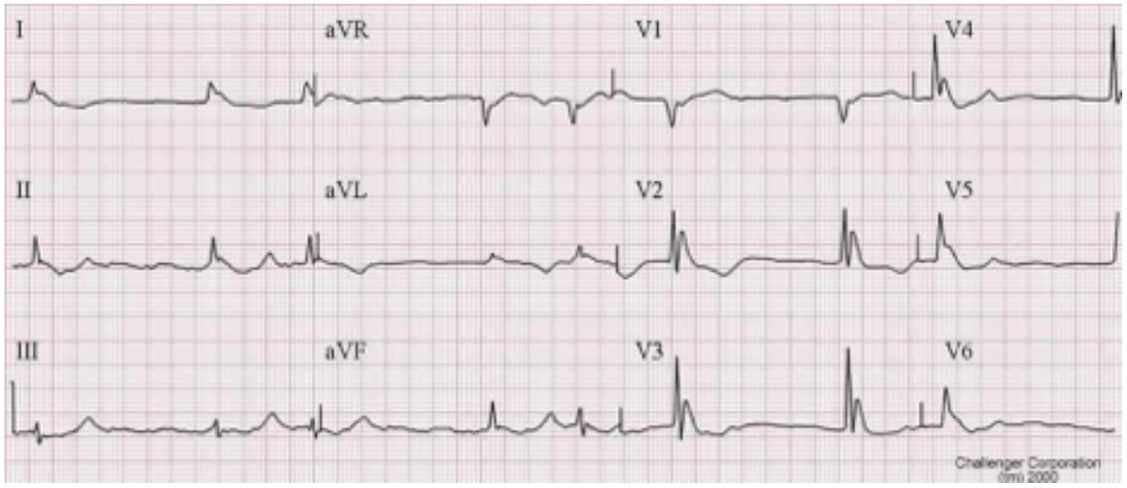
C. Rash

D. Renal failure

E. Shortness of breath

Click here for the correct answer.

25. You are on a busy overnight shift and are handed the following ECG for a patient who was just brought in by ambulance. What is the most likely diagnosis?



(Courtesy of Wikimedia Commons)

A. Hyperkalemia

B. Hypokalemia

C. Hypothermia

D. Tricyclic antidepressant overdose

E. Third degree heart block

Click here for the correct answer.

26. Which of the following has been shown to be POORLY effective at reducing *Clostridium difficile* transmission?

A. Isolating hospitalized patients suspected of having *C. difficile*

B. Narrowing antibiotic coverage as soon as possible

C. Sending a *C. difficile* nuclear acid amplification test on patients who have had more than 3 unformed stools in a 24-hour period

D. Using contact precautions for patients suspected of having *C. difficile*

E. Using hand sanitizer before and after examining a patient

Click here for the correct answer.

27. An unrestrained driver in an automobile collision presents with a Glasgow Coma Scale of 6 and is intubated immediately on arrival. A non-contrast head CT shows a large intracranial hemorrhage with midline shift. Exam shows a right pupil that is looking down and outward. Which of the following interventions should not be utilized in the emergency department to treat this patient's elevated intracranial pressure (ICP) while awaiting neurosurgery evaluation?

A. Adjust bed to 30 degrees of reverse Trendelenburg

B. Administer atropine and fentanyl as pretreatment to intubation

C. Administer mannitol bolus

D. Administer propofol for sedation

E. Administer vasopressor for hypotension

Click here for the correct answer.

28. A 57-year-old male with a history of hypertension, diabetes mellitus, and chronic kidney disease presents to the emergency department with a complaint of pain in his first metatarsophalangeal (MTP) joint. He reports that it started several days after one of his medications was changed. He has had episodes in the past and has been on allopurinol ever since. Which of the following statements about this diagnosis is true?

A. Allopurinol should be stopped during an acute attack of gout

B. Intramuscular injections of ACTH are not useful in this condition

C. Lack of hyperuricemia rules out gout

D. The culprit medication was likely hydrochlorothiazide

E. The patient's pain should be treated with indomethacin and corticosteroids

Click here for the correct answer.

29. A 55-year-old female with hypertension presents with worsening headaches over the past 4 months. The headache, initially only present in the morning, has gradually increased in duration during the day. Suddenly this morning, she vomited once without prior nausea. On exam her vital signs are T 96.8°F, BP 180/56, HR 62, RR 14, SpO2 100% on room air. She is lethargic on exam without cranial nerve deficits. Her speech is normal, breath sounds are clear, and distal extremities have strong pulses. There is 3/5 right upper extremity strength and 5/5 strength in all other extremities. Her husband reports she was moving all her extremities normally 2 hours prior to arrival. What are the next steps in her management?

A. Administer ibuprofen and an anti-emetic. Discharge with outpatient Neurology follow up.

B. Administer ibuprofen and an anti-emetic. If headache continues, admit to Neurology for intractable migraine.

C. Administer tPA, obtain a stat head CT, consult Neurology, admit to Stroke Unit.

D. Obtain a stat head CT, consult Neurosurgery, administer dexamethasone and anti-epileptic, admit to Neurosurgical ICU.

E. Obtain a stat MRI brain, consult Interventional Radiology, and admit to a monitored floor.

Click here for the correct answer.

30. Which of the following patients needs prophylaxis for endocarditis?

A. A patient who abuses intravenous drugs and is undergoing a tooth extraction

B. A patient with a history of endocarditis having a central line placed

C. A patient with anemia and a heart murmur

D. A patient with a prosthetic valve and a laceration through the oral mucosa

E. A patient with mitral valve prolapse undergoing a root canal

Click here for the correct answer.

31. A 29-year-old male with a past medical history of Goodpasture's Syndrome presents with shortness of breath. He is in acute respiratory distress and is coughing up blood. He is afebrile with a heart rate of 105, blood pressure of 105/60, respiratory rate of 30, and oxygen saturation of 88% on room air. A chest radiograph reveals hilar pulmonary infiltrates. In addition to airway management, the treatment in the emergency department for this patient includes which of the following?

A. Administration of methylprednisolone

B. Continuous nebulized albuterol

C. Empiric administration of heparin for suspected pulmonary emboli

D. Pulmonology consult for urgent lung biopsy

E. Transfuse fresh frozen plasma

Click here for the correct answer.

32. A 22-year-old previously healthy female presents with malaise, fever, vomiting, and diffuse abdominal pain for the past week. Today she developed jaundice. She states that six weeks prior, she was studying abroad in India. She took malaria prophylaxis, but refused any vaccinations because she is afraid of needles. In the emergency department, she is febrile but with otherwise normal vital signs. Her exam is significant for scleral icterus, jaundice, mild hepatomegaly, and right upper quadrant tenderness to palpation. Her labs are significant for transaminitis with an elevated bilirubin. What is the best test to confirm the diagnosis?

A. Acute hepatitis viral panel

B. Admission for liver biopsy

C. Anti-smooth muscle antibody and anti-liver-kidney-microsomal antibody testing

D. Blood smear with thick and thin films

E. Direct and indirect Coombs testing

Click here for the correct answer.

33. A 65-year-old male with a history of diabetes mellitus and hyperlipidemia presents to the emergency department with lethargy and dizziness. Physical examination reveals a decreased level of alertness with a weak palpable pulse. The patient's extremities are cool to touch with a core temperature of 37° Celsius. His ECG demonstrates a complete heart block with a ventricular rate of 36 beats per minute. Which of the following is the appropriate immediate course of action while preparing for transcutaneous pacing?

A. Administration of 0.5 mg of IV atropine

B. Administration of 1 mg of IV epinephrine

C. Apply a warming blanket

D. Begin chest compressions

E. Consult cardiology

Click here for the correct answer.

34. A 24-year-old female presents with a chief complaint of fatigue. She also complains of multiple large red areas on her back and abdomen. She cannot recall any preceding symptoms, but states that it began after she went camping with her fiancée last week. Her physical exam is significant for multiple, 3-5 cm circular lesions with a central clearing located on her back and abdomen. Her labs are within normal limits and a urine pregnancy test is positive. What is the correct treatment for this patient?

A. She should receive one 200 mg dose of IV doxycycline

B. She should receive one 2 gram dose of IM ceftriaxone

C. She should receive a 14-day course of 500 mg of oral amoxicillin three times a day

D. She should receive a 14-day course of 100mg of oral doxycycline twice a day

E. Treatment should be withheld until after she gives birth.

Click here for the correct answer.

35. A 32-year-old intravenous drug user presents with weight loss and fatigue. His vital signs include a temperature of 38.2º Celsius, heart rate of 92, blood pressure of 108/66, respiratory rate of 18, and oxygen saturation of 97%. Which of the following findings is LEAST helpful in supporting a diagnosis of infective endocarditis?

A. Bilateral retinal hemorrhages

B. Night sweats

C. Non-tender macules on the palms and soles of the feet

D. Small, dark, linear lesions within the fingernails

E. Tender papules on the fingers

Click here for the correct answer.

36. Paramedics arrive at the site of a factory explosion. On site they come across a patient who has a piece of machinery fragment stuck in his right thigh. The bleeding is controlled, and the patient's right lower extremity has normal pulses, strength, and sensation. His injury is an example of what type of blast injury?

A. Primary blast injury

B. Secondary blast injury

C. Tertiary blast injury

D. Quaternary blast injury

E. Quinary blast injury

Click here for the correct answer.

37. A patient with suspected chloroquine-resistant malaria is being treated with intravenous quinidine sulfate, doxycycline, and boluses of normal saline. The patient has a sudden change in orientation and is now diaphoretic and tachycardic. What is the most appropriate treatment in this patient?

A. Aspirin and nitroglycerin

B. Calcium

C. Change the intravenous fluids to lactated ringers

D. Dextrose

E. Primaquine

Click here for the correct answer.

38. In a patient presenting with cocaine-induced hypertension, which blood pressure agent should be avoided?

A. Ativan

B. Diltiazem

C. Metoprolol

D. Nicardipine

E. Phentolamine

Click here for the correct answer.

39. A patient presents in cardiac arrest to your facility after witnessed arrest. After defibrillation and achieving return of spontaneous circulation, you obtain an ECG showing large R-waves in V1 and V2 with ST-depressions. His blood pressure is 70/40. Which of the following is NOT indicated?

A. Aspirin

B. Hemodynamic supportive measures

C. Nitroglycerin

D. Percutaneous coronary intervention

E. Prevention of hyperthermia

Click here for the correct answer.

40. A 36-year-old male presents with right eye pain and vision loss after he was hit in the face with a chair during a bar fight. On physical examination, the right eye has proptosis and significant chemosis. The eye is firm to palpation. Visual acuity is 20/200 on the right and 20/20 on the left. Which of the following is the most appropriate next step in management?

A. Perform an anterior chamber paracentesis to decrease intraocular pressure

B. Perform an immediate lateral canthotomy

C. Perform a therapeutic lumbar puncture to decrease intracranial pressure

D. Perform an ocular ultrasound to assess for traumatic injury to the eye

E. Perform CT of the orbits to evaluate for traumatic injury to the eye

Click here for the correct answer.

41. A 52-year-old previously healthy emergency physician from Connecticut presents to his emergency department complaining of fever, headache, malaise, abdominal pain, jaundice, and dark urine that started 2 days prior after a medical mission trip in Haiti. He states that, while there, he was supposed to take mefloquine for malaria prophylaxis but lost the medication prior to taking it. He denies any medications or significant medical history. His only surgery was a splenectomy at age 17 after a motorcycle crash. Social history is negative for drug or alcohol use and he denies high risk sexual behavior. Lab studies shows pancytopenia and an indirect hyperbilirubinemia with elevated hepatic transaminases. His peripheral smear shows red blood cells with multiple intracellular ring forms and tetrads that look like "Maltese crosses" per the pathology report. What is the most likely diagnosis?

A. Babesiosis

B. Lyme disease

C. *Plasmodium falciparum* infection

D. *Plasmodium vivax* infection

E. Tularemia

Click here for the correct answer.

42. An 8-day-old male infant is brought to the emergency department by his grandparents with cyanosis. His mother has a history of bipolar disorder and did not seek prenatal care. The infant was born at home with the help of a doula. The grandparents came to visit and were alarmed to find a lethargic infant with blue discoloration of the mouth and perioral area. On examination, the infant is afebrile with a heart rate of 140, systolic blood pressure 60 mmHg, and respiratory rate of 42. He is cyanotic and on auscultation you appreciate a holosystolic murmur at the third intercostal space along the left sternal border. Chest x-ray reveals a balloon shaped heart. ECG shows a pre-excitation pattern with left bundle branch block and echocardiogram shows moderate tricuspid regurgitation with inferior displacement of the tricuspid valve, as well as a large right atrium and an atrialized right ventricle. Which of the following do you suspect this infant was exposed to in utero?

A. Cigarettes

B. Lamotrigine

C. Lithium

D. Paroxetine

E. Valproate

Click here for the correct answer.

43. A 6-year-old girl with no prior medical history presents for evaluation of rash and shortness of breath after being stung by a bee. On examination, she is in mild distress with tachycardia and tachypnea. On exam, she has wheezing on lung auscultation. Her skin exam also shows diffuse erythema and hives. There is no evidence of stridor, and she is protecting her airway. What is the correct dose of epinephrine if given intramuscularly?

A. 0.1 mg/kg of 1:1,000 concentration

B. 0.1 mg/kg of 1:10,000 concentration

C. 0.01 mg/kg of 1:1,000 concentration

D. 0.01 mg/kg of 1:10,000 concentration

E. 0.001 mg/kg of 1:10,000 concentration

Click here for the correct answer.

44. Which finding is more common in rheumatoid arthritis than osteoarthritis?

A. Discomfort with both passive and active motion of joints

B. Fingernail pitting

C. No multi-system involvement

D. Pain in the distal interphalangeal (DIP) and proximal interphalangeal (PIP) joints

E. Ulnar deviation of the metacarpophalangeal (MCP) joint

Click here for the correct answer.

45. All of the following are common complications of rhabdomyolysis EXCEPT:

A. Acute renal failure

B. Cardiac arrhythmias

C. Compartment syndrome

D. Disseminated intravascular coagulation (DIC)

E. Hyponatremia

Click here for the correct answer.

46. Which of the following is true regarding the process of labor and delivery?

A. After the delivery of the fetus, look for 3 signs of imminent delivery of the placenta: lengthening of the cord, a gush of blood, and a change in the shape of the uterine fundus.

B. Any pregnant female patient presenting to the emergency department with vaginal bleeding should undergo a speculum exam early in their evaluation in order to adequately assess the cervical dilation and effacement.

C. Any vaginal bleeding greater than 250 mL after a vaginal delivery is considered postpartum hemorrhage.

D. Episiotomies should routinely be performed in order to prevent high-degree tears.

E. It is important to consider the presentation of a fetus prior to its delivery. Fetal presentation is defined as its orientation in space relative to the maternal pelvis.

Click here for the correct answer.

47. A 55-year-old male comes to the emergency department with shortness of breath. He endorses increasing fatigue for the last two weeks and dyspnea on exertion for the past week. He is afebrile, has a blood pressure of 133/82, a heart rate of 104, respiratory rate of 30, and is saturating 83% on room air. His labs are notable for a white blood cell count of 95,000 (88% blasts), hemoglobin of 8.2 g/dL, and platelets of 2,000 x10^9/L. His chest x-ray demonstrates diffuse bilateral infiltrates. Which of the following is an appropriate treatment for this patient?

A. Aggressive fluid resuscitation

B. Emergent leukapheresis and hematology consultation

C. Intravenous antibiotics to cover for likely community-acquired pneumonia

D. Nitroglycerin drip, furosemide, and non-invasive ventilation

E. Red blood cell transfusion

Click here for the correct answer.

48. A 23-year-old male presents with right-sided eye pain and diplopia. He states that he was recently treated for a "horrible sinus infection" with azithromycin. On physical examination, the right eye is medially deviated. There is tenderness to palpation and fullness of the right maxillary sinus. The patient is febrile to 103.5°F. Which of the following is the most appropriate next step in diagnosis or management?

A. Administer high-dose corticosteroids

B. Administer oral acetazolamide

C. Order a CT of the orbits

D. Order a MRI/MRV of the head

E. Perform a dilated fundoscopic exam

Click here for the correct answer.

49. Which of the following patients is at greatest risk for exertional heat stroke?

A. 2-week-old infant

B. 5-year-old female

C. 28-year-old male

D. 52-year-old male on metoprolol

E. 85-year-old diabetic

Click here for the correct answer.

50. Which of the following patient features is NOT taken into account when using the ABCD2 score to calculate a patient's risk for subsequent stroke after a transient ischemic attack (TIA)?

A. Age

B. Blood pressure

C. History of diabetes

D. History of a prior stroke

E. Symptom duration

Click here for the correct answer.

Practice Test #4

1. A 5-year-old female presents with a rash and abdominal pain for the past two days. Two days ago, the patient developed red bumps over her lower legs and buttocks. This morning, her father noticed that her ankles were swollen. She is now complaining of body aches and abdominal discomfort. She is fully immunized and has no recent travel. She is afebrile and her vital signs are within normal limits. On physical examination, you note raised, purplish lesions to her lower legs and buttocks. The complete blood count, electrolytes, kidney function testing, and urinalysis are all within normal limits. What is the next step in the management of this patient?

A. Administer ceftriaxone 50mg/kg intravenously

B. Admit the patient with an urgent consult to an Infectious Disease specialist

C. Discharge the patient home after she tolerates an oral challenge

D. Obtain blood cultures

E. Perform an ankle arthrocentesis

Click here for the correct answer.

2. A previously healthy 40-year-old male reports watery diarrhea and lower abdominal cramping after completing a course of antibiotics one week ago. He is afebrile. What should the patient be started on?

A. Intravenous vancomycin

B. Oral fidaxomicin

C. Oral metronidazole

D. Oral rifaximin

E. Oral vancomycin

Click here for the correct answer.

3. A 24-year-old male suffers a high-voltage electrical injury to the right upper extremity. In which of the following scenarios does the patient require surgical decompression?

A. Circumferential deep partial thickness burn

B. Full thickness burn to the volar forearm

C. Joint dislocation

D. Myoglobinuria

E. Prolonged capillary refill time

Click here for the correct answer.

4. Which of the following is NOT recommended for the prevention of acute mountain sickness?

A. Acetazolamide

B. Dexamethasone

C. Mild-to-moderate exercise

D. Slow ascent

E. Zolpidem

Click here for the correct answer.

5. A 45-year-old man presents to the emergency department with fever, cough, and shortness of breath. You find out that he returned from another country 12 days prior. Which of the following countries has a low incidence of Middle East Respiratory Syndrome Coronavirus (MERS-CoV)?

A. Brazil

B. Iran

C. Israel

D. Korea

E. Saudi Arabia

Click here for the correct answer.

6. Which of the following is TRUE about hernias?

A. Both incarcerated and strangulated hernias are more common with large abdominal wall defects

B. Incarcerated hernias are easily reducible

C. Incarcerated hernias have compromised blood flow

D. Strangulated hernias are easily reducible

E. Strangulated hernias have compromised blood flow

Click here for the correct answer.

7. What is the primary physiologic goal of cardiopulmonary resuscitation (CPR) and epinephrine in cardiac arrest?

A. Direct stimulation of the sinoatrial node

B. Dislodge coronary thrombus

C. Facilitate reversal of metabolic acidosis

D. Increase intracranial pressure

E. Increase coronary perfusion pressure

Click here for the correct answer.

8. Four workers arrive by ambulance after a chemical plant leak. After appropriate decontamination efforts, the patients are assessed in the emergency department. They have tearing eyes, rhinorrhea, and mild coughing. They also complain of throat pain. Which of the following is most likely to be responsible?

A. Ammonia

B. Carbon dioxide

C. Cyanide

D. Nitrogen dioxide

E. Phosgene

Click here for the correct answer.

9. All of the following sonographic findings support a diagnosis of acute cholecystitis EXCEPT:

A. Common bile duct diameter >6 mm

B. Gallbladder wall thickness >3 mm

C. Pericholecystic fluid

D. Presence of gallstones

E. Sonographic Murphy's sign

Click here for the correct answer.

10. A 62-year-old male with hyperlipidemia presents to the emergency department reporting weakness in his left arm and left leg that began one hour prior to arrival. His vital signs and blood glucose level are within normal limits. A stroke alert is activated, and the patient has a non-contrast head CT that does not reveal any acute findings. His electrocardiogram is normal. Approximately 30 minutes into his hospital course, his symptoms have resolved. The neurology team would like to admit the patient for further testing. Which medication should be started?

A. Aspirin

B. Rivaroxaban

C. Tissue plasminogen activator

D. Unfractionated heparin drip

E. Warfarin

Click here for the correct answer.

11. Which of following statements about status epilepticus is correct:

A. A female presenting in status epilepticus should not be managed for potential eclampsia unless she has an obviously gravid uterus, as this is a condition that presents only in late pregnancy.

B. A patient with severe hypoglycemia presenting to the emergency department with status epilepticus should receive parenteral dextrose before other anticonvulsants.

C. In patients presenting with status epilepticus due to hyponatremia, 3% hypertonic saline is indicated and should be administered with a goal of restoring serum sodium levels to a value of 120 mEq/L or greater.

D. The most common cause of status epilepticus is alcohol withdrawal.

E. The operational definition of status epilepticus is a continuous seizure lasting more than 30 minutes, or more than 2 discrete seizures without intervening recovery of consciousness.

Click here for the correct answer.

12. A 68-year-old woman visiting from abroad is brought in by her family for abdominal pain. Her family states she has become increasingly confused over the last week, and for the last two days, she has been complaining of abdominal discomfort. She has a history of heart failure and is compliant with her medications. She is afebrile with normal vital signs. Physical exam is significant for mild diffuse abdominal tenderness to palpation, but is otherwise unremarkable. Her labs are notable for a white blood cell count of 12 x 10^9/L, hemoglobin of 9.3 g/dL, BUN of 28 mg/dL, creatinine of 1.8 mg/dL, calcium of 13.4 mg/dL, and albumin of 1.6 g/dL. A CT scan of her head, abdomen, and pelvis was obtained and demonstrated multiple lytic lesions of her skull and iliac crest. Which of the following treatments would be unlikely to improve this patient's symptoms?

A. Bisphosphonates

B. Calcitonin

C. Hemodialysis

D. Hydrochlorothiazide

E. Intravenous normal saline

Click here for the correct answer.

13. A 25-year-old male arrives by ambulance to the emergency department after a witnessed collapse during a marathon. He is complaining of fatigue and muscle weakness. The nurse notifies you that the patient's urine is dark brown. Which of the following is the most likely set of laboratory results for creatine kinase (CK), potassium, phosphate, and urinalysis?

A. Elevated serum CK, hypokalemia, normal phosphate, positive urine blood, 0 UA RBC

B. Elevated serum CK, hypokalemia, normal phosphate, positive urine blood, 100 UA RBC

C. Elevated serum CK, hyperkalemia, elevated phosphate, positive urine blood, 0 UA RBC

D. Elevated serum CK, hyperkalemia, elevated phosphate, positive urine blood, 100 UA RBC

E. Normal serum CK, hyperkalemia, normal phosphate, positive urine blood, 0 UA RBC

Click here for the correct answer.

14. All of the following are considered high-risk features of acute pericarditis EXCEPT:

A. Currently receiving chemotherapy

B. Currently taking warfarin

C. Elevated troponin

D. Recent upper respiratory infection symptoms

E. White blood cell count of 19,000/mm^3

Click here for the correct answer.

15. An 18-year-old female with no past medical history presents to the emergency department with dizziness, weakness, and recent skin and buccal hyperpigmentation for the past week. She denies taking any medications. Vitals signs are significant for a temperature of 98.5 degrees Fahrenheit, pulse 104, blood pressure 122/78, respiratory rate 12, oxygen saturation 100%. Lab results: sodium 128 mEq/L, potassium 5.7 mEq/L, chloride 105 mEq/L, bicarbonate 24 mEq/L, BUN 20 mg/dL, creatinine 0.90 mg/dL, and glucose 128 mg/dL. What is the most likely diagnosis?

A. Diabetic ketoacidosis (DKA)

B. Hyperglycemic hyperosmolar syndrome (HHS)

C. Hypothyroidism

D. Primary adrenal insufficiency

E. Secondary adrenal insufficiency

Click here for the correct answer.

16. A 70-year-old male with a history of hypertension, hyperlipidemia, and a 50-pack-year smoking history presents to the emergency department with colicky abdominal pain. Vital signs show a temperature of 37 degrees Celsius, heart rate 110, blood pressure 90/60, and respiratory rate of 22. Point of care ultrasound reveals a 5.5 centimeter abdominal aortic aneurysm with free fluid in Morrison's Pouch. What is your immediate next step in management?

A. Aggressive fluid resuscitation

B. Counsel the patient against smoking

C. Emergent vascular surgery consultation

D. Initiate an esmolol infusion

E. Proceed with formal CT imaging

Click here for the correct answer.

17. Which of the following is NOT a common postpartum complication?

A. Cardiomyopathy

B. Infection

C. Splenic Rupture

D. Thromboembolic disease

E. Thyroiditis

Click here for the correct answer.

18. Which organism most commonly mimics an acute appendicitis?

A. *Clostridium difficile*

B. *Escherichia coli*

C. *Salmonella enterica*

D. *Shigella dysenteriae*

E. *Yersinia enterocolitica*

Click here for the correct answer.

19. A 22-year-old male presents with acute left elbow swelling and pain. He denies trauma to the area. He reports that the swelling occurred 2 days ago and progressively worsened. He also endorses malaise and new penile discharge for the past week. What is the most likely organism?

A. *Group A streptococcus*

B. *Haemophilus influenzae*

C. *Neisseria gonorrhoeae*

D. *Pseudomonas aeruginosa*

E. *Staphylococcus aureus*

Click here for the correct answer.

20. A 56-year-old female with a past medical history of arthritis and chronic "burning" epigastric pain, which is usually alleviated with antacids and food, presents with severe, acute-onset epigastric abdominal pain and right shoulder pain that started one hour ago. She denies any trauma or injury. Her vitals are blood pressure 135/85, heart rate 120, respiratory rate 18, temperature 37.6 degrees Celsius, oxygen saturation 100%. Which of the following imaging tests should be obtained next?

A. Chest x-ray

B. CT abdomen with contrast

C. Right shoulder x-ray

D. Right upper quadrant ultrasound

E. Upper GI endoscopy

Click here for the correct answer.

21. A 12-year-old previously healthy female presents with a 4 days history of sore throat and cough. The patient's vitals include a temperature of 101 degrees Fahrenheit, heart rate of 78, blood pressure of 125/78, oxygen saturation of 98%. On examination, the patient has bilateral erythematous tonsils with exudates but without uvular deviation, unilateral swelling, or cervical lymphadenopathy. Her voice is normal and there is no stridor. What is the appropriate management for this patient?

A. Begin empiric penicillin therapy

B. Obtain a CT scan to evaluate for peritonsillar abscess

C. Perform nasopharyngoscopy

D. Send a rapid strep test

E. Treat symptomatically

Click here for the correct answer.

22. Which of the following is NOT a feature of peripartum cardiomyopathy?

A. Can occur up to 5 months after delivery

B. Clinically presents with dyspnea, edema, and orthopnea

C. Cocaine abuse is a risk factor

D. If left unidentified, the patient is at risk for thromboembolic events or arrhythmias

E. Typically seen in women with a history of underlying heart failure

Click here for the correct answer.

23. A 45-year-old woman with a history of rheumatoid arthritis (RA) presents with progressive swelling and pain in her knee for 6 days. She denies fever or trauma. She reports that her RA flares are typically in her ankles, knees, and fingers. Her vital signs demonstrate a mild tachycardia. The physical exam reveals a moderate-sized knee effusion with warmth, tenderness, and extreme pain with minimal range of motion of the knee. Which is the most appropriate next step?

A. Colchicine

B. Indomethacin

C. Intra-articular steroids

D. Joint aspiration

E. MRI of the knee

Click here for the correct answer.

24. A 36-year-old male from Texas presents to your emergency department with a one day history of severe diffuse abdominal pain. He also endorses two days of diffuse muscle aches and muscle spasms. He recalls being bit by an insect two days previously, but cannot recall what it looked like. His vital signs demonstrate a temperature of 98.5 degrees Fahrenheit, a heart rate of 105, a blood pressure of 165/96, and an oxygen saturation of 99%. His physical exam is significant for a diffusely tender abdomen with voluntary guarding and some rigidity. He has no significant erythema or rashes on his skin. What is the next best step in management?

A. Abdominal CT

B. Abdominal ultrasound

C. Appropriate anti-venom

D. Basic metabolic panel, liver studies, and lipase

E. Surgical consultation

Click here for the correct answer.

25. A 23-year-old female is sent to the emergency department (ED) from hematology-oncology clinic for dystonia. She was receiving a highly emetogenic chemotherapy treatment for hepatic sarcoma and was sent to the ED because the nurse noted that her neck became hyperextended. Of the following medications, which drug is the most likely cause of her symptoms?

A. Diphenhydramine

B. Lorazepam

C. Metoclopramide

D. Ondansetron

E. Pantoprazole

Click here for the correct answer.

26. A 75-year-old female with a history of cirrhosis related to chronic hepatitis C infection, portal hypertension, and ascites presents complaining of fever and abdominal discomfort. A paracentesis is performed and examination of the ascitic fluid reveals a neutrophil count of 400 cells/mm^3. Which of the following treatments is indicated?

A. Admission and administration of intravenous cefotaxime

B. Admission and administration of intravenous vancomycin

C. Discharge home with a prescription for ciprofloxacin and metronidazole

D. Discharge home with analgesics and close follow up with primary care

E. Repeat paracentesis as initial results likely reflect contamination

Click here for the correct answer.

27. A 28-year-old female presents with 3 days of a diffuse, progressively worsening headache. She denies fever, neck stiffness, photophobia, or phonophobia. Her only medication is oral contraceptives. Imaging is obtained and demonstrates a cerebral venous sinus thrombosis. Which of the following is the most common complication?

A. Dural arteriovenous fistula

B. Hydrocephalus

C. Intracranial hypertension

D. Seizure

E. Vision loss

Click here for the correct answer.

28. A 60-year-old female with no past medical history presents to the emergency department complaining of a headache and vision loss. She reports that the headache was gradual in onset, worse with brushing her hair, and described as an aching pain. She is afebrile with normal vitals. On physical exam, she has tenderness and nodularity to her left frontotemporal area. Laboratory testing reveals an erythrocyte sedimentation rate (ESR) of 110 mm/hr. What is the most appropriate management of this patient?

A. CT scan of the head and lumbar puncture

B. Discharge home with general surgery follow up for biopsy

C. Empiric steroid therapy and admission

D. Reassurance that this is a self-limiting disease that does not require treatment

E. Trial of carbamazepine

Click here for the correct answer.

29. A 31-year-old healthy female presents with sudden-onset nausea, vomiting, and dizziness, which she describes as the sensation that the room is spinning. The dizziness is severe, lasts for a couple minutes, and then resolves. She denies any tinnitus, chest pain, palpitations, visual changes, or syncope. She is sitting still because she notes that any movement of her head makes her symptoms worse. On exam, her gait is normal, but she keeps her head still while walking. What will the physical exam be most likely to show?

A. Carotid bruit

B. Dix-Hallpike test with horizontal nystagmus that is fatiguable

C. Dix-Hallpike test with vertical nystagmus that is not fatiguable

D. Focal weakness of her left lower extremity

E. Focal weakness of her right upper extremity

Click here for the correct answer.

30. A 34-year-old male presents with groin pain and swelling after lifting weights at the gym. On physical examination, a small tender mass is noted in the left scrotum. These physical findings are consistent with which of the following?

A. Direct hernia

B. Femoral hernia

C. Incisional hernia

D. Indirect hernia

E. Neoplasm

Click here for the correct answer.

31. A 25-year-old female presents following a gunshot wound to her left chest. The patient is initially hemodynamically stable. However, she develops progressively worsening hypotension and tachycardia, which are refractory to fluid resuscitation. She now has weak and thready pulses on examination. EKG shows sinus tachycardia with QRS of alternating voltage. Bedside ultrasound shows an anechoic stripe with right ventricular diastolic collapse in parasternal long view. What is the next most appropriate intervention?

A. Laparotomy

B. Needle thoracostomy at the left 2nd intercostal space in the midclavicular line

C. Pericardiocentesis at the left 5th intercostal space 3-5 cm lateral to the sternum

D. Thoracotomy at the left 5th intercostal space

E. Tube thoracostomy at the left 5th intercostal space in the midaxillary line

Click here for the correct answer.

32. A 65-year-old male with a history of hypertension and atrial fibrillation presents to the emergency department for recurrent nosebleeds over the past three days. The patient is afebrile with a heart rate of 72 and blood pressure is 186/92 mmHg. On exam, the patient has unilateral bleeding from the right nostril. A site of bleeding is not visualized on physical exam and placement of an anterior nasal packing fails to control bleeding. A posterior packing is then placed with cessation of bleeding. The patient's vital signs remain stable with no evidence of airway compromise. What is the most appropriate next step?

A. Admit the patient to the hospital for aggressive blood pressure reduction.

B. Admit the patient to the hospital for continuous cardiac monitoring.

C. Consult the otolaryngology service for immediate surgical intervention such as arterial ligation or embolization.

D. Discharge the patient with antibiotics and instructions to follow up with an otolaryngologist in 24 hours.

E. Discharge the patient with antibiotics and instructions to follow up with his primary care physician within 3-5 days.

Click here for the correct answer.

33. A 72-year-old female presents to the emergency department with progressive difficulty rising from her chair over the past few days, general weakness, and difficulty combing her hair. She denies any recent illness, fever, trauma, rash, joint pain, or focal neurological deficits. Her vital signs are within normal limits. Her laboratory results show a mildly elevated creatine kinase (CK), a normal blood urea nitrogen (BUN) and creatinine. What is the most likely cause for her weakness?

A. Dermatomyositis

B. Myasthenia gravis

C. Polymyositis

D. Tick paralysis

E. Transverse myelitis

Click here for the correct answer.

34. A 2-year-old female presents via ambulance after a submersion event in the bathtub. Her mother left to grab pajamas and returned to find the child under the water. The child was initially unresponsive. The paramedics started CPR and she began spontaneously breathing. On arrival she is alert with a GCS of 14, and appears tired. She is normotensive and her oxygen saturation is 92% on room air. There are no rales or wheezing on examination. Which of the following is an appropriate choice in management?

A. Administration of broad-spectrum antibiotics

B. Arterial blood gas

C. Emergency department observation for 4-6 hours

D. Positive pressure ventilation

E. Supplemental oxygenation with goal saturation ≥ 95%

Click here for the correct answer.

35. A 27-year-old female presents with low back pain and an intermittent inability to control her bladder function. This has been worsening for the past 3 days. She recently gave birth a week ago and has been having back pain ever since. Her neurologic exam is otherwise normal. You are concerned about an epidural compression syndrome. What test would be MOST helpful in excluding this diagnosis?

A. Lumbar spine bone scan

B. Lumbar spine CT

C. Lumbar spine x-rays

D. Post-void bedside ultrasound of the bladder

E. Rectal tone exam

Click here for the correct answer.

36. Which of the following is true regarding trauma to the neck?

A. Bleeding vessels in the neck should be clamped to achieve hemostasis.

B. CT angiography is generally the initial diagnostic screening study for stable patients with penetrating neck injuries that violate the platysma.

C. Esophageal injuries are readily identified on physical examination

D. Subcutaneous emphysema is a “hard sign” of neck trauma.

E. Wounds should be probed to determine whether the platysma is violated.

Click here for the correct answer.

37. A 21-year-old healthy male presents to the emergency department after developing left knee pain and swelling. The pain gradually worsened after playing basketball three days ago. Although he is able to ambulate, this worsens the pain. His vital signs are normal. On physical examination, the knee is tender, swollen, and warm to the touch. His knee x-rays are normal except for an effusion. His labs demonstrate a normal complete blood count and chemistry panel. Which of the following studies is the most appropriate next step?

A. Add on a serum uric acid level

B. Arthrocentesis

C. Arthroscopy

D. Knee immobilizer and outpatient follow-up

E. Discharge home with acetaminophen

Click here for the correct answer.

38. Which of the following is an indication to perform a peri-mortem c-section on a pregnant trauma patient?

A. Cardiac arrest in a pregnant female at 20 weeks gestational age with fetal heart tones

B. Hypotensive pregnant female at 20 weeks gestation without fetal heart tones

C. Hypoxic pregnant female at 34 weeks gestation with fetal heart tones

D. Pulseless female at 29 weeks gestation with fetal heart tones

E. None of the above

Click here for the correct answer.

39. A 65-year-old female florist presents to the emergency department with a non-healing, painless mass on her right index finger. On physical examination, there are multiple painless nodules on the dorsum of right hand and arm extending proximally in a linear arrangement. Which of the following organisms is the most likely cause of this presentation?

A. Bartonella

B. Cutaneous anthrax

C. Dermatophytes

D. Leishmania

E. Sporothrix

Click here for the correct answer.

40. Which of the following indicates a POOR response to acclimation after three months at high altitude?

A. Decreased plasma volume

B. Excretion of bicarbonate by the kidneys

C. Increased 2-3 diphosphoglycerate

D. Increased heart rate

E. Increased minute ventilation

Click here for the correct answer.

41. A 45-year-old male with a past medical history of schizophrenia and bipolar disorder presents one hour after ingesting a gallon of household bleach. Which of the following is TRUE regarding caustic ingestions?

A. Alkaline ingestions cause liquefactive necrosis, while acidic ingestions cause coagulative necrosis

B. Gastric decontamination with activated charcoal should be initiated immediately

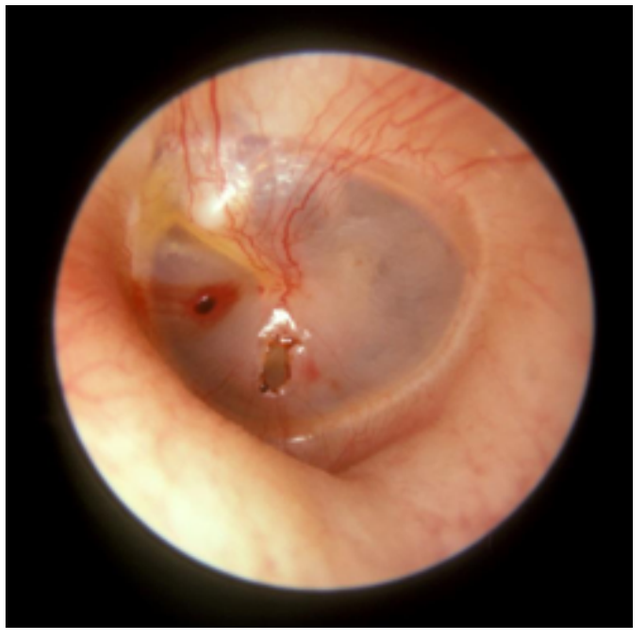
C. Intentional ingestions are more common than accidental ingestions

D. Prophylactic antibiotics are indicated

E. Vomiting should be induced with syrup of ipecac

Click here for the correct answer.

42. A 17-year-old patient presents to the emergency department complaining of pain in his right ear and mild hearing loss after cleaning his ears with a cotton swab. He denies fever, headache, or ear discharge. On otoscopic examination, you see the following image. What is the most appropriate treatment?



(Courtesy of Michael Hawke, MD; via Wikimedia Commons)

A. Amoxicillin 45 mg/kg by mouth, twice daily for 10 days

B. Ciprofloxacin/hydrocortisone otic solution, three drops twice daily for 5 days

C. Fluticasone nasal spray 1-2 sprays per nostril, once daily for 5 days

D. Ofloxacin otic solution, five drops twice daily for 5 days

E. No therapy is necessary

Click here for the correct answer.

43. A 4-year-old previously healthy male presents to your emergency department after a syncopal episode. His mother states that this happened while they were playing at a local park. He is an otherwise healthy child, but she notes that he was also complaining that his legs hurt today. On exam, his vitals are heart rate 114, respiratory rate 28, temperature 36.5 degrees Celsius, blood pressure 124/68, and oxygen saturation 99%. He is well appearing. His examination is significant for a systolic ejection murmur radiating to the center of his back and decreased pulses in his bilateral lower extremities. Regardless of repair, this disease puts the patient at greater risk for which of the following?

A. Aortic dissection

B. Cerebrovascular accident

C. Coronary artery disease

D. Infective endocarditis

E. All of the above

Click here for the correct answer.

44. Which of the following medications is NOT routinely given to a patient with premature rupture of membranes at 35 weeks gestation?

A. Ampicillin

B. Atosiban

C. Betamethasone

D. Erythromycin

E. Nifedipine

Click here for the correct answer.

45. A 6-year-old girl presents with persistent nasal congestion, nasal discharge, and coughing, which has become progressively worse over the past week. The nasal discharge is mainly from her right nostril and has recently begun to have a foul odor. The father states that, earlier in the day, the child had one episode of epistaxis which quickly resolved. Her temperature is 38.0 degrees Celsius, but the remainder of her vital signs are within normal limits. Her exam is notable for unilateral tenderness to palpation of the right maxillary sinus, as well as foul-smelling mucopurulent discharge from the right nare. The oropharynx is erythematous with no exudates. The remainder of the exam is normal. What is the most likely etiology of this patient's symptoms?

A. Acute bacterial sinusitis

B. Allergic rhinitis

C. Nasal foreign body

D. Septal hematoma

E. Viral sinusitis

Click here for the correct answer.

46. A 19-year-old male with no past medical history presents with a chief complain of throat tightness after receiving penicillin for a dental infection. He has no prior history of allergies and does not take medications. He states his throat feels irritated and a little tight, but he is able to tolerate his secretions. On exam, he has mild hoarseness and wheezing. When giving epinephrine, what is the preferred route?

A. Intramuscular, anterolateral thigh

B. Intramuscular, deltoid

C. Intravascular

D. Subcutaneous, anterolateral thigh

E. Subcutaneous, deltoid

Click here for the correct answer.

47. Which of the following is TRUE regarding necrotizing soft tissue infections?

A. Antibiotic therapy alone is usually effective for treatment

B. CT scan is the diagnostic gold standard.

C. Early infection commonly presents with overlying skin changes.

D. Most infections are polymicrobial.

E. Pain is directly correlated with physical exam findings.

Click here for the correct answer.

48. Which of the following conditions is MOST likely to present after the first month of life with diaphoresis during feeding, rales, and normal skin coloration?

A. Coarctation of the aorta

B. Ebstein's anomaly

C. Hypoplastic left heart syndrome

D. Total anomalous pulmonary venous return

E. Transposition of the great arteries

Click here for the correct answer.

49. A 46-year-old woman presents with right heel pain that has worsened over the past 2 weeks. The pain is sharp and stabbing in character and is worse in the morning, especially with the first several steps from bed. On exam, the patient has exquisite pain over the medial aspect of her calcaneus and over the plantar surface of her hindfoot. A plain film x-ray is normal. Which of the following is the next best step in management?

A. Bedside ultrasound to evaluate for retained foreign body

B. Instruct the patient to limit weight-bearing activity, use ibuprofen, initiate a stretching regimen, and follow up with a primary care physician

C. MRI of the foot and ankle to evaluate for an Achilles tendon tear

D. Place a stirrup splint to immobilize the ankle and have the patient follow up with an orthopedist in 1-2 weeks

E. Radionuclide bone scan of the foot to evaluate for an acute calcaneal stress fracture

Click here for the correct answer.

50. Your emergency department recently was offered an opportunity to train physician assistants along with the medical students already being trained. According to study findings, which one of the following is an advantage of inter-professional education?

A. Collaborative team behavior

B. Improved patient satisfaction

C. Improved skills and attitudes toward inter-professional work by learners

D. Reduction of clinical error rates

E. All of the above

Click here for the correct answer.

Practice Test #5

1. A 40-year-old male with no past medical history presents with two days of coffee-ground emesis. The patient denies alcohol abuse. Which of the following is most likely to be the cause of his symptoms?

A. Esophageal varices

B. Gastritis

C. Mallory-Weiss tear

D. Neoplasm

E. Peptic ulcer disease

Click here for the correct answer.

2. Which of the following tissues best conducts electricity?

A. Bone

B. Fat

C. Muscle

D. Skin

E. Tendon

Click here for the correct answer.

3. An 85-year-old male presents from the nursing home with significant abdominal pain, constipation, fever, and signs of peritonitis. Abdominal radiographs suggest a sigmoid volvulus. What is the next best step in the management of this patient?

A. Barium enema

B. Endoscopic decompression

C. CT scan to confirm diagnosis

D. Supportive care

E. Surgical consultation

Click here for the correct answer.

4. A 42-year-old male presents with a facial droop for the past 2 days. When you ask him to smile and raise his eyebrow he is unable to perform either maneuver with the left side of his face. The remainder of his neurologic and physical exam is normal. What is the next step in the management of this disease?

A. Arrange admission for high dose pulsed IV corticosteroids.

B. Obtain an emergent MRI and neurology consultation.

C. Send Lyme titers and start on doxycycline.

D. Start acyclovir and have the patient follow up with his physician next week.

E. Start oral corticosteroids and valacyclovir for 7-10 days.

Click here for the correct answer.

5. An 8-year-old girl presents in acute respiratory distress and is unable to answer questions. Her mother states that they just moved to the United States from a small village in the Middle East and she is unsure of her vaccination status. On your examination, the child is tachycardic, tachypneic, leaning forward, and drooling. Per her mother, these symptoms have been progressively worsening over the past 36 hours. You suspect epiglottitis in this patient, which of the following is correct?

A. Bedside cervical soft tissue radiographs are useless

B. Lie the patient flat and attempt direct laryngoscopy to confirm the diagnosis

C. Obtain a CT neck to confirm the diagnosis

D. Prepare for operative intubation

E. Steroids, antibiotics, and admission for observation

Click here for the correct answer.

6. A 75-year-old man who has a history of hypertension presents to the emergency department with active generalized tonic clonic seizures. His wife states that he has been febrile and complaining of neck stiffness for the past day. He has a temperature of 40 ^{o} Celsius, blood pressure of 80/40, and heart rate of 110. On exam you note a non-blanching petechial rash on his extremities and nuchal rigidity. He has a WBC count of 20 x $10^{o}9$/L, platelet count of 50 x $10^{o}9$/L and a venous pH of 7.3. You start fluids and broad spectrum antibiotics. The diagnosis of meningococcal meningitis is later confirmed. Despite treatment, the patient unfortunately dies 24 hours after hospital admission. Which of the following is NOT associated with this infection?

A. Adrenal crisis

B. Disseminated intravascular coagulation

C. Hypothyroidism

D. Myocarditis

E. Septic shock

Click here for the correct answer.

7. The management of Guillain-Barré syndrome may include all of the following EXCEPT:

A. Corticosteroids

B. Intravenous immunoglobulin

C. Mechanical ventilation for respiratory failure

D. Plasmapheresis

E. Pulmonary function testing

Click here for the correct answer.

8. Which of the following characteristics associated with a submersion event can be safely managed as an outpatient after the patient is observed in the emergency department?

A. Amnesia for the event

B. CPR prior to presentation

C. Initial Glasgow Coma Scale of 13

D. Oxygen saturation of 94%

E. Wheezing which resolves

Click here for the correct answer.

9. A 73-year-old woman presents with a productive cough for five days. She had a lung transplantation performed approximately 6 months prior and is currently on immunosuppressive therapy. She is afebrile with a HR of 90, blood pressure 132/84, respiratory rate of 22, and oxygen saturation of 95% on 2 liters of nasal cannula. Her chest x-ray appears similar to prior. Laboratory studies are significant for mild neutropenia. What is the next best step in the management of this patient?

A. Discharge the patient home with follow up in one week

B. Increase the dose of her immunosuppressant medications

C. Start empiric antibiotics

D. Start ganciclovir

E. Start high-dose methylprednisolone

Click here for the correct answer.

10. Uterine rupture most commonly occurs during which stage of labor?

A. Prior to the first stage

B. First stage

C. Second stage

D. Third stage

E. Postpartum

Click here for the correct answer.

11. A 27-year-old woman with no past medical or surgical history presents with sudden onset severe left lower quadrant abdominal pain that began a few minutes ago while she was jogging on the treadmill. Upon arrival to the emergency department, the patient is in moderate distress, doubled over in pain and actively vomiting. Her last normal menstrual period was 3 weeks ago. Her vital signs are: temperature 99 º Fahrenheit, blood pressure 140/85, heart rate 120, respiratory rate 22, SpO2 99% on room air. Her abdominal exam reveals exquisite tenderness in the left lower quadrant with voluntary guarding. The genitourinary exam is remarkable for a tender left sided adnexal mass. Her urine pregnancy test is negative. Which of the following is true regarding ovarian torsion?

A. Malignant tumors of the ovary are more likely to cause torsion than benign ovarian tumors

B. Most cases of ovarian torsion occur on the left side

C. Pregnancy does not increase the risk of ovarian torsion

D. The presence of arterial blood flow on color Doppler sonography definitively rules out the diagnosis of torsion

E. Women with a history of tubal ligation or other pelvic surgery are at increased risk for ovarian torsion

Click here for the correct answer.

12. A 29-year-old female with no past medical history presents with one month of heavy menses and worsening lightheadedness. On presentation, she is afebrile with a heart rate of 105 and blood pressure of 102/77. She appears pale and complains of lightheadedness during the exam. Her pregnancy test is negative. Her labs are significant for a hemoglobin of 4.2 g/dL. Shortly after starting the blood transfusion, she develops a low grade fever, but is otherwise asymptomatic. You stop the transfusion. What is the next step in management?

A. Give acetaminophen and restart the transfusion

B. Give empiric antibiotics

C. Give furosemide

D. Give intravenous steroids

E. Repeat type and crossmatch

Click here for the correct answer.

13. A 32-year-old pregnant female at 8 weeks gestation presents in atrial fibrillation with a rapid ventricular response, bibasilar rales, fever, nausea, and a resting tremor. You suspect a hyperthyroid state. Which of the following medications is contraindicated in your initial stabilization of this patient?

A. Dexamethasone

B. Methimazole

C. Propylthiouracil

D. Propranolol

E. Sodium Iodide

Click here for the correct answer.

14. A 36-year-old female has a dislocated shoulder. You choose to use propofol and fentanyl for procedural sedation. After administration of the drugs, the patient's eyes are closed, she is breathing spontaneously, has good oxygen saturations, a blood pressure of 110/70, and heart rate of 85. She slowly answers yes/no questions only and grabs your hand with her non-injured hand when light sternal rub is applied. What level of sedation has been produced?

A. Deep sedation

B. Dissociative sedation

C. General anesthesia

D. Minimal sedation

E. Moderate sedation

Click here for the correct answer.

15. What is the correct order for the 6 cardinal movements of labor?

A. Descent, Extension, Internal rotation, Engagement, External rotation, Flexion

B. Engagement, External rotation, Flexion, Internal rotation, Extension, Descent

C. Engagement, Flexion, Descent, Internal rotation, Extension, External rotation

D. Engagement, Internal rotation, Flexion, Descent, External rotation, Extension

E. Flexion, Extension, Internal rotation, External rotation, Engagement, Descent

Click here for the correct answer.

16. A 40-year-old healthy male presents with pain in the front of his knee which began several weeks ago and has persistently worsened. He works as a software engineer and feels that sitting at his desk all day makes the pain worse. His x-ray is normal. Which of the following overuse syndromes is the most common cause of anterior knee pain?

A.Medial tibial stress syndrome

B. Patellar tendonitis

C. Patellofemoral pain syndrome

D. Pes anserine bursitis

E. Quadriceps tendonitis

Click here for the correct answer.

17. A 27-year-old female presents with severe left eye pain and decreased visual acuity. The patient states that she left her contacts in for several days because she "was too busy studying for her graduate school exams." On physical examination, there is severe chemosis of the left eye. There is photophobia to direct light. Visual acuity is 20/200 on the left and 20/60 on the right without correction. On fluorescein staining, there is a large area of uptake. What organism must you make sure to cover when treating this patient?

A. *Bacteroides fragilis*

B. *Candida albicans*

C. *Methicillin-resistant staphylococcus aureus*

D. *Moraxella catarrhalis*

E. *Pseudomonas aeruginosa*

Click here for the correct answer.

18. Which of the following patients is at LOWEST risk for spinal infection?

A. 57-year-old man with HIV currently on antiretroviral therapy

B. 24-year-old man with a history of intravenous drug use

C. 60-year-old woman with a history of chronic back pain who gets intermittent steroid injections

D. 55-year-old woman currently being treated as an outpatient with antibiotics for community- acquired pneumonia

E. 58-year-old woman with a history of diabetes and end stage renal disease on dialysis

Click here for the correct answer.

19. A 7-year-old male presents with eye swelling and fever. His mother reports that the child was "bitten by a bug near the eye a couple of days ago." On physical exam, the left eye has significant periorbital swelling and erythema. The child reports pain with extraocular movements and visual acuity is 20/60 on the left and 20/20 on the right. Which of the following is the most appropriate next step in management?

A. Perform a CT of the orbits and consult ophthalmology

B. Start amoxicillin and discharge home with urgent ophthalmology follow-up

C. Start ceftriaxone and vancomycin and consult ophthalmology

D. Start levofloxacin and admit to the hospitalist

E. Start topical erythromycin and discharge home with urgent ophthalmology follow-up

Click here for the correct answer.

20. Which is of the following is NOT part of the Well's criteria for estimating pre-test probability of pulmonary embolism (PE)?

A. Heart rate >100

B. Hemoptysis

C. Immobilization

D. Pregnancy

E. Testicular cancer

Click here for the correct answer.

21. With regards to postpartum hemorrhage (PPH), which of the following is FALSE?

A. After volume resuscitation, the first line medication is oxytocin

B. Physiologic changes of pregnancy can mask impending hypovolemic shock

C. PPH typically occurs within the first 24 hours of delivery

D. PPH can occur up to 6 weeks postpartum

E. The most common cause is a lower genital tract laceration

Click here for the correct answer.

22. A 34-year-old female with a past medical history of asthma and Addison's disease presents to the emergency department with abdominal pain, vomiting, and dizziness. Her vitals are temperature 98.9°F, pulse 120, blood pressure 80/42, respiratory rate 22, and oxygen saturation of 99%. These vitals persist despite fluids and vasopressors. After initial evaluation, you determine she is in primary adrenal crisis. What electrolyte abnormalities do you most expect?

A. Hyperkalemia, hypernatremia

B. Hyperkalemia, hyponatremia

C. Hypokalemia, hypernatremia

D. Hypokalemia, hyponatremia

E. Hypernatremia, hypochloremia

Click here for the correct answer.

23. Which of the following is true regarding the diagnosis of ectopic pregnancy?

A. A definite intrauterine pregnancy seen on ultrasound practically excludes ectopic pregnancy

B. A single β-hCG level can be used to exclude ectopic pregnancy

C. Bedside β-hCG tests can only be performed on urine

D. β-hCG that does not double in 2 days is indicative of an abnormal pregnancy

E. If the β-hCG is below the discriminatory zone, an ultrasound should not be performed

Click here for the correct answer.

24. A 50-year-old healthy female presents to the emergency department with 3 days of slowly worsening pain and diffuse redness of her right lower leg. She states that the symptoms began shortly after she cut herself while shaving 3 days ago. The patient denies any fevers or chills and states that she has never had this happen before. She has an area of diffuse redness and increased warmth without fluctuance or lymphangitic streaking, Her serum white blood cell count is 8.5 x 10^9/L with no left shift. Which of the following is the most likely diagnosis?

A. Cellulitis

B. Deep vein thrombosis

C. Erysipelas

D. Folliculitis

E. Necrotizing fasciitis

Click here for the correct answer.

25. A 67-year-old male presents with hematemesis and melena. He is afebrile with a heart rate of 115, blood pressure of 85/65, respiratory rate of 17, and oxygen saturation of 95%. His exam is significant for caput medusae and an enlarged liver. His laboratory findings are significant for an international normalized ratio (INR) of 7 and hemoglobin of 3 g/dL. After receiving 4 units of fresh frozen plasma and 4 units of packed red blood cells, what electrolyte abnormality is he at highest risk of having?

A. Hypercalcemia

B. Hyperchloremia

C. Hypocalcemia

D. Hypochloremia

E. Hypokalemia

Click here for the correct answer.

26. A 63-year-old female with a past medical history of lung cancer presents to the emergency department with a new-onset bilateral lower extremity paralysis for the past hour. She walks with a walker at baseline because of recurrent falls over the past year. On exam she is well appearing, is alert and oriented but smells of urine. Her vital signs are significant for a temperature of 98.6° Fahrenheit, heart rate of 113, blood pressure of 100/58, respiratory rate of 18, and oxygen saturation of 98% on room air. Her cranial nerve exam is normal, she has 0/5 strength in both lower extremities, and 4/5 strength in both upper extremities. A stroke alert is called and patient is taken for STAT non-contrast head CT that is negative. Her exam is unchanged after CT. What is the next step in management?

A. Administer fibrinolytic

B. Consult neurology

C. Do nothing, she is malingering

D. Obtain MRI brain

E. Obtain MRI spine

Click here for the correct answer.

27. A 64-year-old smoker with a history of hypertension presents with epistaxis. He states this is his eighth episode in the past year and it always involves his right nostril. The current episode resolved shortly after arrival to the emergency department. His vital signs are within normal limits and exam is unremarkable except for only a small amount of dried nasal blood. Which of the following is the best choice for management of this patient?

A. Advise on avoidance of nasal trauma and begin nasal saline

B. Follow up with his primary physician in one week for re-evaluation

C. Perform prophylactic nasal packing

D. Place an urgent otolaryngology referral

E. Prescribe topical antibiotics

Click here for the correct answer.

28. A 45-year-old woman with a history of benzodiazepine dependence presents to your emergency department (ED) after an intentional ingestion of diazepam one hour prior to arrival. The patient endorses consuming 50 diazepam 10 mg tablets after getting into an argument with her husband. While in the ED she becomes more lethargic and her breathing becomes shallow. What is the best course of action?

A. Administer flumazenil

B. Administer fomepizole

C. Intubate patient and administer flumazenil

D. Intubate patient and administer fomepizole

E. Intubate patient and provide supportive care

Click here for the correct answer.

29. A 22-year-old female is diagnosed with new onset schizophrenia, for which she was started on haloperidol treatment. Which movement disorder, if present, will be a delayed complication of therapy initiation or dose change and is potentially irreversible?

A. Akathisia

B. Akinesia

C. Dystonia

D. Myoclonus

E. Tardive dyskinesia

Click here for the correct answer.

30. There is an explosion at a local grocery store. You are told there are hundreds of people who are potentially injured and you are first to the scene. You start using the Simple Triage and Rapid Treatment (START) technique. The first person you examine is a young female lying on the ground with a palpable radial pulse - heart rate 120, respiratory rate 27, mild facial trauma, and an obvious open right lower extremity deformity. She is alert but does not follow commands. Which color tag is appropriate for triaging this patient?

A. Black

B. Green

C. Red

D. White

E. Yellow

Click here for the correct answer.

31. A 30-year-old male pedestrian was brought in by EMS after being struck by a motor vehicle. He is unresponsive, has absent breath sounds on the left, and distended neck veins. His blood pressure is 85/48 mmHg, heart rate 120 beats per minute, oxygen saturation 90% and GCS 6. What is the next step in management?

A. Perform a Focused Assessment with Sonography in Trauma (FAST) exam

B. Perform needle thoracostomy, then place a tube thoracostomy

C. Perform rapid-sequence intubation

D. Place two large-bore IVs and activate massive transfusion protocol

E. Obtain an immediate portable chest x-ray

Click here for the correct answer.

32. A 35-year-old male presents with one day of right lower quadrant abdominal pain. He has a history of acute lymphoblastic leukemia on chemotherapy. He is ten days removed from chemotherapy. He is afebrile with normal vitals. On exam, he appears comfortable, but is tender in the right lower quadrant. His labs are notable for a white blood cell count of 0.7 $x10^9$/L and hemoglobin of 8.2 g/dL. CT scan shows a distended cecum and right colon with thickening of the bowel wall. His nurse reports that he has just passed a bloody bowel movement. Which of the following would is the best management of this patient?

A. Bowel rest, nasogastric decompression, intravenous fluids, and admission to medicine

B. Bowel rest, nasogastric decompression, broad spectrum antibiotics, and surgical consultation

C. Broad spectrum antibiotics, early oral intake, and admission to medical service

D. Oral challenge and discharge with antibiotics

E. Radiation oncology consult

Click here for the correct answer.

33. Which of the following chest radiograph findings is most commonly seen in patients with anthrax?

A. Diffuse pulmonary edema

B. Mediastinal widening

C. Pleural effusion

D. Pneumothorax

E. Right lower lobe infiltrate

Click here for the correct answer.

34. Which of the following is true regarding electrical injuries?

A. Anterior shoulder dislocation are commonly seen with electrical injuries.

B. Cardiac dysrhythmias are frequently a delayed presentation.

C. Lhermitte's sign can be seen after a lightning injury.

D. The most important complication from oral commissure burns is immediate bleeding.

E. When similar voltages are used, alternating current is more dangerous than direct current.

Click here for the correct answer.

35. A patient presents after a witnessed out-of-hospital arrest. He is successfully defibrillated into sinus rhythm. Which of the following is a goal of post-arrest care?

A. Avoid hyperthermia

B. Avoid use of vasoactive agents

C. Hypothermia to goal temperature <32 degrees Celsius

D. Initiation of intravenous heparin

E. Oxygen saturation of 100%

Click here for the correct answer.

36. A 52-year-old male is fulfilling his bucket list wish to climb Mount Everest. He has just arrived at basecamp (altitude 5,545 meters) and is planning to spend several days acclimating to the increased altitude. Within the first day of arrival, he starts feeling unwell and experiences all of the symptoms listed below. Which of these symptoms is an indication for IMMEDIATE descent?

A. Ataxia

B. Headache

C. Increased fatigue

D. Malaise

E. Nausea

Click here for the correct answer.

37. A 29-year-old G0P0 female presents to the emergency department with several days of moderate lower abdominal pain that radiates to her low back. She tells you she has been diagnosed with endometriosis via laparoscopy. Which of the following is the most common site of involvement in endometriosis?

A. Bladder

B. Ovaries

C. Pouch of Douglas

D. Sigmoid colon

E. Ureter

Click here for the correct answer.

38. A 23-year-old woman presents with unilateral vision loss and severe pain with extraocular movement. Her intraocular pressures are normal, and her fundoscopic exam is unremarkable. The rest of her physical exam is normal. Which of the following disorders is this patient at the highest risk of developing?

A. Behcet's disease

B. Diabetes mellitus

C. Graves' disease

D. Guillain-Barre syndrome

E. Multiple sclerosis

Click here for the correct answer.

39. A 50-year-old male with a history of hypertension presents to the emergency department with reports of right-sided body weakness with his arm more affected than his leg. His cranial nerve exam is normal. His wife states the symptoms began 45 minutes prior to arrival. Approximately 20 minutes into his hospital stay, his symptoms resolve without any intervention. The patient's non-contrast head CT head is unremarkable. His electrocardiogram and laboratory results are normal. You diagnose him with a transient ischemic attack (TIA). Which vessel was likely affected?

A. Anterior cerebral artery

B. Middle cerebral artery

C. Pontine artery

D. Posterior cerebral artery

E. Vertebrobasilar artery

Click here for the correct answer.

40. Which of the following statements regarding vulvovaginal candidiasis is FALSE?

A. Adding Lugol's to vaginal secretions increases the sensitivity and specificity of microscopic examination

B. Self-medication is recommended in women with recurrence of previously diagnosed vulvovaginal candidiasis

C. Single-dose treatment with oral fluconazole is not recommended during pregnancy

D. Vaginal discharge is the most common and specific symptom

E. Vulvovaginial candidiasis in HIV positive patients is not considered complicated and should be treated similarly to vulvovaginal candidiasis in immunocompetent patients

Click here for the correct answer.

41. A recreational diver goes for a two-hour dive at 100 meters. While beginning his ascent, the patient sees a shark and resurfaces too quickly. Which of the following is an example of decompression sickness?

A. Ataxia

B. Headache

C. Joint pain

D. Motor weakness

E. Vomiting

Click here for the correct answer.

42. A 69-year-old male with diabetes presents with severe left ear pain and discharge for the past week. He denies fever, hearing loss, or visual changes. On examination, there is mild erythema of the helix with significant granulation tissue and discharge within the canal. What is the most appropriate treatment?

A. Amoxicillin 45 mg/kg by mouth, twice daily

B. Carbamide peroxide 6.5% topical, twice daily

C. Cephalexin 500 mg by mouth, four times daily

D. Ciprofloxacin 400 mg intravenous, twice daily

E. Vancomycin 1000 mg intravenous, once daily

Click here for the correct answer.

43. A patient with a prosthetic heart valve is diagnosed with endocarditis. He is otherwise healthy, does not take medications, and does not abuse intravenous drugs. What is the appropriate empiric antibiotic treatment?

A. Nafcillin

B. Nafcillin and gentamicin

C. Nafcillin, gentamicin, and vancomycin

D. Vancomycin and gentamicin

E. Vancomycin, gentamicin, and rifampin

Click here for the correct answer.

44. A 19-year-old male presents with altered mental status. His vitals are as follows: Temperature 106.7^{0}F, heart rate 168, blood pressure 112/78, respiratory rate 18, oxygen saturation 99%. His ECG shows atrial fibrillation with rapid ventricular response. What treatment should be initiated immediately?

A. Antipyretic oral medication

B. Beta blocker for rate control

C. Cold intravenous fluids

D. Ice water immersion

E. Synchronized cardioversion

Click here for the correct answer.

45. A 41-year-old man presents with severe rectal pain worsening over the past 24 hours. On exam, you note a bluish purple mass at the anal verge which is tender to palpation. Which of the following techniques can be performed to treat this patient's condition?

A. Apply granulated sugar over mass to help facilitate reduction

B. Elevate and make an elliptical incision on the overlying skin

C. Grasp and elevate the mass with forceps and make an incision at the base

D. Make an incision into the mass allowing it to drain

E. Reduce the mass back into the anus

Click here for the correct answer.

46. A 70-year-old female with an unknown past medical history is brought to the emergency department by her friend, who reports that the patient has had slurring of her speech for the past 20 minutes. You note no other deficits on her physical exam besides dysarthria. Her vital signs are temperature 98.2° Fahrenheit, blood pressure 126/82, heart rate 72 beats/minute, respiratory rate 14 breaths/min, and oxygen saturation 99% on room air. What is the next most appropriate action?

A. Administer aspirin

B. Administer thrombolytics

C. Check alcohol level

D. Check fingerstick blood glucose level

E. Obtain brain imaging

Click here for the correct answer.

47. A mother brings her 10-year-old son to the emergency department for intermittent epistaxis over the past hour, which has not been relieved by applying pressure to the nose. When discussing proper technique for applying pressure, which of the following is correct?

A. Leaning the head forward while applying pressure only to the nasal ala on the side of the bleeding.

B. Leaning the head forward while pressing both nasal ala against the septum.

C. Tilting the head backwards while applying pressure only to the nasal ala on the side of the bleeding.

D. Tilting the head backwards while pressing both nasal ala against the septum.

E. Tilting the head sideways while applying pressure only to the nasal ala on the side of the bleeding.

Click here for the correct answer.

48. A 23-year-old male with type 1 diabetes presents to the emergency department with one day of worsening abdominal pain and multiple episodes of vomiting. He is tachycardic and tachypneic. He appears lethargic but arousable. His labs are as follows:

Na: 130 mEq/L
K: 4.0 mEq/L
Cl: 101 mEq/L
CO2: 12 mEq/L
BUN: 28 mg/dL
Creatinine: 1.5 mg/dL
Glucose: 540 mg/dL

What is his corrected sodium?

A. 133 mEq/L

B. 135 mEq/L

C. 137 mEq/L

D. 139 mEq/L

E. Unable to determine with the information given

Click here for the correct answer.

49. Which of the following does NOT indicate a need for endotracheal intubation in a patient with a recent diagnosis of Guillain-Barré syndrome?

A. Arterial blood gas with pCO2 of 88 mmHg

B. Inability to tolerate secretions

C. Negative inspiratory force of -10 cm H20

D. Pulse oximetry of 63% on 15L oxygen by face mask

E. Vital capacity of 30 mL/kg

Click here for the correct answer.

50. A 28-year-old female with multiple sclerosis, non-compliant with her medications, presents to the emergency department complaining of recent vision changes. She has been having blurred vision in her right eye for the past week and associated pain with eye movement. The symptoms worsened when she went out for a run yesterday. The patient also complains of increased paresthesias of all her extremities for the past month. A recent MRI did not show any masses. On physical exam, patient has decreased visual acuity of her right eye, a Marcus-Gunn right pupil, and clonus of her lower extremities. What will be most appropriate treatment for the patient's acute symptoms?

A. Baclofen

B. Glatiramer acetate

C. Hydroxychloroquine

D. Intravenous immunoglobulin

E. Methylprednisolone

Click here for the correct answer.

Board Review Answers

Practice Test #1

1. Correct Answer: B. The iliotibial (IT) band is a strip of fascia that extends down the lateral aspect of the thigh, originating at the lateral iliac crest and inserting distally on the tibia, patella, and biceps femoris tendon. Overlying the knee, it connects the lateral femoral condyle to the lateral tibia, serving to stabilize the knee during extension. IT band syndrome is an overuse injury resulting from inflammation of the distal IT band, which slides over the lateral femoral epicondyle during repetitive flexion and extension. This syndrome is common in runners, especially those who have recently increased their distance or activity level.

Ober's test is performed in order to assess tightness of the IT band. Have the patient lie in the lateral decubitus position with the affected knee upward. Abduct the hip with the knee extended, then release and allow the leg to return to the neutral position under the influence of gravity. If the leg does not smoothly return to a neutral position, this implies IT band tightness. Pain may also be present. Treatment is conservative and symptoms typically improve with an IT band stretching regimen as well as orthotics.

A Baker's cyst (answer A) is the result of an evolving knee effusion that forces a herniation of the synovial membrane through the posterior knee capsule. This causes a painful, tender bulge which is palpable in the posterior knee and may limit the range of motion. The cyst can occasionally rupture and lead to pain and swelling down the calf.

A lateral meniscus injury (answer C) is less common than a medial meniscus injury. Symptoms typically begin abruptly, often as the result of a twisting injury. Depending on the extent of a tear, patients may feel a subsequent popping or clicking sensation (the result of the loose edge of the torn meniscus). On exam you would expect to find lateral joint line tenderness and a positive McMurray's test (reproducible pain or a palpable click felt on axial loading of the meniscus). There may also be a positive Thessaly maneuver (the patient performs a one legged squat on the affected knee and then twists his/her hips back and forth). A positive result is if symptoms are reproduced by this maneuver.

Pes anserine bursitis (answer D) is a painful, acute inflammation of the pes anserine bursa, which is located a few centimeters below the medial joint line, overlying the proximal tibia at the insertion site of the sartorius, gracilis, and semitendinosus tendons. It is not a cause of lateral/posterior knee pain. It is usually a self-limited condition and management is conservative.

Popliteus tendonitis (answer E) is inflammation and tenderness of the small, flat popliteus muscle which originates on the lateral femoral condyle and inserts on the posteromedial tibia. It serves to prevent external rotation of the knee during flexion. Hence, symptoms of popliteus tendonitis are reproduced when the knee is flexed and internally rotated and the patient attempts to resist external rotation by the examiner (Webb Test). Treatment is conservative and includes NSAIDs as well as quadriceps strengthening.

References:

1. Pallin D. Knee and Lower Leg. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

Click here to return to the question.

2. Correct Answer: E. Osteomyelitis is the infection of the bone or bone marrow. Infectious organisms can be introduced by hematogenous or contiguous spread. A common example of contiguous spread is a diabetic ulcer. Although debate exists about whether *Salmonella* or *Staphylococcus* is the most common infectious organism found in osteomyelitis in patients with sickle cell disease, *Streptococcus* is much less common.

Staphylococcus aureus is the most common overall infectious organism in osteomyelitis, including in children (answer A). Patients in developing countries are at higher risk for a *Mycobacterium* infectious agent (answer B). Patients with diabetes mellitus are most likely to have *Staphylococcus aureus*, *Streptococcal* species, or anaerobic species as the infectious organism in osteomyelitis (answer C). Patients with bite wounds are more likely to be infected with oral flora, such as *Streptococcal* and anaerobic species (answer D). Additionally, *Pseudomonas* osteomyelitis is more common in intravenous drug users.

It is important to note that despite epidemiological data on osteomyelitis, a deep bone culture is recommended to identify the infectious organism. A culture of any surface or sinus tract leading to the bone typically does not actually match the organism found in the bone.

References:

1. Brinker MR, O'Connor DP. Basic Sciences. In: Miller MD. Review of Orthopaedics. 4th ed. Philadelphia, PA: Elsevier, 2004.

2. O'Keefe KP, Sanson TG. Hip and Knee Pain. In Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

Click here to return to the question.

3. Correct Answer: D. This patient presents with vertigo, unilateral nystagmus, and hearing loss after a recent viral infection, making labyrinthitis the most likely etiology. Labyrinthitis occurs when an infection (either bacterial or viral) affects both the vestibular and cochlear branches of cranial nerve VIII. In some patients with labyrinthitis, hearing loss may be the only presenting symptom.

Acoustic neuroma is a slow-growing tumor that can cause progressively worsening hearing loss, vertigo, and headaches. This patient's sudden onset presentation makes this much less likely. Benign paroxysmal positional vertigo is rapid onset, short in duration, and not associated with unilateral hearing loss. Cerebellar infarct is a central cause of vertigo which will more commonly present with multidirectional nystagmus and additional neurologic findings. In this young patient without major risk factors, a cerebellar infarct would be unlikely. Meniere's disease is caused by excess endolymph within the cochlea and labyrinth. This is more commonly diagnosed after repeated episodes and may be associated with tinnitus. Given the initial presentation and preceding viral symptoms without tinnitus, labyrinthitis is a much more likely diagnosis.

References:

1. Goldman B. Vertigo and Dizziness. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Chang AK, Olshaker JS. Dizziness and Vertigo. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

Click here to return to the question.

4. Correct Answer: E. In the past, patients with pancreatitis were allowed nothing by mouth and nasogastric suctioning was initiated out of concern that oral intake would stimulate the release of pancreatic enzymes. However, randomized clinical trials in patients with mild-to-moderate pancreatitis have shown no benefit from either fasting or use of nasogastric suctioning. While H2 blockers, glucagon, and octreotide, in theory, work to decrease pancreatic function in the acute setting, they have not been shown to be clinically effective. Hyperglycemia should be treated cautiously because it may self-correct as the pancreatitis resolves. Hypocalcemia may be the result of either decreased albumin or hypomagnesemia. However, if true hypocalcemia exists with a decreased ionized calcium level, treatment with calcium gluconate is appropriate.

References:

1. Hemphill R, Santen S. Disorders of the Pancreas. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

Click here to return to the question.

5. Correct Answer: B. Any elevation in creatinine (especially greater than 30% from baseline) should trigger an evaluation for possible renal transplant dysfunction. Of all of the options listed, ultrasound should be the next step after contacting the patient's transplant team. Ultrasound helps rule out abscess, urinary obstruction, and renal artery or vein thrombosis as potential causes of renal dysfunction. Vascular causes such as renal artery or vein thrombosis are most commonly found during the first few months after transplant, especially during the first 1-2 weeks.

Blood cultures are recommended in a transplant patient with fatigue, as infection can present subtly in immunocompromised patients. However, as the patient has no other signs of infection broad-spectrum antibiotics are not indicated at this point. High-dose glucocorticoids can also be deferred until the cause of the creatinine elevation is discovered and are usually administered in conjunction with the patient's transplant team. Intravenous fluids are commonly used to treat pre-renal acute kidney injury. This patient does not give a history of poor oral intake and has a BUN-to-creatinine ratio of less than 20, making dehydration unlikely. The patient may go on to have a renal biopsy performed, but this is not the first step that should be taken.

References:

1. Fish RM, Massad MG. The Transplant Patient. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Keadey MT. The Solid Organ Transplant Patient. In: Marx JA, Hockberger RS, Walls RM. Eds. Rosen's Emergency Medicine- Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Keller AK, Jorgensen TM, Jespersen B. Identification of risk factors for vascular thrombosis may reduce renal graft loss: a review of recent literature. J Transplant. 2012; Epub 31 May 2012.

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6. Correct Answer: D. Serotonin syndrome usually results from two or more drugs with serotonergic actions [e.g. tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), monoamine oxidase inhibitors (MAOIs), or triptans], resulting in enhancement of serotonergic transmission. It can also occur iatrogenically by administration of serotonergic agents (e.g. meperidine, tramadol, dextromethorphan). Myoclonus is the most common finding in serotonin syndrome and is rarely seen in any other condition that mimics serotonin syndrome, including neuroleptic malignant syndrome. Neuroleptic malignant syndrome is characterized by the tetrad of fever, muscular rigidity, autonomic dysfunction, and altered mental status. Serotonin syndrome can also be confused with malignant hyperthermia, but hyperreflexia and lack of muscle rigidity is more common in serotonin syndrome.

References:

1. Mills K, Bora K. Atypical Antidepressants, Serotonin Reuptake Inhibitors, and Serotonin Syndrome. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Levine M, Lovecchio F. Antipsychotics. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Boyer EW, Shannon M. The serotonin syndrome. N Engl J Med. 2005;352:(11)1112-20.

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7. Correct Answer: A. This patient presenting with a dental abscess, facial cellulitis, and a new neurologic deficit is highly concerning for a cavernous sinus thrombosis (CST). CST is a dangerous condition, which can lead to sepsis, neurologic deficits, and even death. Early treatment involves intravenous antibiotics and close monitoring.

Diabetic cranial nerve neuropathy can present with an isolated loss of ocular movements and diplopia, but would be atypical in this young patient with an associated facial infection. Ludwig's angina is another dangerous complication of dental infections, which can be life-threatening as progressive sublingual swelling may cause an airway emergency. However, this patient is not presenting with submandibular swelling. Optic neuritis is an inflammation of the optic nerve which presents with blurred vision and pain with extraocular movements. Cranial nerve palsies are uncommon, unless this is associated with a multiple sclerosis flare. Vestibular abscess is a local facial abscess associated with dental infections, but does not cause neurologic abnormalities.

References:

1. Denny CJ, Schull MJ. Headache and Facial Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Crocco TJ, Goldstein JN. Stroke. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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8. Correct Answer: D. Symptoms of shunt malfunction can develop over hours to days. Clinical features include altered mental status, headache, nausea, vomiting, abdominal pain, ataxia, and autonomic instability. Often, the presenting complaint is vague, although a decrease in mental status may have the highest correlation in predicting shunt malfunction. A quick-brain MRI scan or non-contrast head CT is the recommended emergency department imaging test to evaluate for shunt complications and hydrocephalus. Of note, patients with a VP shunt can have chronic ventricular dilation. Therefore, comparison with prior imaging studies is important. A shunt series is a collection of x-rays tracing the shunt from the head to its destination to evaluate for disconnections or kinks causing shunt obstruction. A neurosurgical consultation should be obtained whenever shunt malfunction is suspected.

While a shunt tap and empiric antibiotics may eventually be indicated to evaluate for a shunt infection, the history and presentation suggests an obstructive process, which will need to be evaluated first. A lumbar puncture should never be performed without first obtaining a CT or MRI scan given the risk of shunt malfunction and increased ICP (answer E). Given the clinical presentation and concern for shunt malfunction, our patient should have an emergent neurosurgery evaluation while in the ED and not as an outpatient (answer B).

References:

1. Ladde JG. Central Nervous System Procedures and Devices. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Moro-Sutherland D. The Child with Special Health Care Needs. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Perkin RM. Understanding hydrocephalus and the ED management of VP shunts and their complications. Pediatr Emerg Med Rep. 10: 37, 2005.

4. Lan CC, Wong TT, Chen SJ. Early diagnosis of ventriculoperitoneal shunt infections and malfunction in children with hydrocephalus. J Microbiol Immunol Infect. 36(1): 47, 2003.

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9. Correct Answer: E. The patient's paresthesias and signs of lower motor neuron involvement (decreased reflexes and weakness) are consistent with Guillain-Barre Syndrome (GBS), a demyelinating disease of peripheral nerves. Typically patients with GBS have progressive, symmetrical weakness and paresthesias of the lower extremities; however, 10% of GBS patients (such as in this case) have weakness that begins in the upper extremities.

The patient is tachypneic and should have immediate pulmonary function testing. Up to one-third of GBS patients require ventilatory support. Forced vital capacity (FVC) of less than 20 mL/kg is associated with impending respiratory failure and the need for endotracheal intubation.

After pulmonary function has been assessed, management includes intravenous immunoglobulin (answer A) and plasma exchange. Corticosteroids (answers B and C) are not recommended for the treatment of GBS. A lumbar puncture may reveal increased protein in the cerebrospinal fluid (CSF) at the peak of illness (4-6 weeks), but is usually normal during the initial onset of GBS.

References:

1. Klein J, Ropper A, Samuels M. Disease of Spinal Cord, Peripheral Nerve and Muscle. In: Adams and Victor's Principles of neurology. S.l; 2014.

2. Marx JA, Hockberger R, Walls R. Peripheral Nerve Disorders. In: Rosen's emergency medicine: concepts and clinical practice. 8th ed. Philadelphia: Elsevier, Saunders; 2014.

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10. Correct Answer: B. Many anti-epileptics are teratogenic. Taking valproic acid (answer E) during the first trimester poses the highest risk of congenital malformations including neural tube defects, hypospadias, cardiac defects, limb abnormalities, and oral clefts. This effect may be dose related. Phenobarbital and topiramate (answer D), which are associated with an increased risk of cleft lip as well as metabolic acidosis, are associated with the next most risk of major malformations. Phenytoin (answer C) and carbamazepine (answer A) also carry a risk of teratogenicity, but to a lesser degree. Phenytoin has been associated with cardiac defects, cleft lip, dysmorphic facial features, nail or digit hypoplasia, microcephaly, and mental retardation. Carbamazepine is also associated with craniofacial defects, and cardiovascular malformations, and additionally, spina bifida, and hypospadias.

Newer anti-epileptics including levetiracetam and lamotrigine are associated with the lowest risk of congenital malformations.

When anti-epileptics are given during pregnancy, monotherapy is preferred over polytherapy. Seizure frequency increases in pregnancy, secondary to an increase in volume of distribution and plasma clearance, and therefore adjustments in medication dosing must usually be made. Anti-epileptic drug levels should be monitored at regular intervals throughout pregnancy; the therapeutic range of anti-epileptic drugs is not adjusted for pregnancy.

References:

1. Dyne P, Waxman M. Comorbid Diseases in Pregnancy. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Diaz S, Smith CR, Shen A, et al. Comparative safety of antiepileptic drugs during pregnancy. Neurology. 202. May 22;78(21):1692-9.

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11. Correct Answer: C. Current recommendations from the U.S. Center for Disease Control and Prevention (CDC) show efficacy in emergency contraception up to 5 days after unprotected sexual activity in females able to get pregnant. Option E is incorrect as no studies beyond 5 days have proven efficacy of emergency contraception and should not be routinely offered after 5 days.

References:

1. Slaughter L. Sexual Assault. In: Marx JA et al, eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Piaggio G, Kapp N, von Hertzen H. Effect on pregnancy rates of the delay in the administration of levonorgestrel for emergency contraception: a combined analysis of four WHO trials. Contraception. 2011;84:35-39.

3. Moreno-Walton L. Female and Male Sexual Assault. In: Tintinalli JE, et al., eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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12. Correct Answer: E. The patient has a prolapsed umbilical cord. No attempt should be made to use a speculum examination at this point (answer A). This could cause bleeding and exsanguination. It is not recommended to remove the hand once the prolapsed cord is found (answer B). Every effort should be made to elevate the presenting fetal part to allow good blood flow through the cord. It is not recommended to try and reduce a prolapsed cord (answer C). Likewise, it is not advised to cut the cord at this stage as the delivery of the infant has not taken place and the infant would likely die (answer D).

References:

1. VanRooyen MJ, Scott JA. Emergent Delivery. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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13. Correct Answer: A. Diabetes is a commonly encountered problem during pregnancy, affecting more than 8% of pregnancies. 75% of pregnant patients with diabetes suffer from gestational diabetes. Of the remaining 25% that had pre-existing diabetes, only 1% are type 1 diabetics. Most gestational diabetics are managed with dietary modification alone (answer C). Almost all patients with pre-existing diabetes have increasing insulin requirements throughout the pregnancy to maintain euglycemia, typically ranging from 0.7 units/kg/day in the first trimester to 1 unit/kg/day in the third trimester (answer E). During pregnancy, euglycemic cutoffs are a fasting glucose <95 mg/dL and 2-hour postprandial glucose of <120 mg/dL (answer B).

The incidence of diabetic ketoacidosis (DKA) increases during pregnancy, since ketosis occurs more rapidly and at lower glucose levels (answer D). Thus, pregnant patients with serum glucose levels >180 mg/dL should be screened for DKA. The incidence of DKA can be dramatically decreased with early diagnosis and prenatal counseling.

References:

1. Dyne P, Waxman M. Comorbid Diseases in Pregnancy. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Lindsay R. Gestational diabetes: causes and consequences. British Journal of Diabetes & Vascular Disease. Jan/Feb 2009; 9(1): 27-31.

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14. Correct Answer: A. There are three main mechanisms whereby malignancy can produce hypercalcemia:

1. By production of a parathyroid hormone–related protein that is structurally similar to parathyroid hormone

2. By extensive local bone destruction associated with osteoclast activating factors

3. By production of vitamin D analogues

Clinical symptoms of hypercalcemia are most correlated with the rate of rise in the serum calcium level, as opposed to the actual calcium level. Therefore, slow increases in serum calcium may be relatively asymptomatic until reaching high levels.

The initial treatment of hypercalcemia is with intravenous isotonic saline at a rate adjusted to the ability of the patient's cardiovascular system to tolerate a volume load.

References:

1. Blackburn P. Emergency Complications of Malignancy. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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15. Correct Answer: E. Symptomatic patients with spinal stenosis typically have chronic low back pain and lower extremity pain that is worse with extension and relieved with rest and forward flexion of the spine (answer E). This is because the forward flexion increases the spinal canal diameter and reduces spinal cord tension. A classic description is a patient who has no pain when walking uphill but will have pain when walking downhill as their spine is more extended. This pain is sometimes termed neurogenic claudication or pseudo-claudication to distinguish it from vascular claudication.

Answer D describes the opposite, and thus is an incorrect answer. The other answer choices describe pain that is more consistent with other etiologies for low back pain. Acute onset back pain after lifting (answer A), is more consistent with lumbago or lumbar strain. Chronic low back pain that improves throughout the day with movement, is more consistent with various inflammatory arthropathies, such as ankylosing spondylitis or rheumatoid arthritis (answer B). Chronic low back pain that is persistent throughout day with rest and worse at night, is potentially concerning for other more serious etiologies such as spinal malignancy or infection depending on the patient's clinical history (answer C).

References:

1. Frohna WJ, Della-Giustina D. Neck and Back Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Lin M, Kea B. Musculoskeletal Back Pain. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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16. Correct Answer: A. When trying to distinguish the difference between a coral snake and a mimicker such as a milk snake, remember the saying, "Red on yellow kill a fellow. Red on black venom lack." If the red band is bordered by yellow bands, it is likely a coral snake.

The patient was envenomated by a coral snake, which is a member of the *Elapidae* species. *Elapidae* envenomations can cause some mild localized swelling, but the most concerning findings from a significant envenomation are neurological symptoms, which may include paresthesias, altered mental status, or cranial nerve palsies. Severe reactions can even result in cardiovascular collapse.

In contrast, significant *Crotalidae* (e.g. rattlesnake, water moccasins, and copperheads) envenomation most commonly causes severe local tissue injuries and coagulopathy.

References:

1. Dart RC, Daly FF. Reptile Bites. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Otten EJ. Venomous Animal Injuries. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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17. Correct Answer: D. Children with hemophilia are very susceptible to intracranial hemorrhage (ICH) from minor head trauma. Although commonly used in the evaluation of pediatric patients, the PECARN (Pediatric Emergency Care Applied Research Network) head CT rule does not apply to these patients. In fact, even patients without a headache or neurological abnormality may have a slow intracranial bleed. Therefore, all patients with head trauma warrant an emergent head CT to evaluate for ICH. Factor replacement should be initiated simultaneously and expeditiously for all head trauma. Although observation would be important, head CT and factor replacement should take priority. Discharge would not be appropriate given the potential for delayed bleeds and decompensation.

References:

1. Place R, Lagoc AM, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Schwartz KR, Rubinstein M. Hemophilia And Von Willebrand Disease In Children: Emergency Department Evaluation And Management. Pediatric Emergency Medicine Practice 2015, 12 (9): 1-20.

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18. Correct Answer: C. Pulmonary complications in acute pancreatitis include atelectasis (answer B), hypoxia, pleural effusions (most commonly on the left side with elevated amylase levels), surfactant degradation (answer E) and capillary leak leading to acute respiratory distress syndrome (ARDS) (answer A), as well as generalized hypoventilation causing pulmonary shunting (answer D). A chylothorax is not a common pulmonary complication in acute pancreatitis.

References:

1. Hemphill R, Santen S. Disorders of the Pancreas. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Brown GW, Pitchumoni CS. Pathophysiology of pulmonary complications of acute pancreatitis. World J Gastroenterol. Nov 28, 2006; 12(44): 7087-7096.

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19. Correct Answer: B. Symptoms of diaphragmatic hernias include chest pain and cough. The liver is protective, making the left side a more common location. They are more likely with penetrating trauma of the upper abdomen, and CT chest and abdomen can miss small diaphragmatic hernias. Mortality rate is high in congenital diaphragmatic hernias, which is attributed to pulmonary hypoplasia.

References:

1. Eckstein M, Henderson SO. Thoracic Trauma. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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20. Correct Answer: A. This patient has a Grade 2 splenic laceration and is hemodynamically stable (see grading below). Stable trauma patients may receive a CT scan to evaluate the extent of injury. Extracapsular bleeding may occur hours or days later, so patients should be admitted for serial abdominal examinations and hematocrits.

This patient is hemodynamically stable and thus does not require emergent surgical intervention (answer D) or angiographic embolization (answer B) at this time. Surgical intervention is reserved for patients with a positive FAST and hemodynamic instability likely secondary to hemorrhagic shock. Angiographic embolization is usually reserved for patients with pelvic fractures rather than injury from penetrating trauma. Although stable at this time, this patient requires further monitoring for re-bleeding and should not be discharged home (answers C and E).

GRADING OF SPLENIC INJURY:

Grade 1: <1 cm laceration or <10% subcapsular hematoma

Grade 2: 1-3 cm laceration or 10-50% subcapsular hematoma

Grade 3: >3 cm laceration or >50% subcapsular hematoma

Grade 4: Partially devascularized spleen or contrast blush

Grade 5: Devascularized spleen

Note: Grade 3 or higher should be considered for angiography with embolization.

References:

1. Cordle RJ, Candor RM. Pediatric Trauma. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Moore EE, Cogbill TH, Malangoni MA, et al. Organ injury scaling. Surg Clin N A 1995; 75:293-303.

3. Scalea TM, Boswell SA, Baron BJ, Ma OJ. Abdominal Trauma. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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21. Correct Answer: E. This question describes a woman who is suffering from Takotsubo Cardiomyopathy, also known as stress cardiomyopathy, or transient apical ballooning. This disorder typically affects women and is usually, but not always, preceded by an emotional or physical stressor. It is thought to be a catecholamine-mediated process. Presenting symptoms are most commonly chest pain and dyspnea. ECG findings typically seen in this condition are ST elevations in precordial leads without reciprocal changes. T wave inversions can be seen later as the condition progresses. Brain natriuretic peptide and catecholamine levels are usually elevated, and typically minor elevations in troponin are seen. Transthoracic echo reveals widespread wall motion abnormalities of the left ventricle and apex, extending beyond a single vascular territory. Angiography typically lacks evidence of plaque rupture or obstructive coronary artery disease. Myocardial biopsy shows contraction band necrosis, and an inflammatory interstitial infiltrate. This is in contrast to an acute myocardial infarction, which demonstrates coagulation necrosis on myocardial biopsy. ECG alone cannot reliably diagnose this condition (answer B).

References:

1. Niemann JT. The Cardiomyopathies, Myocarditis, and Pericardial Disease. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Akashi YJ, Goldstein DS, Barbaro G, Ueyama T. Takotsubo cardiomyopathy: a new form of acute, reversible heart failure. Circulation. 2008; 118: 2754-2762.

3. Schoen F, Mitchell R. The Heart. In: Kumar V et al, eds. Robbins and Cotran Pathologic Basis of Disease. 8th ed. Philadelphia, PA: Saunders, 2010.

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22. Correct Answer: A. Direct hernias are found medial to the the inferior epigastric vessels, while indirect inguinal hernias are lateral to the vessels and can frequently be palpated in the scrotum. Femoral hernias are more common in women and elderly patients. Umbilical hernias are more common with increased intra-abdominal pressure (pregnancy and obesity). Coughing artificially increases intra-abdominal pressure, causing the hernia to protrude slightly, thereby enhancing detection on palpation.

References:

1. Byars D, Kayagil T. Hernias. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

1. Roline CE, Reardon RF. Disorders of the Small Intestine. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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23. Correct Answer: C. The clinical course of inhalational anthrax most closely fits the description in choice C. The clinical course of inhalational anthrax typically occurs in a biphasic pattern with the initial prodromal phase occurring between 2 and 10 days after exposure with a febrile flu-like illness. After 2 to 4 days of prodromal illness, the fulminant phase begins, resulting in dyspnea, sepsis, mediastinitis, and often meningitis. Chest radiography may show widening of the mediastinum, hilar lymphadenopathy, or pleural effusions due to hemorrhagic mediastinitis. Mortality is estimated between 50% and 90% in untreated cases that progress to the fulminant phase. Ciprofloxacin or doxycycline are recommended for treatment and post-exposure prophylaxis and must continue for 60 days, or until the patient receives 3 doses of the anthrax vaccine (given on days 0, 14, and 28).

Answer A describes the lesion and clinical course often seen with a brown recluse spider bite.

Answer B describes the buboes and symptoms associated with bubonic plague.

Answer D describes the clinical course of smallpox.

Answer E describes the clinical course of Ebola virus disease.

References:

1. Schultz CH, Koenig KL. Weapons of Mass Destruction, Chapter 194. In: Marx JA, ed. Rosen's Emergency Medicine: Concepts and Clinical practice. Philadelphia: Elsevier Saunders, 2014.

2. Holty JE, Bravata DM, Liu H, Olshen RA, Mcdonald KM, Owens DK. Systematic review: a century of inhalational anthrax cases from 1900 to 2005. Ann Intern Med. 2006;144(4):270-80.

3. Isbister GK, Fan HW. Spider bite. Lancet. 2011;378(9808):2039-47.

4. Moore ZS, Seward JF, Lane JM. Smallpox. Lancet. 2006;367(9508):425-35.

5. Schieffelin JS, Shaffer JG, Goba A, et al. Clinical illness and outcomes in patients with Ebola in Sierra Leone. N Engl J Med. 2014;371(22):2092-100.

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24. Correct Answer: E. Cryptococcal infections may have subtle presentations. Cryptococcal meningoencephalitis usually presents with malaise, headache, and fever followed by nausea, altered mental status, visual disturbances, and focal neurologic deficits. Meningismus is not common. Stiff neck, photophobia, and vomiting are seen in only 25% of patients. It is seen in up to 10% of HIV infected patients but most commonly affects those with CD4 counts of less than 100 cells/microLiter. Elevated intracranial pressure is common and an opening pressure of >25 cm H20 should prompt drainage of fluid until pressure is <20 cm H20. Treatment requires hospital admission for administration of intravenous amphotericin B (0.7 mg/kg per day) with flucytosine (100 mg/kg per day) for 14 days, followed by oral fluconazole (400 mg per day) for 8 weeks to clear CSF.

References:

1. Rothman RE, Marco CA, Yang S. Human Immunodeficiency Virus Infection and Acquired Immunodeficiency Syndrome. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Rothman RE, Marco CA, Yang S. AIDS and HIV infection. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Elsevier/Saunders, 2011.

3. Jarvis JN, Harrison TS. HIV-associated cryptococcal meningitis. AIDS. 2007; 21(16):2119-2129.

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25. Correct Answer: B. This patient is suffering from a central retinal artery occlusion. This condition is caused by an acute thrombotic or embolic occlusion of the central retinal artery, a branch of the ophthalmic artery which directly branches from the internal carotid artery. The central retinal artery supplies the inner retina. Thus, occlusion of this vessel causes sudden onset of painless vision loss. The inner retina infarcts, developing a pale appearance, while the macula retains its circulation, giving rise to the appearance of a cherry red spot. Treatment options involve ocular massage or anterior chamber paracentesis in an attempt to save the patient's vision. Hyperbaric oxygen treatment has also been shown to be potentially useful. Emergent consultation with ophthalmology should be obtained.

Central retinal vein occlusion typically presents with retinal hemorrhages and is treated with laser photocoagulation therapy. Acute angle closure glaucoma is a cause of painful vision loss and eye redness that is treated with intraocular pressure-lowering medications including topical timolol and oral acetazolamide. Idiopathic intracranial hypertension can present with decreased vision and blurring of the optic discs. This condition can be treated with therapeutic lumbar puncture or acetazolamide.

References:

1. Crocco TJ, Goldstein JN. Stroke. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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26. Correct Answer: C. Chagas disease, or American Trypanosomiasis, can include cardiomyopathy, megacolon, and achalasia. The causative parasite is *Trypanosoma Cruzi*, which can lay dormant for years before exerting its deleterious effects. *T. Cruzi* is transmitted by the reduviid bug, which can spread the infection during a skin bite.

Deer ticks transmit bacterial diseases such as lyme disease, anaplasmosis, and ehrlichiosis. Babesiosis is a protozoan parasite that is also transmitted by this tick. However, none of these infections can cause all of the above symptoms. Mosquitoes can spread malaria, which is a life-threatening infection that can cause fever, anemia, and respiratory distress. The sand fly is a known vector for leishmaniasis. Leishmaniasis can present as cutaneous lesions, mucocutaneous lesions or as a systemic infection known as visceral leishmaniasis, also known as kala-azar, which causes hepatosplenomegaly, anorexia, renal failure, and eventually death. The tsetse fly spreads *Trypanosoma brucei gambiense* or *rhodesiense*, otherwise known as "African Trypanosomiasis". This can cause African sleeping sickness, a disease involving fevers and body aches, followed by confusion, sensory disturbances, poor coordination, and altered sleep cycles.

References:

1. VanRooyen MJ, et al. World Travelers. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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27. Correct Answer: B. The patient is showing signs of bronchospasm and mucus membrane irritation post exposure to chlorine. Treatment should include bronchodilators, such as albuterol, as well as oxygen and supportive care. Inhaled steroids and even nebulized bicarbonate are controversial and not generally recommended. Intravenous bicarbonate and antibiotics are not recommended for wheezing from an irritant gas exposure. Cyanocobalamin is the antidote to cyanide toxicity and does not play a role in a chlorine exposure.

References:

1. Gresham C, LoVecchio F. Industrial Toxins. In Tintinalli JE et al eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw Hill, 2011.

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28. Correct Answer: A. The patient's presentation is concerning for a metastatic spinal cord lesion causing a spinal cord compression or cauda equina syndrome. Administration of corticosteroids in the emergency department should be considered, especially if there will be a delay in obtaining the gold standard diagnostic MRI study of the spine. The typical agent and dose is dexamethasone 10 mg intravenous (IV), followed by 4 mg IV every 6 hours. Further treatment, with continued corticosteroids, radiation therapy, surgery, or a combination of modalities, will depend on the life expectancy of the patient, extent of disease, and degree of motor impairment.

A bone scan, x-rays, and a non-contrast CT are not ideal modalities for diagnosing an acute spinal cord compression (answers B, C, and D). Radiation therapy should be started only after consultation with the appropriate service and should not delay MRI.

References:

1. Blackburn P. Emergency Complications of Malignancy. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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29. Correct Answer: C. When considering the etiology of pulseless electrical activity (PEA) in the patient, we often refer to the H's and T's. In this case, a patient with COPD is at risk for a tension pneumothorax as an etiology of his arrest and bilateral needle thoracostomies may be helpful (answer C). Amiodarone has no role in PEA, but can be administered 300 mg intravenous (IV) push in arrests due to ventricular fibrillation after attempting defibrillation (Choice A). Pericardiocentesis would be indicated for suspicion of tamponade as an etiology of the patient's PEA rhythm (answer E). This would be more likely in the case of a patient with end-stage renal disease, malignancy, or history suggestive of aortic dissection. Bronchodilators would be indicated via the ventilator if the patient has return of spontaneous circulation and has clinical evidence of bronchospasm and hypoxia (answer B). However, this is not the most appropriate and necessary next step in the patient's resuscitation. The FAST exam is a tool built for assessing hypotension in blunt trauma (answer D). The sonographic windows may have diagnostic utility in non-trauma applications, however empiric treatment of a tension pneumothorax should not be delayed.

References:

1. Ward K, Kurz M, Neuromar R. Adult Resuscitation In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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30. Correct Answer: A. In this older patient with new lytic lesions, anemia, and hypercalcemia, multiple myeloma is the most likely etiology. Multiple myeloma is a plasma cell proliferative disorder that results in overproduction of immunoglobulin. As plasma cell proliferation increases, the bone marrow has less space to devote to erythropoiesis, resulting in anemia. Progression of the disease causes skeletal destruction, resulting in the classic "punched out" osteolytic lesions, particularly in the skull and lumbar spine. Osteolysis also results in hypercalcemia.

Prostate cancer can spread to cause metastatic lesions in the lumbar spine, but does not have strong correlation with hypercalcemia. Additionally, prostate cancer is typically identified by a firm, nodular mass on prostate exam, rather than diffuse enlargement, which is more consistent with benign prostatic hypertrophy. The patient denies dysuria, is afebrile, and has midline tenderness, as opposed to CVA tenderness, making pyelonephritis very unlikely. The patient does not describe radiation of pain down his posterior lower extremities, making lumbar disc herniation and sciatica less likely. This patient is afebrile, has no major risk factors (e.g. injection drug use, recent spinal procedures, immunocompromised, etc), and has diffuse spinal tenderness with lytic lesions, making spinal epidural abscess significantly less likely.

References:

1. Janz T, Jamilton G. Anemia, Polycythemia, and White Blood Cell Disorders. Marx JA, Hockberger RS, Walls RM, et al (eds): Rosen's Emergency Medicine: Concepts and Clinical Practice, ed 7. St Louis, Mosby, Inc., 2010

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31. Correct Answer: B. This patient is presenting with brisk bleeding after a recent tracheostomy, which is concerning for a tracheo-innominate artery fistula. A tracheo-innominate artery fistula can be a life threatening and requires a rapid approach to intervention. Initially, the provider should attempt direct pressure to the area to tamponade the bleeding. If this is unsuccessful, the tracheostomy cuff should be hyper-inflated while applying direct external pressure. Bilateral neck pressure should be avoided, as this is unlikely to tamponade the bleeding and may result in cerebral ischemia from bilateral carotid compression. If the fistula continues to bleed, the patient should be orotracheally intubated to protect the airway from bleeding. Although a type and screen should be performed and the otolaryngologist should be involved in this case, neither of these would be the first step in management.

References:

1. Patel MR. Complications of Airway Devices. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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32. Correct Answer: C. A digital exam of any kind, sterile or unsterile, is contraindicated when premature rupture of membranes (PROM) is suspected, because it has been shown to increase the risk of positive amniotic cultures and potential for subsequent chorioamnionitis by three-fold.

PROM should be considered when pregnant patients at <37 weeks gestation experience a sudden rush or a slow, continuous leak of fluid that does not look or smell like urine. The diagnosis is typically confirmed with nitrazine paper testing of the fluid to determine if the fluid is amniotic (pH 7.1-7.3) or normal vaginal fluid (pH 3.0-3.5). A sterile speculum exam can confirm leakage of fluid by visualizing fluid pooling in the vaginal vault. Ultrasound can confirm relative loss of amniotic fluid. Unless delivery is imminent, every effort should be made to transfer the patient to the OB-GYN floor, or to a hospital with OB-GYN capabilities.

References:

1. Echevarria M, Kuhn G. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Poma P. Premature Rupture of Membranes. J Natl. Med Assoc. 1996 Jan;88(1):27-32.

3. Tripp M. Complications of Labor. In: Harrigan, Ufberg, Tripp, eds. Emergency Medicine Review: Preparing for the Boards. St Louis Elsevier, 2010.

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33. Correct Answer: A. This patient should be admitted for a blood transfusion (answer A). She has Parvovirus B19-associated aplastic crisis, which is a depression in production of all erythroid cell precursors. Usually patients complain of a viral illness followed by a rash 4-14 days after exposure to Parvovirus B19. In patients with chronic hemolytic anemia, such as from hereditary spherocytosis, iron deficiency anemia, G6PD deficiency, sickle cell disease, or thalassemias, aplastic crisis is precipitated by Parvovirus B19 infection.

This patient is presumed to have hereditary spherocytosis. She has a family history of the disease and is from Scandinavia. Hereditary spherocytosis is more prevalent in those of Northern European descent.

Patients are no longer contagious by the time they have the exanthem, therefore this patient would not benefit from isolation (answer B). Splenectomy is not indicated in aplastic crisis (answer C). Most patients affected by Parvovirus B19 are asymptomatic or have mild symptoms that are self-limited and would benefit from supportive treatment with non-steroidal anti-inflammatory drug treatment (answers D and E).

References:

1. Haile-Marian T, Polis MA. Viral Illness. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Place R, Lagoc AMT, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Servey JT, Reamy BV, Hodge J. Clinical Presentations of Parvovirus B19 Infection. Am Fam Physician 2007 Feb 1;75(3):373-376.

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34. Correct Answer: E. Pregnancy causes various physiological changes to the body. There is a disproportionate increase in plasma volume compared to red blood cells (RBCs), 48-58% vs 18%, respectively, causing hemodilution and what is known as physiologic anemia of pregnancy. The hematocrit can decrease to mid-30% by the third trimester. However, even with the lower hematocrit, there is still an overall increased oxygen-carrying capacity due to the absolute increase in RBCs. The heart rate typically increases during pregnancy, although usually not more than 10-15 beats per minute above baseline. Furthermore, cardiac output also increases by about 40% up to 6 L/min as increased flow to the uterus is necessary for adequate oxygen delivery to the fetus. Also, the enlarging uterus can cause compression of the inferior vena cava, causing central venous pressure to be decreased. Oxygen reserve however is decreased in a pregnant woman due to diaphragm elevation due to the enlarging uterus and increased oxygen demand by the growing fetus.

References:

1. Echevarria M, Kuhn G. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Poma P. Premature Rupture of Membranes. J Natl. Med Assoc. 1996 Jan;88(1):27-32.

3. Tripp M. Complications of Labor. In: Harrigan, Ufberg, Tripp, eds. Emergency Medicine Review: Preparing for the Boards. St Louis Elsevier, 2010.

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35. Correct Answer: E. Schistosomiasis is a parasitic helminth infection that affects >200 million people worldwide. Endemic in Africa and Southern Asia, the disease is mostly of a chronic nature. It is the leading parasitic cause of esophageal varices worldwide and is the reason for high rates of bladder cancer in endemic areas. The parasite infects humans who swim in contaminated water via direct skin penetration

Ascaris lumbricoides infects humans via the fecal-oral route. Humans ingest the larval form, which then penetrates through the intestines and goes to the lungs. In the lungs, the larvae mature and cause coughing, wheezing, and pneumonia (Loeffler syndrome). Cysticercosis infects pigs and spreads to humans through the ingestion of undercooked pork. The most common presenting form of cysticercosis is neurocysticercosis, which is an important cause of secondary seizures worldwide. Filariasis is caused by *Wuchereria bancrofti*. It is transmitted to humans through the bite of an infected mosquito and causes damage to the lymphatic vessels, resulting in severe lymphedema and elephantiasis. Onchocerciasis is a parasitic disease caused by *Onchocerca volvulus*. It is transmitted through the bites of infected black flies. The larvae move throughout the body and, when they die, cause a variety of conditions, including blindness, skin rashes, intense itching, and skin depigmentation.

References:

1. VanRooyen MJ, et al. World Travelers. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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36. Correct Answer: C. Chemical dependence is a disease and medical professionals are not immune. Anesthetists and emergency medicine physicians have the highest risk of chemical dependence and it is theorized that this is due to both open access to medications and open opportunity to use related to their professional roles. While healthcare professionals may have a higher pay grade or better insurance coverage, the success of a physician who enters a recovery program is not based on private enrollment, extensive inpatient rehabilitation, or access to experimental treatments. The success is due to a strict physician-specific treatment-monitoring system with continuous accountability through aftercare programs. As with any disease, no amount of self-control or willpower abolishes the burden of addiction.

References:

1. Goldberg R, Barnosky AR. Wellness, Stress, and the Impaired Physician. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Whitehead DC, Smith-Coggins R, Packard DC, Brendel J. Managing Impaired Professionals. In: Strauss RW, Mayer TA. eds. Strauss & Mayer's Emergency Department Management. New York, NY: McGraw-Hill; 2014.

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37. Correct Answer: D. Smallpox (*Variola major*) is the most highly contagious because it is transmitted person-to-person by aerosol inhalation.

Botulism (*Clostridium botulinum*) is not transmitted person-to-person. In infants, botulism toxin may be absorbed through the intestine, classically linked to honey ingestion. Other botulism syndromes include food-borne botulism (from inadequately processed foods, traditionally linked to home canning) and wound botulism (from spores injected into the skin, rarely occurring with injection drug use).

Tularemia (*Francisella tularensis*) has not been reported to be transmitted between humans. Small mammals (such as rabbits, mice, and squirrels) act as reservoirs of infection. Humans can become infected with tularemia via arthropod bites, ingesting contaminated water, or handling or inhaling aerosols from infectious animal tissue.

Inhalational anthrax (*Bacillus anthracis*) is caused by inhalation of spores into the lungs and not by person-to-person transmission. All forms of anthrax infection, including inhalational, cutaneous, and gastrointestinal, result from exposure to the spores, rather than the bacteria.

Bubonic plague (*Yersinia pestis*) is traditionally spread by flea bites, resulting in lymph node inflammation and tenderness (buboes). In contrast, pneumonic plague (also due to *Yersinia pestis*) can be transmitted person-to-person via inhalation.

References:

1. Schultz CH, Koenig KL. Weapons of Mass Destruction, Chapter 194. In: Marx JA, ed. Rosen's Emergency Medicine: Concepts and Clinical practice. Philadelphia: Elsevier Saunders, 2014.

2. Sobel J. Botulism. Clin Infect Dis. 2005;41(8):1167-73.

3. Dennis DT, Inglesby TV, Henderson DA, et al. Tularemia as a biological weapon: medical and public health management. JAMA. 2001;285(21):2763-73.

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38. Correct Answer: E. The ECG reveals atrial fibrillation with a rapid ventricular response of 176 beats per minute. Unstable tachycardia with a pulse should be treated with immediate synchronized cardioversion (answer E). Intravenous diltiazem can be used in the setting of stable rapid atrial fibrillation, but should not be used in the unstable patient (answer B). Chest compressions and defibrillation are not indicated for unstable rapid atrial fibrillation (answers C and D). Additionally, adenosine is not effective in the treatment of rapid atrial fibrillation (answer A).

References:

1. Piktel JS. Cardiac Rhythm Disturbances. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Sinz E, Navarro K. Advanced Cardiovascular Life Support. Dallas, Tex.: American Heart Association; 2011.

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39. Correct Answer: E. The vignette is a classic story for avascular (aseptic) necrosis of the femoral head, also called Legg-Calve-Perthes disease in children. Clues to the diagnosis include the patient's age, gender, and the quality and location of pain. Often parents will attribute the pain to a minor traumatic event, such as playing roughly with the family dog. The physical exam indicates decreased range of motion with internal rotation and abduction, also classic for avascular necrosis. Additionally, a history of sickle cell disease increases the likelihood of avascular necrosis, as 30% of all patients with sickle cell disease will have avascular necrosis by 30 years old.

All answers are common findings on x-ray except for stippled calcification of the epiphysis (answer E). Stippled calcification is found in new areas of growth and is traditionally associated with osteochondroma or chondrosarcoma. Bilateral hip findings of avascular necrosis is found in 10% of cases (answer A). A "crescent sign" is a subchondral lucency at the epiphysis that signifies impending collapse of the femoral head (answer B).

References:

1. Claudius I. Sickle Cell Disease. In Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Flynn JM, Ibrahim DT, Leitch KK, Skaggs DL. Pediatric Orthopaedics. In: Johnson TR, Steinbach LS. eds. Essentials of Musculoskeletal Imaging. 1st ed. Rosemont, IL: American Academy of Orthopaedic Surgeons, 2004.

3. Hopkins-Mann C, Ogunnaike-Joseph D, Moro-Sutherland D. Musculoskeletal Disorders in Children. In Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

4. Johnston JO. Tumors. In: Johnson TR, Steinbach LS. eds. Essentials of Musculoskeletal Imaging. 1st ed. Rosemont, IL: American Academy of Orthopaedic Surgeons, 2004.

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40. Correct Answer: B. Von Willebrand factor serves as a cofactor for platelet adhesion. Von Willebrand disease is characterized by a decreased quantity or abnormal function of this factor, resulting in prolonged bleeding time. These patients can present with gingival bleeding, epistaxis, or menorrhagia. Initial treatment for minor bleeding secondary to vWD can be managed with intravenous, subcutaneous, or intranasal desmopressin. For refractory or severe cases, Factor VII infusions or cryoprecriptate may be needed. Factor VIII and IX are given to people with hemophilia A and B, respectively. Platelet transfusions are indicated for thrombocytopenia. In von Willebrand disease, the platelets are normal and, therefore, a platelet transfusion is unlikely to help this patient.

References:

1. Place R, Lagoc AM, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Schwartz KR, Rubinstein M. Hemophilia And Von Willebrand Disease In Children: Emergency Department Evaluation And Management. Pediatric Emergency Medicine Practice 2015, 12 (9): 1-20.

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41. Correct Answer: B. Denial is the earliest symptom exhibited by an untreated impaired medical professional and may even be displayed by family and colleagues, as well. There are secondary components of dependence, including compulsion, progression of the pattern of use (social use → abuse → addiction → death) and relapse, which is largely due to a return of denial.

While tardiness and aggression are possible red flags of an impaired medical professional, these findings might also be a personal or professional issue that is isolated and unrelated to chemical dependence.

References:

1. Goldberg R, Barnosky AR. Chapter 203. Wellness, Stress, and the Impaired Physician. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Whitehead DC, Smith-Coggins R, Packard DC, Brendel J. Chapter 104. Managing Impaired Professionals. In: Strauss RW, Mayer TA. eds. Strauss & Mayer's Emergency Department Management. New York, NY: McGraw-Hill; 2014.

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42. Correct Answer: A. This patient has clinical features of encephalitis, with seizures, altered mental status, fever, and a headache. The cerebrospinal fluid (CSF) shows a viral pattern but with a significant number of red blood cells, this should raise concern for herpes simplex virus (HSV) encephalitis. While the diagnosis cannot be confirmed until the CSF result for HSV polymerase chain reaction (PCR) returns, it is generally recommended to cover empirically while awaiting results. Given the severity of his illness, typical meningitis antibiotics (vancomycin and ceftriaxone) would also be indicated.

Ampicillin would be indicated if the patient were over the age of 50, as listeria becomes a more common organism in that age group. Vidarabine is a topical ophthalmologic agent used to treat herpes keratitis, but would not be indicated in this patient.

References:

1. Haile-Mariam T, May L. Viral Illnesses. Rosen's emergency medicine. 8th ed. John Marx. Philadelphia, PA: Elsevier Saunders; 2014: 1718-1741. Print.

2. Meurer WJ. Central Nervous System Infections. Rosen's emergency medicine. 8th ed. John Marx. Philadelphia, PA: Elsevier Saunders; 2014: 1447-1459. Print.

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43. Correct Answer: C. Carbon dioxide (CO_2) detected by capnography is created in the body and delivered to the lungs by circulating blood. Cardiac output is the major determinant of CO_2 delivery to the lungs. If ventilation is relatively constant, then end tidal CO_2 correlates well with cardiac output during CPR.

During CPR arterial blood gases do not reliably indicate the severity of tissue hypoxemia, hypercarbia, or acidosis and its use during CPR is of uncertain value.

There is no evidence of the utility of checking carotid or femoral pulses during ongoing CPR. The inferior vena cava does not have valves, and thus a pulse palpated in the inguinal triangle could be the femoral vein and not the femoral artery. Additionally, a carotid pulse does not indicate the efficacy of cerebral or myocardial perfusion during CPR.

During cardiac arrest, pulse oximetry does not provide a reliable signal because pulsatile blood flow to the periphery is inadequate. However, pulse oximetry can be useful in indicating whether there has been a return of spontaneous circulation and monitoring oxygenation thereafter.

Transthoracic echocardiography may have utility in diagnosing the cause of cardiac arrest or perhaps even differentiating cardiac arrest that is more likely to respond to resuscitation efforts from those that are less likely. However, there is no evidence that transthoracic echocardiography is useful in assessing the adequacy of CPR.

References:

1. Neumar R, Otto C, Link M et al. Part 8: Adult Advanced Cardiovascular Life Support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2010;122(18_suppl_3):S729-S767.

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44. Correct Answer: B. Multiple sclerosis (MS) remains a clinical diagnosis with the assistance of labs and imaging. The clinical diagnosis of MS involves two different neurological symptoms separated by time. Oligoclonal bands may be present in the CSF of MS patients, but may also be present in patients with neurosyphilis, fungal meningitis, or other central nervous system infections.

A T2-weighted brain MRI may demonstrate hyper-intense lesions in the white matter, most commonly in the periventricular white matter. Optic neuritis accounts for 25% of initial manifestation of MS. Examination of the patient's eye may reveal a Marcus-Gunn pupil, the failure of constriction when direct light is shone to the affected eye. Other physical examination findings of MS patients include upper motor neuron involvement such as hyperreflexia, positive Babinski sign, and muscle weakness.

References:

1. Tintinalli JE. Neurology. In Tintinalli's emergency medicine: a comprehensive study guide. 7th ed. New York: McGraw-Hill; 2011.

2. Klein J, Ropper A, Samuels M. Major Categories of Neurologic Disease. In Adams and Victor's Principles of Neurology. S.l.: [s.n.]; 2014.

3. Marx JA, Hockberger R, Walls R. Brain and Cranial Nerve Disorders. In Rosen's emergency medicine: concepts and clinical practice. 9th ed. Philadelphia: Elsevier, Saunders; 2014.

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45. Correct Answer: D. Aplastic anemia is a rare disease with presentations ranging from mild and non-specific to severe symptomatology. It can occur due to a variety of causes with drug or chemical exposure being the etiology in more than half of proven cases. The two most common medications associated with this disorder are chemotherapeutic agents and anticonvulsants (e.g. phenytoin).

The long-term administration of phenytoin is associated with numerous side effects that involve a variety of organ systems. Many of these side effects depend on dose and duration, but some are idiosyncratic. Hypersensitivity reactions to phenytoin usually occur within the first few months of therapy and include fever, skin rashes, blood dyscrasias, and, rarely, hepatitis. Amlodipine can cause hypotension and edema, but aplastic anemia is not a well-known side effect. Fluoxetine can cause serotonin syndrome when combined with other serotonergic medications. Lisinopril can cause angioedema in patients regardless of the length of treatment. Warfarin can cause skin necrosis, as well as increased risk of bleeding, but does not have a significant effect on cell lines.

References:

1. Janz TG, Hamilton GC. Anemia, Polycythemia, and White Blood Cell Disorders. In: Marx J, Rosen P. Rosen's Emergency Medicine: Concepts And Clinical Practice [e-book]. Philadelphia, PA: Saunders; 2013.

2. LoVecchio F, Smith JC. Anticonvulsants. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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46. Correct Answer: E. This patient is suffering from acute angle closure glaucoma, a condition that results from acute obstruction of the outflow of aqueous humor resulting in significantly increased intra-ocular pressure. This condition is characterized by ocular pain and decreased vision, often precipitated by sudden pupil dilation such as that which occurs with entering a dark room. Physical examination often reveals a fixed mid-dilated pupil, cloudy cornea, globe that is firm to palpation, significant conjunctival and scleral injection, and decreased visual acuity. This condition is extremely painful and may be associated with headache and vomiting.

Acute angle closure glaucoma is initially treated with agents used to lower intra-ocular pressure. Topical timolol is used as the first agent to immediately lower intra-ocular pressure. The patient should then be given oral acetazolamide as an osmotic agent to also lower intra-ocular pressure over a longer period of time. After the intra-ocular pressure has been documented to be decreasing over at least one hour, the patient may then be given topical pilocarpine. This acts to widen the anterior chamber and reestablish outflow of the aqueous humor. Finally, the patient should undergo laser iridotomy performed by ophthalmology as definitive management within the subsequent 24-48 hours.

References:

1. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Wright C, Tawfik MA, et al. Primary angle-closure glaucoma: an update. Acta Ophthalmol. 2015 Jun 27.

4. Wright JL, Wightman JM. Red and Painful Eye. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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47. Correct Answer: E. This patient is presenting with heat stroke, which is a life-threatening condition that is characterized by hyperthermia (typically over 40°Celsius) and alterations in mental status. Mortality rates range from 30-80% and prompt treatment is essential. The most rapid method of cooling hyperthermic patients is immersive cooling. This involves submerging a patient from the chest downward in an ice bath.

The second most rapid method is evaporative cooling, wherein the patient is sprayed with cool water and high speed fans are aimed at the patient. Ice packs to the axillae and groin are the least effective cooling method. Shivering is a frequent complication of cooling and can increase heat production, occasionally requiring benzodiazepine treatment. Antipyretics, such as acetaminophen, are not effective as the etiology is external rather than changes in the thermoregulatory zone of the hypothalamus. Dantrolene is used in the treatment of malignant hyperthermia.

References:

1. Waters TA, Al-Salamah MA. Heat Emergencies. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Platt M, Vicario S. Heat Illness. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014

3. Davis V. Heat-Related Emergencies. In: Adams J, ed. Emergency Medicine: Clinical Essentials. 2nd ed. Philadelphia: Saunders/Elsevier; 2013.

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48. Correct Answer: E. Osteosarcoma classically presents in young males with a protracted time course and can be mistaken for "growing pains." 90% of osteosarcomas will extend through the cortex into the soft tissue to produce local swelling. The patient has osteosarcoma at the medial epicondyle of the distal femur. Osteosarcoma typically affects the metaphysis of long bones as seen in the x-ray. Approximately 50-60% of all osteosarcomas occur around the knee. Codman's triangle, which is a non-neoplastic, rapid proliferation of bone in response to the separation of the periosteum from cortex, is commonly seen in osteosarcoma (blue arrow).

The initial work up for osteosarcoma should include a chest computed tomography because 10% of osteosarcomas having metastases to the lungs on presentation. Chondrosarcoma is very rare in children (answer A). Ewing's sarcoma typically presents with low grade fever and weight loss (answer B). Imaging often shows onion-skinning of the periosteum. Although lymphoma of the bone may present similarly to osteosarcoma, it is more commonly found in males older than 25 years (answer C). Osteomyelitis is an infection of the bone or bone marrow. This patient does not report typical symptoms of osteomyelitis and does not have a fever. Additionally, the mixed sclerotic/lytic lesion seen on x-ray and the protracted time course are not typical of osteomyelitis in an immunocompetent patient (answer D).

References:

1. Frassica FJ, Frassica DA, McCarthy EF. Orthopaedic Pathology. In: Miller MD. Review of Orthopaedics. 4th ed. Philadelphia, PA: Elsevier, 2004.

2. Johnston JO. Tumors. In: Johnson TR, Steinbach LS. eds. Essentials of Musculoskeletal Imaging. 1st ed. Rosemont, IL: American Academy of Orthopaedic Surgeons, 2004.

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49. Correct Answer: B. This patient is suffering from giant cell (temporal) arteritis, a medium-to-large vessel vasculitis. The etiology is inflammation of the temporal artery, resulting in ischemic optic neuropathy. It is often seen in women over age 50 and is associated with temporal headache, jaw claudication, and polymyalgia rheumatica. There is often tenderness to palpation of the temporal artery. It can have devastating visual consequences and rapid contralateral involvement if not treated promptly with high-dose corticosteroids. Temporal artery biopsy is the gold-standard for diagnosis. The erythrocyte sedimentation rate is also often significantly elevated. However, steroids should NOT be delayed for temporal artery biopsy because of the risk for rapid, permanent bilateral vision loss.

A dilated fundoscopic exam will not aid the diagnosis in this condition. Although temporal artery biopsy is the gold standard for diagnosis, this should not delay the administration of high-dose corticosteroids. MRI/MRV of the brain is useful in diagnosing dural venous sinus or cavernous sinus thrombosis; however, it is not useful in diagnosing giant cell arteritis. Broad spectrum antibiotics are not useful in treating this condition.

References:

1. Arntfield RT, Hicks CM. Systemic Lupus Erythematosis and the Vasculitides. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Denny CJ, Schull MJ. Headache and Facial Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Kwiatkowski T, Friedman BW. Headache Disorders. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

4. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

5. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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50. Correct Answer: D. Sexually transmitted infections of the anorectal area should be considered in men who have sex with men or women who take part in anal intercourse. The incubation period after an exposure is typically 5 to 7 days and patients often present with tenesmus, discharge (bloody or purulent) and anal pruritus. Receptive anal intercourse puts the patient at risk for sexually transmitted organisms such as *N. Gonorrhoeae* and *C. Trachomatis*. In this population, testing for further sexually transmitted infections, such as HIV and Syphilis, should also be considered. The appropriate treatment is ceftriaxone 250 milligrams intramuscular (activity against gonococcus) and doxycycline 100 milligrams by mouth, twice daily for 7 days (activity against chlamydia).

References:

1. Branecki C. Anorectal Disorders. In: Cline D, Ma O, Cydulka R, Thomas S, Handel D, Meckler G, ed. Tintinalli's Emergency Medicine: Just The Facts. 3rd ed. New York: McGraw-Hill Companies, Inc; 2013:170-175.

2. Burgess B, Bouzoukis J. Gastrointestinal Emergencies: Anorectal disorders. In: Tintinalli J, ed.Emergency Medicine: A Comprehensive Study Guide. 6th ed. New York: McGraw-Hill; 2004:539-551.

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Practice Test #2

1. Correct Answer: A. The classic triad of spinal epidural abscess is severe back pain, fever, and neurologic deficits, but the triad is present in only 13% of patients. An established staging system outlines the progression of symptoms and physical findings:

Stage 1: Back pain at the level of the affected spine

Stage 2: Nerve-root pain radiating from the involved spinal area

Stage 3: Motor weakness, sensory deficit, and bladder and bowel dysfunction

Stage 4: Paralysis

The time course for progression through these stages is highly variable, from 1 to 30 days. In a case-control study of 63 patients matched to 126 controls, the presence of one or more risk factors was 98% sensitive for the epidural abscess: injection drug use, immunocompromised status, alcohol abuse, recent spine procedure, distant site of infection, diabetes, indwelling catheter, recent spine fracture, chronic renal failure, and cancer. An elevated ESR occurs in >90% of patients with a spinal epidural abscess (answer A). The WBC is elevated in 50% of patients with a spinal epidural abscess (answer E). An elevated hemoglobin, hemoglobin A1c, and neutrophil count are not associated with spinal epidural abscesses (answers B, C, D).

References:

1. Frohna WJ, Della-Giustina D. Neck and Back Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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2. Correct Answer: B. Edrophonium chloride (Tensilon) is a short-acting acetylcholinesterase inhibitor. The onset of action of this agent is rapid and duration is short, usually having maximal effect between 30 seconds and 2 minutes with complete resolution in 5-10 minutes. When administering the drug, one should have ready resuscitative agents, especially atropine, at the bedside. The procedure should be performed in a monitored setting. After administration of intravenous edrophonium, one should monitor a specific muscle and observe for any noticeable improvement in the weakness to confirm a positive test. A portion of individuals given this medication may show cholinergic side effects including excessive salivation, lacrimation, miosis, or symptomatic bradycardia (or other potentially fatal arrhythmias) which tend to respond to intravenous atropine administration or may require other resuscitative procedures including emergent intubation.

The use of the Tensilon test is controversial and should be done in consultation with a neurologist and should not be viewed as an alternative to intubation when a patient suspected of myasthenia is in respiratory distress. When intubating, note that succinylcholine is a neuromuscular blocking agent and should be used with caution in myasthenia gravis patients. Other drugs that should be used cautiously in myasthenia patients include magnesium, calcium channel blockers, beta blockers, certain antibiotics, and certain anti-epileptics. Adenosine and lorazepam administration has not been implicated in worsening symptoms of patients with myasthenia gravis.

References:

1. Sloan EP, Handel DA, Gaines SA. Chronic Neurologic Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Ulane C. Myasthenic Crisis and Peripheral Neuromuscular Disorders. In: Arbo JE, Ruoss SJ, Geoffrey KL, Jones MP. eds. Decision Making in Emergency Medicine Critical Care. 1st ed. Philadelphia, PA: Wolters Kluwer, 2015.

3. Shearer P, Jagoda A. Neuromuscular Disorders. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

4. Huff JS. Special Neurologic Tests and Procedures. In: Roberts JR, Hedges JR, eds. Clinical Procedures in Emergency Medicine. 5th ed. Philadelphia, PA: Elsevier/Saunders, 2010.

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3. Correct Answer: B. The patient in question is having intermittent catecholamine surges caused by a pheochromocytoma. The key highlights of this question involve the paroxysmal nature of her symptoms that wax and wane. Her negative urine drug screen can help to rule out exogenous intoxicants like cocaine or amphetamines. Medications should be given to block the effects of increased catecholamines that are being released by the adrenal tumor. Treatment should be initiated with alpha adrenergic receptor blockers followed by beta blockade to help control blood pressure and heart rate while avoiding unopposed alpha stimulation. The other targets listed among the answers can be involved in episodes of hypertension and tachycardia, though the patient's symptoms are most likely to be from a pheochromocytoma.

References:

1. McPheeters R, Tobias JL. Anxiety Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. O'Brien JF, Hunter CL. Heart Failure. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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4. Correct Answer: A. This patient with tachycardia, hypotension, and low voltage on her ECG needs an emergent bedside ultrasound to assess for evidence of pericardial effusion with cardiac tamponade, which would require emergent management. This would also allow the provider to assess volume status, intra-abdominal fluid, pneumothorax, and right ventricular dilatation. Oncology should be consulted, but that should not take priority over initial stabilization of the patient. Sepsis is a possibility in this patient who may well be neutropenic, but the low voltage ECG findings raise concern for cardiac tamponade, and ruling this out should take priority. While pulmonary embolism is also on the differential, this patient is too unstable to go to CT. Finally, this patient is in shock and may well require vasopressors, but ultrasound should be performed first to assess for potentially reversible causes of obstructive shock.

References:

1. Ugras-Rey S, Watson M. Selected Oncologic Emergencies. Marx JA, Hockberger RS, Walls RM, et al (eds): Rosen's Emergency Medicine: Concepts and Clinical Practice, ed 7. St Louis, Mosby, Inc., 2010, (Ch) 121: p 1590-1613.

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5. Correct Answer: C. Pulmonary infiltrates are expected to be present within 6 hours and are classically bilateral. It is rarely fatal, with only supportive care being required in most cases. Because it is not caused by volume overload, diuresis is not indicated. Antibiotics also serve no role in the treatment of this condition.

References:

1. Coil CJ, Santen SA. Transfusion Therapy. In Tintinalli JE et al eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw Hill, 2011.

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6. Correct Answer: B. NAATs are very sensitive for both gonorrhea and chlamydia detection. Some studies cite sensitivities of greater than 95%. In contrast, culture sensitivity may be as low as 60% (answer B). It is true that NAATs may be used on both endocervical swabs and urine (answer A). It is also true that the specificity of NAATs for diagnosis of chlamydia and gonorrhea is high, with most sources citing greater than 90% specificity (answer C). Only a minority of women with chlamydial infection are symptomatic. Some studies estimate that as many as 75% of women and as many as 50% of men infected with chlamydia are asymptomatic (answer D). In a patient diagnosed with chlamydia, after treatment with either a single dose of 1 g azithromycin or doxycycline 100 mg twice daily for 7 days, follow-up testing to ensure eradication of chlamydia is generally not necessary (answer E). Exceptions to this are if the patient continues to have symptoms or if there is suspected reinfection. Due to the high level of co-infection, patients with documented chlamydial infection should also be treated empirically for gonorrhea, unless the latter has been definitively ruled out.

References:

1. Bachmann LH, et al. Nucleic acid amplification tests for diagnosis of Neisseria gonorrhoeae and Chlamydia trachomatis rectal infections. J Clin Microbiol. 2010 May;48(5):1827-32.

2. Birnbaumer DM.Sexually Transmitted Diseases.In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

3. Cook RL, et al. Systematic review: noninvasive testing for Chlamydia trachomatis and Neisseria gonorrhea. Ann Intern Med. 2005 Jun;142(11):914–925.

4. Meyers DS, Halvorson H, Luckhaupt S. U.S. Preventive Services Task Force: Screening for chlamydial infection: An evidence update for the U.S Preventive Services Task Force. Ann Intern Med. 2007 July;147(135).

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7. Correct Answer: D. Middle East Respiratory Syndrome (MERS-CoV) is a novel coronavirus, which has caused an acute respiratory syndrome epidemic similar to the other widely known deadly corona virus, severe acute respiratory syndrome (SARS-CoV). The SARS-CoV global outbreak occurred from 2002-2004. The first case of MERS-CoV was confirmed in April 2012. MERS-CoV should be considered in people with acute respiratory infection and a history of travel to the Middle East or close contact with a symptomatic traveler within 14 days of presentation.

While both coronaviruses have worse outcomes in elderly people with co-morbidities, MERS-CoV has shown a higher rate of infection amongst older, chronically ill patients. This is compared to SARS-CoV which predominantly affected young, healthy patients. Early SARS-CoV transmission was also more prevalent in restaurant workers and farmer. Healthcare workers are always at risk of infectious epidemics; however, given their relative youth, they are more likely to be affected by SARS-CoV.

References:

1. Zumla A, Hui DS, Perlman S. Middle East respiratory syndrome. Lancet. 2015;386(9997):995-1007.

2. Hui DS, Memish ZA, Zumla A. Severe acute respiratory syndrome vs. the Middle East respiratory syndrome. Curr Opin Pulm Med. 2014;20(3):233-41.

3. Haile-Mariam T, May L. Viral Illness. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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8. Correct Answer: A. This patient is presenting with symptoms concerning for Rocky Mountain Spotted Fever (RMSF). Although named after the Rocky Mountains, it is actually most common in the eastern United States. In light of his fever, palmar and wrist rash, and travel to an endemic area, this is the most likely diagnosis. RMSF is treated with doxycycline 100 mg by mouth, twice daily for 7 days. Despite a general contraindication in pediatric patients, Doxycycline remains the drug of choice for RMSF regardless of age.

High dose aspirin is indicated for Kawasaki's Disease, which presents with fever, conjunctival injection, erythema of the mucus membranes, swelling of the bilateral hands and feet, and lymphadenopathy. Levofloxacin is utilized for the treatment of numerous types of infections, including pneumonia and pyelonephritis, but is not indicated for RMFS. Penicillin is the treatment of choice for syphilis, which can present with a palmar rash in the advanced stages, but fever is unlikely. Plasma exchange is indicated for thrombotic thrombocytopenic purpura, which can present with a fever and rash, but the rash is more commonly diffuse and patients typically have additional symptoms (including anemia, thrombocytopenia, kidney injury, and altered mental status).

References:

1. Meredith JT. Zoonotic Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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9. Correct Answer: A. Rapid blood pressure control in aortic dissection is essential. Current recommendations are for tight control with a goal systolic blood pressure under 110 mmHg. The first priority in therapy is to reduce intimal shear forces that occur from left ventricular ejection. The best way to reduce forces is by first decreasing heart rate. Therefore, initial therapy should start with a beta-blocker such as esmolol. Esmolol is an optimal choice for its rapid onset and short half-life. After heart rate is controlled, a second agent such as sodium nitroprusside or nicardipine can be added for blood pressure control. It is essential to start with heart rate control as vasodilation from other agents can cause a reflex tachycardia and worsening of intimal shearing forces.

References:

1. Levy, P. Hypertension. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

2. Tsai TT, Nienaber CA, Eagle KA. Acute aortic syndromes. Circulation. 2005; 112: 3802–13

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10. Correct Answer: A. This patient is presenting with a unilateral, firm, fixed, non-tender nodule in her cervical neck. All of the above descriptors, especially in the absence of associated infectious symptoms, raise concern for a potentially cancerous lesion. The emergency provider should evaluate for any fevers, weight loss, or night sweats (collectively termed B symptoms), as well as risk factors for cancer.

Needle aspiration carries a potential of seeding cancer in additional soft tissues and should be deferred to the managing specialist. Incision and drainage and warm compresses are the treatments for large and small abscess, respectively, but would not be indicated in this patient. Discharging the patient with clindamycin would be appropriate if there was an associated cellulitis after abscess drainage.

References:

1. Cannon TY, Sah RN, Shores C. Infections and Disorders of the Neck and Upper Airway. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Rodgers J, McCaffrey TV. Inflammatory Disorders of the Salivary Glands. In: Flint PW, Haughey BH, Lund VJ, eds Cummings Otolaryngology: Head & Neck Surgery, 3 Volume Set. 5th ed. Philadelphia, PA: Elsevier - Health Sciences Division; 2010.

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11. Correct Answer: A. Hard signs of vascular trauma include absent distal pulses, obvious arterial bleeding, large expanding or pulsatile hematoma, audible bruit or palpable thrill at injury site and distal ischemia (pain, pallor, paralysis, paresthesias, poikilothermia). It is important to be able to recognize these hard signs because they typically mandate either angiography or operative exploration. Soft signs only can often be managed by nonoperative observation alone. Soft signs include small non-expanding hematoma, peripheral nerve deficit, history of pulsatile or significant hemorrhage at time of the injury, unexplained hypotension, bony injury (fracture, dislocation, penetration) or proximity of penetrating injury.

References:

1. Ilgen JS. Trauma. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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12. Correct Answer: E. This patient's symptoms can be attributed to delirium. Delirium is an acute or subacute state of cognitive dysfunction caused by an underlying physiologic condition. It can be caused by infections, metabolic disorders, trauma, CNS disease, toxins, drugs, vascular pathology, or withdrawal. In our patient, urosepsis is the likely cause of delirium. The onset of delirium is over days, and the patient has a fluctuating course over 24 hours. The patient can have a reduced or hyperalert consciousness, disordered attention and cognition, impaired orientation, visual and/or auditory hallucinations, tremors, or asterixis. There is waxing and waning of consciousness and sundowning (patient is somnolent during the day and hyperalert at night). It can be hard to distinguish this from dementia in the acute setting. But it is essential to remember that dementia has an insidious onset and course is stable over a 24-hour period. Attention is normal in dementia although cognition and orientation are often impaired. Dementia is not usually accompanied by delusions or movement disorders. In the setting of a urinalysis demonstrating a urinary tract infection, the patient likely has delirium from urosepsis.

Neurons responsible for arousal functions reside in the reticular activating system, which is a collection of neurons scattered through the midbrain, pons, and medulla. The neuronal structures responsible for the content of consciousness reside in the cerebral cortex. Dementia is the failure of the content portion of consciousness with relatively preserved alerting functions. Delirium is dysfunction of the arousal system and the content of consciousness. Coma is failure of both arousal and content functions. Parkinson's disease is unlikely because it is a chronic, progressive movement disorder.

References:

1. Smith JP, Seirafi J. Delirium and Dementia. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Huff JS. Altered Mental Status and Coma. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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13. Correct Answer: B. This patient is presenting with early disseminated Lyme disease with neurologic manifestations. Erythema migrans (EM) is the most common initial finding in Lyme disease but may be missed or misdiagnosed. There is often a generally asymptomatic period between EM and the disseminated forms of acute Lyme disease. Malaise and fatigue occur in about 80% of patients diagnosed with Lyme disease. If fever occurs, it is generally mild and intermittent. Neurologic manifestations occur in about 15% of patients an average of 4 weeks following the onset of EM. Other associated signs are hepatitis, lymphadenopathy, pharyngitis, rash, arthralgias, conjunctivitis and peripheral neuropathies.

Common neurologic manifestations of early disseminated Lyme disease are meningitis, cranial neuropathy, and radiculopathy. These may occur together or alone. The most common cranial neuropathy is Bell's palsy, occurring in about 50% of patients with Lyme meningitis. It is bilateral one-third of the time and generally resolves without treatment in weeks to months. The most common CSF findings are increased white blood cells and protein with a normal glucose. PCR is not considered useful, because it is positive in less than half of these patients. The Gram stain should be negative, but *B. burgdorferi* antibodies are found in 80-90% of patients. The only answer that reflects these findings is answer B.

References:

1. Marx JA, Hockberger RS, Walls RM, Adams J. Tick-Borne Illnesses. Rosen's Emergency Medicine: Concepts and Clinical Practice. 7th ed. St. Louis: Mosby, 2013.1769-1780.

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14. Correct Answer: E. This patient's presentation is concerning for a subarachnoid hemorrhage (age >50 years, smoker, hypertension, and concerning history with a sudden-onset headache and vomiting). The cornerstone of diagnosing a subarachnoid hemorrhage is a non-contrast CT head, which in this case is negative. Studies have demonstrated a sensitivity of near 100% using 3rd generation head CTs interpreted by expert radiologists in patients who present neurologically intact within the first 6 hours of symptoms. This patient presents after 10 hours of symptoms and has a neurological deficit.

Nicardipine, labetalol, and esmolol are appropriate choices for blood pressure control, but nitroprusside (answer A) may raise intracranial pressure and cause cyanide toxicity with prolonged infusion.

A lumbar puncture (answer E) should be performed in this high risk case. Increased opening pressure and xanthochromia can help confirm the diagnosis. CT angiography (answer D) is used for determining the etiology of the hemorrhage, but still does not exclude the presence of a small subarachnoid hemorrhage or non-aneurysmal bleeding.

Given that subarachnoid hemorrhages can cause rapid neurologic deterioration, it is important not to delay diagnostic testing. Thus, admitting the patient and performing repeat imaging later (answer B) is not a correct answer. Additionally, neurosurgery should not be consulted until either a positive CT head or LP is obtained (answer C).

References:

1. Perry JJ, Stiell IG, Sivilotti ML, et al. Sensitivity of computed tomography performed within six hours of onset of headache for diagnosis of subarachnoid haemorrhage: prospective cohort study. BMJ. 2011; 343:d4277.

2. Backes D, Rinkel GJ, Kemperman H, et al. Time-dependent test characteristics of head computed tomography in patients suspected of nontraumatic subarachnoid hemorrhage. Stroke. 2012; 43:2115.

3. Li Q, Lv F, Li Y, et al. Evaluation of 64-section CT angiography for detection and treatment planning of intracranial aneurysms by using DSA and surgical findings. Radiology. 2009; 252:808.

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15. Correct Answer: D. Elevated blood pressure is very commonly seen in the emergency department. Patients who are asymptomatic should follow with their primary care doctors for repeat blood pressure checks before being diagnosed with hypertension and prescribed medication. In asymptomatic patients with elevated blood pressure, no further diagnostic work up is needed. However, some recommend starting medication at discharge if systolic blood pressure is greater than 200 mmHg or diastolic blood pressure is greater than 120 mmHg. One medication option is hydrochlorothiazide.

References:

1. Levy P. Hypertension. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

2. Cline DM, Machado, AJ. Systemic and Pulmonary Hypertension. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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16. Correct Answer: A. All of the above can be used to treat different forms of Lyme disease. The most appropriate treatment of early disseminated Lyme disease with neurologic findings in children in the absence of meningitis is amoxicillin 25-40 mg/kg/day divided TID. For adults, the first line treatment is doxycycline 100 mg BID for 28 days. When doxycycline and amoxicillin are both not possible, for example in a child with a severe penicillin allergy, erythromycin may be used as a second line therapy. Intravenous antibiotics like ceftriaxone and penicillin G are necessary when signs of Lyme-based meningitis are present.

References:

1. Marx JA, Hockberger RS, Walls RM, Adams J. Tick-Borne Illnesses. Rosen's Emergency Medicine: Concepts and Clinical Practice. 7th ed. St. Louis: Mosby, 2013.1769-1780.

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17. Correct Answer: E. Hyperbaric oxygen therapy involves placing a patient in an oxygen chamber where multiple atmospheres of pressure are applied with 100% oxygen for various intervals of time. Research in hyperbaric therapy is an evolving field, but the FDA has approved hyperbaric oxygen as a treatment for the following conditions (see table). Methemoglobinemia is a hemoglobinopathy characterized by elevated levels of methemoglobin in the red blood cells and thus decreasing oxygen delivery to the cells). This condition is treated with methylene blue. Hyperbaric oxygen has no significant effect on this disease because the limiting factor is the hemoglobin molecule.

Indications for Hyperbaric Oxygen Therapy
Arterial gas embolism
Carbon monoxide poisoning
Clostridial myonecrosis (gas gangrene)
Crush injury, compartment syndrome, and other acute traumatic ischemias
Decompression sickness
Delayed radiation injury (osteomyelitis or soft tissue injury)
Exceptional anemia
Osteomyelitis (refractory)
Skin grafts and flaps
Thermal burns

References:

1. Khandelwal S, Kaide CG. Hyperbaric Oxygen Therapy. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Byyny RL, Shockley LW. Scuba Diving and Dysbarism. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Undersea and Hyperbaric Medicine Society. Indications for Hyperbaric Oxygen Therapy.

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18. Correct Answer: E. This postpartum patient is presenting with symptoms concerning for either eclampsia or cerebral venous sinus thrombosis (CVST). The normal blood pressure makes eclampsia very unlikely, making CVST the most likely diagnosis. Patients with cerebral venous sinus thrombosis may present with non-specific signs and symptoms, which may include headache, vomiting, or seizures. On examination, there may be papilledema. Individuals at risk include those with a hypercoagulable state (e.g. oral contraceptive pills, recently postpartum, post-operative, factor V Leiden mutation, protein C/S deficiency).

CT imaging will be normal in one-third of patients. Therefore, a normal CT head does not rule out the diagnosis. Positive findings on CT include:

- Empty delta sign (triangle filling defect in the superior sagittal sinus)
- Cord sign (cord-like hyper-attenuation of the dural venous sinus)
- Cortical edema surrounding the CVT

An EEG may be considered during the hospital stay, but is unlikely to affect the acute management and will not assist in diagnosing CVST. In the setting of papilledema, a lumbar puncture should not be obtained due to the potential for herniation. The gold standard is an emergent MRI with MRA and MRV, which approaches 100% sensitivity.

References:

1. Denny CJ, Schull MJ. Headache and Facial Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.
2. Crocco TJ, Goldstein JN. Stroke. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.
3. Biousse V, Tong F, Newman N. Cerebral venous thrombosis. Current Treatment Options in Neurology. 2003; 5(5): 409-420.
4. Connor S, Jarosz J. Magnetic Resonance Imaging of Cerebral Venous Sinus Thrombosis. 2002 June; 57(6): 449-461.

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19. Correct Answer: B. Radioactive iodine is a form of beta radiation. Beta radiation has a longer range than alpha radiation and can be shielded against with aluminum foil or glass. Beta particles can penetrate the skin and cause internal damage.

Alpha radiation has a short range and is easy to shield. Alpha particles are unable to penetrate the outer layer of the skin and are only dangerous if ingested or inhaled. An example of an alpha particle would be uranium. Gamma radiation has a very long range and is sometimes used in commercial applications. Gamma radiation can penetrate through the entire body. Omega radiation is not a real form of radiation. X radiation is commonly used in the medical field for radiographs and CT scans.

References:

1. Catlett CL, Baker Rogers JE. Radiation Injuries. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Colwell CB. Radiation Injuries. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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20. Correct Answer: A. This patient's presentation is concerning for a possible ruptured abdominal aortic aneurysm (AAA). The classic triad of a ruptured AAA is: abdominal or back pain, hypotension, and pulsatile abdominal mass. Risk factors include: male gender, advanced age, hypertension, and smoking history.

A bedside ultrasound is the test of choice as it can be performed immediately and without the need to move the patient out of the emergency department. AAA can be identified using bedside ultrasonography with a sensitivity of 100% by trained emergency physicians.

Plain film radiography (answers D and E) is not indicated in the evaluation of a suspected AAA patient. A normal radiograph does not exclude the presence of an AAA, and plain films only rarely identify a AAA. An emergent CT scan of the abdomen/pelvis (answer B) would be useful in the diagnosis of an AAA, but this patient is too hemodynamically unstable and should not leave the emergency department for radiology. MRI (answer C) is time consuming and provides no benefit over CT scan. It is not indicated in a case of suspected AAA with acute symptoms.

References:

1. Bessen HA, Cori MP. Abdominal Aortic Aneurysm. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Ma OJ, Mateer JR, Blaivas M. Emergency Ultrasound, 2nd edition. New York: McGraw-Hill Medical, 2008.

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21. Correct Answer: C. This diver likely has decompression sickness. The standard approach to patients with decompression sickness is to provide 100% oxygen (to wash out inert gases from the tissues) and arrange for hyperbaric oxygen treatment. Some advocate for positioning the head in between the legs to prevent cerebral embolization. Most also advocate for placing the patient flat, or at the very minimum avoiding Trendelenburg positioning.

Intravenous hydration is recommended, but AVOID glucose as it has adverse effects in the setting of cerebral injury from decompression illness. Analgesics and observation alone would be insufficient in this patient with decompression sickness. A CT brain may be considered, but is unlikely to affect the acute management since intracranial hemorrhage is uncommon. A knee arthrocentesis may also be considered when the clinical scenario supports a potentially infectious etiology, but appears unlikely in this case.

References:

1. Snyder B, Neuman T. Dysbarism and Complications of Diving. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Byyny RL, Shockley LW. Scuba Diving and Dysbarism. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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22. Correct Answer: B. Inorganic iodine treats thyroid storm by inhibiting thyroid hormone release. It is usually administered as oral iodine (potassium iodide or Lugol's solution). However, ingestion of additional iodine may increase thyroid hormone synthesis. Therefore, iodine should not be administered until one hour after treatment with an agent that reduces thyroid hormone production, such as propylthiouracil (PTU) or methimazole. PTU and methimazole are thioamides, decreasing thyroid hormone synthesis by inhibiting oxidation and organic binding of iodine to thyroglobulin. While either can be used to treat hyperthyroidism, PTU is more beneficial during thyroid storm because it also decreases peripheral conversion of T4 to T3.

Beta blockers (usually propranolol) treat thyroid storm symptomatically by decreasing the adrenergic response. Delayed administration is unnecessary, as these agents do not affect synthesis or release of thyroid hormone.

References:

1. Sharma A, Levy D. Thyroid and adrenal disorders. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Chiha M, Samarasinghe S, Kabaker A. Thyroid storm: an updated review. J Intensive Care Med. 2015 Mar;30(3):131-40. PMID 23920160

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23. Correct Answer: C. The highest incidence of aspiration pneumonia is in stroke and dementia patients. Their risk is compounded by poor oral hygiene, which can lead to oropharyngeal colonization by bacteria. The most common bacteria involved are *S. pneumonia*, *S. aureus*, *H. influenzae*, and *Enterobacteriaceae* in community-acquired aspiration pneumonia and *P. aeruginosa* and gram negative bacteria in hospital-acquired aspiration pneumonia.

In aspiration pneumonia, the chest x-ray findings usually show unilateral focal or patchy consolidations in the dependent lung segments. If a patient is supine, the posterior segments of upper lobes are most common and if patient is upright, the basal segments of the lower lobes are common. When a patient is upright, the most common area to develop aspiration pneumonia is the right lower lobe.

Chronically ill patients or those in nursing homes who have a witnessed aspiration event followed by respiratory symptoms are often sent to the ED for evaluation. These patients may be asymptomatic at the time of arrival, however, they are at risk for aspiration pneumonia due to oropharyngeal colonization from pathogenic bacteria. These patients should be observed in the hospital for 12-24 hours to look for signs/symptoms of pneumonia.

References:

1. Emerman CL, Anderson E, Cline DM. Community-Acquired Pneumonia, Aspiration Pneumonia, and Noninfectious Pulmonary Infiltrates. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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24. Correct Answer: D. Vitamin B12 deficiency may lead to diffuse demyelination of the spinal cord and brain, with early changes primarily in the posterior column of the spinal cord. Early symptoms of cyanocobalamin deficiency include paresthesias of the extremities. As the disease progresses, gait becomes unsteady with loss of vibration sense and position sense. Patients at risk for B12 deficiency include: vegetarians, elderly patients, patients with pernicious anemia, or those with malabsorptive disorders.

Vitamin B1 (thiamine) deficiency can present with Wernicke's encephalopathy (i.e. ataxia, confusion, and ophthalmoplegia) or Korsakoff Syndrome (i.e. amnesia with confabulation) (answer A). Vitamin B3 (niacin) deficiency may lead to pellagra, characterized by anxiety, anorexia, depression, dementia, diarrhea, and scaly dermatitis of sun-exposed areas (answer B). Vitamin B6 (pyridoxine) deficiency is characterized by cheilosis, glossitis, seborrheic dermatitis, and stomatitis (answer C). Zinc deficiency presents as diarrhea, alopecia, muscle wasting, and a vesicular, pustular rash involving the extremities, face and perineum (answer E).

References:

1. Tintinalli, JE. Toxicology. In Tintinalli's emergency medicine: a comprehensive study guide. 7th ed. New York: McGraw-Hill; 2011.

2. Klein J, Ropper A, Samuels M. Major Categories of Neurologic Disease. In Adams and Victor's Principles of Neurology. S.l.: [s.n.]; 2014.

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25. Correct Answer: E. Exudative effusions are due to defective lymphatic drainage or increased permeability of membranes usually due to inflammatory processes. Exudative pleural effusions specifically are due to an abnormality of the pleura, and can be due to any inflammatory process involving the pleura or lungs as does occur in rheumatoid arthritis.

The other choices typically result in transudative effusions, which are caused by an increase in hydrostatic pressure or decrease in oncotic pressure. This results in an ultra-filtrate of plasma which is low in protein.

Exudative Effusions	Transudative Effusions
Infections (Pneumonia, Tuberculosis)	Congestive Heart Failure
Neoplasms	Cirrhosis
Connective Tissue Disorders	Peritoneal Dialysis
Rheumatologic Disease (Lupus, Rheumatoid Arthritis)	Renal Disease (Nephrotic Syndrome, ESRD, Glomerulonephritis)
Gastrointestinal Disease (Abscess)	Myxedema

Light's Criteria	Pleural/Serum Protein Level	Pleural LDH Level	Pleural/Serum LDH Level
Exudative	> 0.5	> 2/3 Upper Normal for serum LDH	> 0.6
Transudative	≤ 0.5	< 2/3 Upper Normal for serum LDH	<0.6

References:

1. Kosowsky J, Kimberly H. Pleural Disease. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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26. Correct Answer: B. This patient likely has symptomatic primary human immunodeficiency virus (HIV) infection. The most common findings are mononucleosis-like symptoms with fever, pharyngitis, and lymphadenopathy occurring 2-6 weeks after transmission. Currently, the Center for Disease Control and Prevention (CDC) recommends beginning with a combination p24 antigen and antibody test. The combination antigen and antibody assay will become positive much earlier in the disease process than assays looking only at antibody levels (ELISA and western blot). Acute HIV infection is associated with very high HIV viral loads, so nucleic acids tests will also typically detect acute HIV infection. However, nucleic acid tests are not recommended as a screening test in the asymptomatic patient as false positives can occur and the test is very expensive. These studies are used to confirm an acute diagnosis by showing positive viral loads with negative antibody titers. The CD4+ level may decrease transiently during acute infection, but this is not a reliable method for detection of acute HIV infection.

References:

1. Centers for Disease Control and Prevention and Association of Public Health Laboratories. Laboratory Testing for the Diagnosis of HIV Infection: Updated Recommendations. Published June 27, 2014. Accessed August 31, 2015.
2. Takhar SS, O'Laughlin KN. HIV Infection and AIDS. Rosen's emergency medicine. 8th ed. John Marx. Philadelphia, PA: Elsevier Saunders; 2014: 1751-1767.

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27. Correct Answer: A. Acromegaly is a pituitary disorder of increased growth hormone production after epiphyseal plates have fused. Common complaints include carpal tunnel syndrome, heart failure, and expansion of the skull, jaw, and hands. Octreotide is a somatostatin analog that strongly inhibits growth hormone and is used frequently as medical therapy for acromegaly. Besides blocking growth hormone, it also inhibits secretion of insulin, glucagon, and a whole host of other intestinal hormones. The wide array of intestinal hormones that are blocked by octreotide cause reduced gastrointestinal (GI) motility, decreased contraction of the gallbladder often leading to stones, and decreased fluid production by the pancreas and intestines. These combined problems lead to common side effects involving the GI tract. None of the other side effects are associated with octreotide use.

References:

1. Williams DT, Kim HT. Wrist and Forearm. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Katznelson L. Medical Therapy for Acromegaly. Neuroendocrine Clinical Center. Issue 2, 1993.

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28. Correct Answer: C. When treating a pregnant patient who has been involved in a trauma it is important to remember you really have two patients. Concerns for fetal demise are related to maternal hypotension, acidosis (i.e. low bicarbonate, low pH, hypoxia), and a fetal heart rate of < 110. This warrants emergent OB/GYN consultation. Failure to rapidly recognize these injuries can be fatal to the fetus and the mother.

References:

1. Marx JA, et al. Rosen's Emergency Medicine. Philadelphia: Elsevier, Saunders, 2014. Print.

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29. Correct Answer: D. The CT shows signs of neurocysticercosis causing acute hydrocephalus with dilated ventricles. Neurocysticercosis remains a serious health problem worldwide and is the leading cause of acquired epilepsy in the developing world. The manifestations of neurocysticercosis are numerous, depending on the number and locations of the lesions. In the acute phase, the cysts can cause surrounding edema and inflammation leading to obstruction of cerebrospinal fluid (CSF) flow and acute hydrocephalus. Given the patient's presentation and CT findings, the most appropriate step in management is to obtain emergent neurosurgical consultation for definitive management of elevated intracranial pressure (ICP). This is usually achieved with an extra-ventricular drain placement or a ventriculoperitoneal shunt.

Anti-parasitics (praziquantel and albendazole) and steroids are best initiated in consultation with an infectious disease specialist or neurologist (answer B). While treatment with anti-helminthic agents may be part of routine therapy, neurosurgical intervention takes precedence given the acute development of hydrocephalus. If anti-parasitics are administered, steroids are often recommended in conjunction, particularly in those with encephalitis, hydrocephalus, or vasculitis to avoid further inflammation as cysts involute. Acetazolamide and mannitol may be used to decrease CSF production and ICP, but serve as adjuncts to definitive therapy (answer A). Given the signs of increased ICP on CT, a high volume lumbar puncture is contraindicated (answer E). In addition, while the patient may benefit from a neurology consultation, her emergent neurosurgical needs takes precedence (answer C).

References:

1. VanRooyen, MJ, Venugopal, R. World Travelers. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Denny, CJ, Schull, MJ. Headache and Facial Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Del Brutto OH. Neurocysticercosis: A review. Scientific World Journal. 2012 Jan 4.

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30. Correct Answer: E. This patient is in cardiogenic shock due to the closure of his ductus arteriosus as part of the normal changes in circulation following birth. This patient failed a hyperoxia test, which is a measurement of PaO_2 before and after a 20min trial of 100% oxygen. Patients who do not have an increase of PaO_2 > 20 millimeters of mercury can be presumed to have cyanotic congenital heart disease. The appropriate medication to start would be prostaglandin E1 (0.03-0.1 mcg/kg/min), which works to reopen the ductus arteriosus.

There are several side effects associated with prostaglandin E1 including focal seizures, hyperthermia, apnea, and hypotension (answers B, C, and D). Bradycardia, not tachycardia, is also a side effect (answer E). Every patient with a Prostaglandin E1 infusion should be carefully monitored. Intubation should be considered prior to transfer to an institution with a higher level of care due to the possibility of apnea (answer A).

References:

1. Horeczko T, Young KD. Congenital Heart Disease. In: Schafermeyer R, Tenenbein M, Macias CG, Sharieff GQ, Yamamoto LG. eds. Strange and Schafermeyer's Pediatric Emergency Medicine, 4e. New York, NY: McGraw-Hill; 2015.

2. Yue EL, Meckler GD. Congenital and Acquired Pediatric Heart Disease. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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31. Correct Answer: B. The diagnosis of prolactinoma is given in the question stem. The FDA has approved dopamine agonists to help shrink the size of prolactinomas. Dopamine inhibits the secretion of prolactin, so a dopamine agonist like bromocriptine or cabergoline will reduce the production of prolactin and help shrink the tumor in the vast majority of patients. The other neurotransmitters listed do not play a primary role with prolactinomas.

References:

1. Sharma R, Brunette DD. Ophthalmology. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Glezer A, Bronstein MD. Prolactinomas. Endocrinol Metab Clin North Am. 1025; 44: 71–78.

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32. Correct Answer: C. This patient has infective endocarditis (IE) of her bioprosthetic valve and has subsequently embolized the vegetation into her left MCA. Up to 20% of patients with IE have neurologic sequelae, with CVA being the most common, occurring in up to 40% of patients. Those with affected bioprosthetic valves have a higher rate of septic embolization, and up to 60% of these emboli can lodge in the MCA distribution.

Patients with prosthetic valves that are suspected of having IE should be empirically covered for *Staphylococcus aureus*, which is the most common organism found in culture-positive IE involving prosthetic valves. This is especially in true in patients whose valves were placed within the preceding year. Other common organisms include Streptococcus species, coagulase-negative staphylococci, enterococci, and HACEK organisms. The American Heart Association recommends that these patients receive gentamicin, rifampin, and vancomycin for adequate empiric coverage.

References:

1. Yue EL, Meckler GD. Congenital and Acquired Pediatric Heart Disease. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

2. Baddour L. Infective Endocarditis: Diagnosis, Antimicrobial Therapy, and Management of Complications: A Statement for Healthcare Professionals From the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, Council on Cardiovascular Disease in the Young, and the Councils on Clinical Cardiology, Stroke, and Cardiovascular Surgery and Anesthesia, American Heart Association: Endorsed by the Infectious Diseases Society of America. Circulation. 2005;111(23):e394-e434.

3. Cruz-Flores S. Neurologic complications of valvular heart disease. Handbook of Clinical Neurology. 2014:61-73.

4. Sonneville R, Mourvillier B, Bouadma L, Wolff M. Management of neurological complications of infective endocarditis in ICU patients. Ann Intensive Care. 2011;1(1):10.

5. Thuny F, Avierinos J, Tribouilloy C et al. Impact of cerebrovascular complications on mortality and neurologic outcome during infective endocarditis: a prospective multicentre study. European Heart Journal. 2007;28(9):1155-1161.

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33. Correct Answer: C. This patient has acute graft-versus-host disease (GVHD). Acute GVHD presents within the first 100 days after a hematopoietic stem cell transplantation. Symptoms typically include a rash and gastrointestinal (GI) symptoms. The rash is classically a macular and papular rash that often begins on the palms or soles before spreading to the trunk. GI symptoms include diarrhea, nausea, anorexia, and cramping. GVHD can involve the liver resulting in transaminitis and hyperbilirubinemia. Initial management of acute GVHD involves systemic glucocorticoids. In a well-appearing patient such as in the vignette above, starting oral prednisone at a dose of 1 mg/kg and having the patient follow-up with the patient's transplant team is a reasonable option (after discussing the patient with the transplant team). For more severe symptoms, intravenous methylprednisolone is often started.

Although transplant patients are prone to infection, the patient's rash is not consistent with cellulitis, so starting cephalexin and trimethoprim-sulfamethoxazole would not be appropriate. Furthermore, as the patient is immunosuppressed, parental antibiotics and admission would be warranted for the treatment of cellulitis. Diphenhydramine would treat the pruritus, but will not address the underlying event. Topical hydrocortisone would be useful for atopic dermatitis, but not sufficient in this case.

References:

1. Fish RM, Massad MG. The Transplant Patient. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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34. Correct Answer: D. Criteria for preeclampsia include:

1. Hypertension in a previously normotensive patient, defined as systolic blood pressure >140 mmHg or diastolic blood pressure >90 mmHg. If the patient was not previously normotensive, look for an increase in systolic blood pressure >30 mmHg from baseline or diastolic blood pressure >15 mmHg from baseline.

2. Proteinuria defined as ≥300 mg in a 24-hour period

Although edema was once part of the preeclampsia criteria, it is no longer a criterion.

Although the most common presentation of preeclampsia is for a pregnant woman to present with new onset hypertension at approximately 20 weeks of gestation or later, preeclampsia can carry over into the postpartum period or even initially present in the postpartum period (answer A). Hypertension in pregnancy is often thought of as a step-wise process (e.g. moving from preeclampsia to HELLP to eclampsia). However, it should be thought of as a spectrum in which patients can initially present at any point on the spectrum (answer B). Although preeclampsia is typically seen after 20 weeks of pregnancy and throughout the third trimester, there are rare instances where it is seen earlier, as in molar pregnancies and partial molar pregnancies (answer C). Failure to recognize preeclampsia can result in many complications detrimental to the CNS, renal, and pulmonary systems, in addition to placing the fetus at risk for fetal demise (answer E).

References:

1. Echevarria MA, Kuhn GJ. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York, NY: McGraw-Hill; 2011.

2. Houry DE, Salhi BA. Acute Complications of Pregnancy. In: Marx JA, Hockberger RS, Walls RM, Rosen P. Rosen's Emergency Medicine: Concepts and Clinical Practice. 8th ed. Philadelphia, Pa: Saunders/Elsevier; 2014.

3. Soriya G. Third-Trimester Complications and Delivery. In: Markovchick VJ, Pons PT, Bakes KA. Emergency Medicine Secrets. 5th ed. St. Louis, Mo: Mosby; 2011.

4. Stella CL, Sibai BM. Preeclampsia: diagnosis and management of the atypical presentation. J Matern Fetal Neonatal Med. 2006;19:381-6.

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35. Correct Answer: B. Aplastic anemia refers to decreased production of all blood cell lines, but has no effect on existing cells. Thus, patients will present with pancytopenia and a low reticulocyte count, but typically will have normal red blood cell indices. Additionally, since it is not an iron-associated anemia, mean corpuscular volume (MCV) should not be affected.

Drugs and chemicals are implicated in 50% of the cases of aplastic anemia. Bone marrow aspiration and assessment is frequently required to make the diagnosis of aplastic anemia as well as to help identify the underlying cause. Parvovirus only infects erythroid precursor cells, resulting in a pure red cell aplasia, but not a true aplastic anemia (all cell lines affected). While mild cases of aplastic anemia tend to resolve well, 80% of patients who develop severe disease will die despite supportive therapy.

References:

1. Janz TG, Hamilton GC. Anemia, Polycythemia, and White Blood Cell Disorders. In: Marx J, Rosen P. Rosen's Emergency Medicine: Concepts And Clinical Practice [e-book]. Philadelphia, PA: Saunders; 2013.

2. Place R, Lagoc AT, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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36. Correct Answer: C. A single 200 mg dose of doxycycline by mouth is the treatment of choice for prophylaxis, as long as the patient meets specific criteria (see table). Answers B, D, and E do not meet the criteria. Answer A describes the dosing for the treatment of symptomatic Lyme disease, not prophylaxis. In cases of children < 8 years or pregnancy, either no treatment or empiric ceftriaxone may be considered.

Antibiotic prophylaxis should be used only in patients who meet ALL of the following criteria:
Attached tick identified as an Ixodes scapularis tick (deer tick)
Tick is estimated to have been attached for ≥36 hours (by degree of engorgement or time of exposure)
Prophylaxis is begun within 72 hours of tick removal
Local rate of infection of ticks with *B. burgdorferi* is >20%
Doxycycline is not contraindicated (i.e. the patient is not <8 years of age, pregnant, or lactating)

References:

1. Meredith JT. Zoonotic Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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37. Correct Answer: A. This clinical vignette is a classic description of peripartum cardiomyopathy. Women can develop this condition between the last month of pregnancy and up to five months postpartum. Presenting symptoms are those of heart failure, including dyspnea on exertion, symmetric lower extremity swelling, orthopnea, and paroxysmal nocturnal dyspnea. Studies have shown that advanced maternal age, multiple gestations, African-American race, hypertension, and preeclampsia are risk factors for this condition.

This is a dilated cardiomyopathy, with enlargement of all four chambers. This disease leads to significant systolic and diastolic dysfunction, often with significantly decreased ejection fractions (<40%). Transthoracic echocardiogram reveals decreased ejection fraction (EF), typically less than 40%. ECG is usually abnormal. Common features include poor R-wave progression ("pseudo-infarction pattern") and LVH.

Answer D is incorrect because it fits a description of hypertrophic cardiomyopathy, the hallmark of which is hypertrophy of the septal wall, usually most pronounced in the sub-aortic area. Diastolic dysfunction with a preserved EF is typical in this condition. Answer B is incorrect because it describes restrictive cardiomyopathy. The hallmark of this condition is diastolic dysfunction secondary to stiff, noncompliant ventricles. EF is variable (45-90%). Answer C is an incorrect description of dilated cardiomyopathy. Answer E describes a pericardial effusion with early tamponade physiology, which is less likely based upon the elevated BNP level and high voltage (rather than low voltage) ECG findings.

References:

1. Niemann JT. The Cardiomyopathies, Myocarditis, and Pericardial Disease. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Kolte D, Khera S, Aronow WS, et al. Temporal trends in incidence and outcomes of peripartum cardiomyopathy in the United States: a nationwide population-based study. J Am Heart Assoc. 2014; 3(3); 1-13. DOI: 10.1161/JAHA.114.001056.

3. Schoen F, Mitchell R. The Heart. In: Kumar V et al, eds. Robbins and Cotran Pathologic Basis of Disease. 8th ed. Philadelphia, PA: Saunders, 2010.

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38. Correct Answer: C. Hypersensitivity is an inappropriate immune response to generally harmless antigens. There are five types of hypersensitivity reactions, each involving one of several immunologic mediators (either humoral or cellular). Below is a table outlining the various types of hypersensitivity. In this case, the patient is presenting with Henoch-Schönlein purpura (HSP), which is caused by immune complex deposition in numerous tissue areas, characteristic of a Type III hypersensitivity.

Type of Hypersensitivity	Immunoglobin Type	Mechanism	Examples
I	IgE	Direct activation of basophils and mast cells causing histamine release	Allergic rhinitis
II	IgG, IgM	Immunoglobin binds to the cell causing direct damage and cell death	Goodpasture's syndrome
III	IgA	Antigen-antibody complex formation and deposition causing inflammation in multiple different areas of the body	HSP, Rheumatoid arthritis, Serum sickness
IV	T-Cell	Delayed T cell reaction against cells	Contact dermatitis
V	IgG, IgM	Inappropriate binding of antibodies to a cell receptor activating or inhibiting sequelae downstream	Graves' disease, Myasthenia gravis

References:

1. Koerner CE. Renal Emergencies in Infants and Children. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Tran TP, Muelleman RL. Allergy, Hypersensitivity, and Anaphylaxis. In: Marx JA, Hockberger RS, Walls RM. Eds. Rosen's Emergency Medicine- Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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39. Correct Answer: B. The presence of vomiting less than 30 minutes after exposure indicates a high level of radiation exposure and is associated with a poor prognosis. Based on Chernobyl data the chances of survival for this patient are less than 5%. The presence of vomiting after 2 hours is more reassuring, with survival rates approaching 100%. The presence of nausea and lassitude are common in those who have been exposed to over 1 Sievert (Sv) of radiation. Those exposed to a dose of 4 Sv or more may experience diarrhea, as well. The presence of leukopenia in a patient can also be a prognostic indicator for radiation exposure. If the lymphocyte count drops to less than 50% of a patient's baseline when checked within the first 24 hours, this signifies significant radiation exposure.

References:

1. Catlett CL, Baker Rogers JE. Radiation Injuries. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Colwell CB. Radiation Injuries. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Flynn DM, Goans RE. Nuclear terrorism: triage and medical management of radiation and combined- injury casualties. Surg Clin North Am. 2006;86:601-636

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40. Correct Answer: A. This patient presents in cardiac arrest with a history suggestive of hyperkalemia. The most important physiologic goal of medical therapy is stabilization of the cardiac membrane. Calcium chloride (answer A) is more efficacious compared to calcium gluconate (answer B) as a result of slower dissociation due the decreased liver perfusion. Sodium bicarbonate (answer D) and insulin (answer C) should be subsequently used to move potassium intracellularly, but are less important than calcium. Ultimately, the patient will require dialysis if return of spontaneous circulation is achieved.

References:

1. Ward K, Kurz M, Neuromar R. Adult Resuscitation In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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41. Correct Answer: C. The patient in question is likely suffering from Sheehan's Syndrome, a disease process that usually occurs after heavy bleeding during childbirth. Complications can include depressed hypothalamus/pituitary/adrenal axis secondary to pituitary ischemia. The patient's presentation of decreased milk production and fatigue are suggestive of prolactin insufficiency. The depressed vital signs and exam finding of hypoglycemia are suspicious of a decrease in adrenal hormones as well.

Though long term management will provide replacement of hormones and steroids that are deficient, initial treatment should be supportive, which should include rapid correction of hypoglycemia. The patient appears confused and agitated, likely as a result of a low blood sugar.

References:

1. Sharma AN, Levy DL. Thyroid and Adrenal Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Schrager S, Sabo L. Sheehan syndrome: a rare complication of postpartum hemorrhage. J Am Board Fam Pract. 2001;14 (5): 389–91.

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42. Correct Answer: C. Acute mountain sickness is a combination of headache and one of the following symptoms: nausea, vomiting, dizziness, fatigue, or insomnia. Mild to moderate sickness occurs when the patient develops a few of the above symptoms within 6-12 hours after reaching altitudes of greater than or equal to 2500 meters. Severe illness is when the patient has many of the above symptoms and usually occurs after progressing through the moderate stage. Unfortunately, there are no physical examination findings to reliably diagnose acute mountain sickness.

High altitude cerebral edema (HACE) is characterized by severe symptoms of acute mountain sickness in combination with central nervous system dysfunction (altered mental status, truncal ataxia, or loss of consciousness).

Climber B is presenting with symptoms of HACE, as evidenced by the truncal ataxia and drowsiness. It is possible to have HACE without first progressing through acute mountain sickness. The treatment for HACE is dexamethasone and descent as soon as possible.

Answer choices B and D are incorrect because the climbers should descend right away for help. Also choices A and B are wrong because acetazolamide is used for the prevention (not treatment) of acute mountain sickness. There is no role for NSAIDs in the treatment of acute mountain sickness or HACE.

References:

1. Hackett PH, Hargrove J. High-Altitude Medical Problems. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Yaron M, Peterson RD, Davis CB. High-Altitude Medicine. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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43. Correct Answer: B. This patient exhibits the classic triad of normal pressure hydrocephalus (NPH), which consists of gait disturbance, urinary incontinence, and subcortical dementia. It is typically a chronic and treatable syndrome that can cause dementia. NPH is a form of communicating hydrocephalus. The non-contrast head CT will demonstrate large ventricles due to decreased resorption of cerebrospinal fluid (CSF), and the lumbar puncture typically yields a normal CSF opening pressure. These patients may respond to intermittent CSF removal or lumbar drain with a ventriculoperitoneal shunt.

NPH is often misdiagnosed as Alzheimer's disease (primarily a cognitive disorder with memory loss) and Parkinson's disease (which classically has Parkinsonism, tremor and rigidity) due to NPH's chronic nature (answers A and C). While frequent falls may lead to a subdural hematoma, our patient also has urinary incontinence and cognitive slowing which is more typical of NPH. Wernicke's encephalopathy includes the classic triad of confusion, ataxia, and ophthalmoplegia (answer E). It tends to occur in chronic alcoholics and results from thiamine deficiency. Symptoms include confabulation, an ataxic, wide-based gait, a gaze palsy (usually cranial nerve VII), and horizontal nystagmus.

References:

1. Huff JS. Altered Mental Status and Coma. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Verrees M, Selman WR. Management of normal pressure hydrocephalus. Am Fam Physician. 2004 Sep 15;70(6):1071-8.

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44. Correct Answer: E.

Ranson's criteria at admission include the following:

- Age >55yrs
- WBC >16 x $10^{o}9$/L
- Glucose >200 mg/dL
- LDH >350 U/L
- AST >250 U/L

Ranson's criteria within 48 hours of admission include

- Hematocrit falling >10%
- BUN rise >5mg/dL
- Calcium <8 mg/dL
- PO2<60 mmHg
- Base deficit >4 mEq/L
- Fluid sequestration >6L

Trends in hematocrit and BUN are utilized 48 hours AFTER admission. Amylase and lipase levels are not included in either of the criteria (answers A and D).

References:

1. Hemphill R, Santen S. Disorders of the Pancreas. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.
2. Ranson JH, et al. Objective early identification of severe acute pancreatitis. Am J Gastroenterol. 1974 Jun;61(6):443-51.

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45. Correct Answer: E. The rhythm is described as a wide complex tachycardia. His vital signs indicate that he is unstable with recorded tachycardia and hypotension. This is an indication for electrical treatment. Synchronized cardioversion is the indicated course of action for treatment of unstable tachydysrhythmias that include monomorphic ventricular tachycardia and supraventricular dysrhythmias.

Adenosine (answers A and B) is a short-acting AV-nodal blocker that is frequently used for supraventricular dysrhythmias. However, it is not recommended for hypotensive patients, and it is generally not used in a wide-complex tachycardia. In supraventricular tachydysrrhythmias, Adenosine 6 mg IV push is the initial dose. If a second administration is needed, the dosage is increased to 12 mg. Defibrillation (answer D) is indicated in patients with no pulse, ventricular fibrillation, or polymorphic ventricular tachycardia. Amiodarone (answer C) is one treatment option for patients with stable ventricular tachycardia, but it is not appropriate as a first-line action for this hemodynamically unstable patient.

References:

1. Pikfel JS. Cardiac rhythm disturbances. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Yealy DM, Koswosky JM. Dysrhythmias. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th Ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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46. Correct Answer: B. Rectal prolapse, also known as procidentia, results from laxity of the muscles and structures anchoring the rectum, causing circumferential protrusion of the rectum through the anal canal. It is typically seen in the extremes of age. A complete prolapse involves all layers of the bowel, while incomplete prolapse involves only the mucosal layer of the rectum. Clinical presentation commonly involves the patient feeling a protrusion or mass on valsalva, strenuous activity, or when attempting to have a bowel movement. Associated symptoms include bleeding, mucoid discharge, or stool incontinence. When the prolapsed rectum is not quickly reduced, it can become edematous and painful. Applying granulated sugar may help remove fluid from the tissue and allow for reduction (answer B). Analgesics and sedation may be required to facilitate a successful reduction. Anusol, hydrocortisone 1% ointment and sitz bath are all part of the therapy for hemorrhoids (answers A,C,D). Topical calcium channel blockers may be considered with anal fissures (answer E).

References:

1. Branecki C. Anorectal Disorders. In: Cline D, Ma O, Cydulka R, Thomas S, Handel D, Meckler G, ed. Tintinalli's Emergency Medicine: Just The Facts. 3rd ed. New York: McGraw-Hill Companies, Inc; 2013:170-175

2. Burgess B, Bouzoukis J. Gastrointestinal Emergencies: Anorectal disorders. In: Tintinalli J, ed. Emergency Medicine: A Comprehensive Study Guide. 6th ed. New York: McGraw-Hill; 2004:539-551.

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47. Correct Answer: D. Tacrolimus is a calcineurin inhibitor which limits proliferation of lymphocytes. It is one of the most commonly used immunosuppressive medications in transplant patients. It has numerous side effects, but nephrotoxicity is the most common and clinically significant. The nephrotoxicity is thought to be due to both renal tubular injury, as well as renal artery vasospasm. Over time, this can lead to hypertension or hyperkalemia, though both are much less common. The toxicity is dose-related and often improves by reducing the dose. Less commonly, tacrolimus can lead to neurotoxicity. Effects range from a mild tremor to a syndrome of headaches and seizures. Other side effects of cyclosporine include glucose intolerance, nausea, diarrhea, anorexia, alopecia, and pain in the lower limbs.

Other immunosuppressants and their common side effects include:

- **Cyclosporine**: similar side effects to tacrolimus
- **Azathioprine**: bone marrow suppression, hepatotoxicity
- **Mycophenolate**: gastrointestinal side effects, bone marrow suppression
- **Glucocorticoids**: glucose intolerance, osteoporosis, GI bleeding, myopathy, adrenal suppression

References:

1. Fish RM, Massad MG. The Transplant Patient. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Keadey MT. The Solid Organ Transplant Patient. In: Marx JA, Hockberger RS, Walls RM. Eds. Rosen's Emergency Medicine- Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Scott LJ. Tacrolimus: a further update of its use in the management of organ transplantation. Drugs. 2003;63(12):1247-97.

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48. Correct Answer: D. Sydenham's chorea occurs in approximately 10% of rheumatic fever cases. It is characterized by uncontrolled chaotic yet fluid movements and usually develops months after a Group A streptococcal infection. Syndenham's chorea is an autoimmune disorder, during which antibodies react against the basal ganglia, causing chorea with psychiatric and behavioral symptoms. Symptoms typically resolve in approximately 6 months.

Attention deficit hyperactivity disorder includes attention difficulty, hyperactivity, and impulsiveness (answer A). Multiple sclerosis, is an upper motor neuron lesion, and thus associated with spasticity (answer B). Tourette's syndrome is associated with tic-like movements, especially facial and verbal tics, which are sudden, repetitive, nonrhythmic motor movements or vocalizations involving discrete muscle groups (answer E).

References:

1. Sloan E, Handel D, Gaines S. Chronic Neurologic Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Shannon KM. Movement disorders. In: Bradley WG, Daroff RB, Fenichel GM, Jankovic J, eds. Neurology in Clinical Practice (4th edition). Elsevier, Inc.; 2004.

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49. Correct Answer: C. Of the choices listed above, isolated calf deep vein thrombosis (DVT), such as a DVT of the peroneal vein, is the only one that is NOT automatically treated with anti-coagulation. The choice to anti-coagulate isolated calf DVTs varies among clinicians. The decision not to anti-coagulate is based on the fact that patients with isolated distal DVTs are at half the risk of embolizing compared to those with proximal clots. However, because of their ability to propagate proximally, a repeat duplex scan in 2-7 days is advised if no anticoagulation is initiated. A DVT in the popliteal, superficial femoral, common femoral, or external iliac veins all warrant long term anticoagulation.

References:

1. Kline JA, Runyon MS. Pulmonary Embolism and Deep Vein Thrombosis. In: Marx J, Hockberger R, Walls R, Adams J, Rosen P. Rosen's Emergency Medicine. Philadelphia: Mosby/Elsevier; 2010.

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50. Correct Answer: C. Aggressive fluid resuscitation is recommended in rhabdomyolysis to prevent acute kidney injury. There seems to be some divergence in the literature, but generally 2-3 mL/kg/hr or approximately 200-300 mL/hr in adults is the targeted urine output for fluid resuscitation. This may require large amounts of IV fluids (up to 10-20 L in the first 24 hours). The use of sodium bicarbonate to alkalinize the urine, especially in patients with metabolic acidosis, seems to be an area of controversy with no controlled randomized studies. Mannitol and loop diuretics (furosemide) are also controversial treatment modalities.

References:

1. Parekh R. Rhabdomyolysis. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Counselman F, Lo BM. Rhabdomyolysis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Zhang M. Rhabdomyolysis and its pathogenesis. World J Emerg Med. 2012; 3(1): 11–15.

4. Scharman EJ, Troutman WG. Prevention of kidney injury following rhabdomyolysis: a systematic review. Ann Pharmacother. 2013 Jan;47(1):90-105.

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Practice Test #3

1. Correct Answer: A. Bartholin gland abscesses are most common in women of reproductive age. It is rare for an abscess to occur in a peri-menopausal woman and when it does, it requires follow-up with gynecology to exclude carcinoma. The glands are pea-sized and located in the 4 and 8 o'clock positions of the labia minora. They are not palpable when they are not infected. An abscess develops when the gland becomes obstructed and a cyst begins to form. The infections are polymicrobial and in a small minority can be caused by *Neisseria gonorrhoeae* and *Chlamydia trachomatis*.

Definitive treatment is marsupialization of the cyst and abscess to prevent recurrence. A temporizing technique of incision, drainage, and placement of a Word catheter is commonly performed in the emergency department. Patients may be discharged home with cephalexin plus metronidazole if sexually transmitted diseases are not suspected.

References:

1. Kelly EW, Magilner D. Soft Tissue Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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2. Correct Answer: C. Early decelerations are typically vagally-mediated and occur when uterine contractions during labor cause fetal head compression. These decelerations are typically symmetrical, gradual, and correlate well with the peak of the contractions. These decelerations are typically not dangerous or a sign of fetal distress.

Late decelerations, on the other hand, are associated with uteroplacental insufficiency, and as such are a sign of fetal hypoxia. They typically occur after the peak of the contraction.

Variable decelerations are caused by umbilical cord compression and typically result in an abrupt decrease in fetal heart rate (FHR) and vary with uterine contractions. Variable decelerations can cause acidosis and fetal distress, and therefore are concerning.

Decreased variability of heart rate is a sign of fetal central nervous depression and reduced fetal movement. Beat-to-beat variability, which is the fluctuation of FHR around the baseline, indicates normal autonomic nervous function. Long-term variability indicates fetal activity.

References:

1. Bhatia K, Cranmer HH. Trauma in Pregnancy. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Martin A. Fetal heart rate during labour: definitions and interpretation. J Gynecol Obstet Biol Reprod (Paris). 2008;37 Suppl 1:S34-45.

3. Sweha A, Hacker TW, Nuovo J. Interpretation of the electronic fetal heart rate during labor. Am Fam Physician. 1999;59(9):2487-500.

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3. Correct Answer: B. The tremor of Parkinson's disease characteristically occurs at rest, unlike familial tremor which is typically an action tremor (exacerbated by movement such as the finger-to-nose test or certain postures). The mnemonic TRAP can be used to remember the hallmark neurologic signs:

1. **T**remor (resting)

2. **R**igidity, cogwheel-like (increased tone as a limb is moved passively during examination),

3. **A**kinesia or bradykinesia (slowness of voluntary movement)

4. **P**osture and equilibrium impairment

Unlike action tremor, the tremor in Parkinson's disease may be suppressed by movement. Patients exposed to toxins (such as 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), manganese, or carbon monoxide), history of repetitive head trauma or infections (HIV, Creutzfeldt-Jakob disease, encephalitis) or taking certain medications (neuroleptics, anti-emetics) can display signs and symptoms of Parkinson's disease.

References:

1. Sloan E, Handel D, Gaines S. Chronic Neurologic Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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4. Correct Answer: E. This patient likely has a vestibular schwannoma, formerly known as an acoustic neuroma. These tumors, which originate from the Schwann cells surrounding the vestibular nerve (cranial nerve VIII), are generally benign and slow growing. However, they can become large enough to cause compression and neurologic effects due to their location at the cerebellopontine angle. Hearing loss often progresses to tinnitus and disequilibrium. Headache and facial pain can accompany these symptoms, as well. Uncommonly the tumors can grow large enough to cause symptoms of increased intracranial pressure.

An audiogram can be used to evaluate hearing loss, but in this case would not provide much additional information (answer A).

Because of its location in the posterior fossa, MRI imaging is superior to CT imaging (answer B).

The Dix-Hallpike maneuver is used to illicit nystagmus and diagnose patients suffering from benign paroxysmal positional vertigo (answer C).

Electronystagmography can be used to evaluate nystagmus that accompanies vertigo, though this would not identify the etiology (answer D).

References:

1. Stettler BA. Brain and Cranial Nerve Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

Click here to return to the question.

5. Correct Answer: C. Calcific tendinitis is a frequently encountered condition in which calcium crystals are deposited within a tendon. This is often seen in the supraspinatus tendon, although it can occur in any of the rotator cuff tendons. The condition may or may not be associated with symptoms. The correlation of calcification with pain is unclear but symptoms are more common among older patients and those with a higher body mass index. The patient's symptoms can be subacute, as the calcified tendon enlarges and begins to impinge under the coraco-acromial arch. The pain is often worse between 60-120 degrees of abduction. Treatment is with NSAIDs and activity modification. Acute symptoms develop as a result of a severe inflammatory reaction. At this point, pain is severe, and the range of motion is very limited. The shoulder can become warm and tender. When acute symptoms are this severe, short-term immobilization is recommended and patients will require analgesia and prompt orthopedic follow up.

Adhesive capsulitis or "frozen shoulder" is a condition of shoulder pain and restricted range of motion secondary to an idiopathic inflammatory reaction within the glenohumeral joint. The shoulder will be painful and both active and passive range of motion will be limited in all directions. The pain is often worse at night. The condition is more prevalent in diabetic patients and can sometimes develop after long-term immobilization for other shoulder conditions. This is why long-term immobilization is never recommended (answer D is incorrect), and instead early mobilization and range of motion exercises are frequently advised for a variety of shoulder conditions. Treatment of adhesive capsulitis is typically conservative, but will require close follow up. Patients will require physical therapy to slowly increase range of motion and may benefit from corticosteroid injections to decrease pain while they work on improving range of motion.

Rotator cuff tears can be either acute or chronic. Acute tears are often accompanied by a sudden ripping sensation. On exam, there is point tenderness and occasionally a palpable defect. With significant tears, the drop-arm test is positive. On x-ray, superior displacement of the humerus can be a sign of a complete rotator cuff tear. Acute tears are typically treated with prompt surgical repair, so orthopedist follow up is crucial. These patients often have pain and weakness with flexion and abduction, which worsens over time. Treatment is typically conservative with pain control and rehabilitation. MRIs are typically performed in the outpatient setting.

While subacromial bursitis is a common inflammatory condition, on the spectrum of rotator cuff impingement syndromes, septic subacromial bursitis is extremely rare (case reportable) and extremely unlikely in the absence of severe comorbidities and a clear mechanism of infection. Subacromial therapeutic injections are common, but diagnostic aspiration is not.

References:

1. Daya M, Bengtzen R. Shoulder. In: Marx, John A, et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Sansone V, Consonni O, Maiorano E, Meroni R, Goddi A. Calcific tendinopathy of the rotator cuff: the correlation between pain and imaging features in symptomatic and asymptomatic female shoulders. Skeletal Radiol. 2016 Jan;45(1): 49-55.

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6. Correct Answer: B. Hypercalcemia reduces neuronal excitability and rarely causes seizures. It is in the setting of significant hypocalcemia (below 7.5 mEq/L) that the seizure threshold lowers considerably. Hypocalcemia can present as a consequence of hypoparathyroidism, renal failure, or acute pancreatitis, and often presents in association with hypomagnesemia (itself an independent risk for seizure).

The most common cause of seizure in a patient with a diagnosed seizure disorder is noncompliance with medications. However, supratherapeutic and toxic levels of some anticonvulsants, such as carbamazepine, phenytoin, lamotrigine, and topiramate, can actually cause seizures. Thus, it is prudent to check the serum drug levels of a prescribed medication prior to administering a full loading dose of anti-convulsive agent in the emergency department (answer A).

A new onset seizure is commonly a presentation for an acute ischemic or hemorrhagic stroke in elderly patients (answer C). This occurs in approximately 40-54% of elderly patients with a stroke. The overall incidence of seizure secondary to stroke ranges from 4-15%.

Focal seizures in adults may be classified as simple partial or complex partial. Simple partial seizures are limited in electrical focus to one cerebral hemisphere and do not cause loss of cognition. Typical features include focal clonic movements, paresthesias, visual, auditory, olfactory and/or gustatory symptoms, diaphoresis and/or flushing. There is generally no post-ictal state after a simple partial seizure. In contrast, complex partial seizures involve impairment of cognition (answer D). They may involve automatisms that are specific to the affected person (e.g. lip smacking, repeated swallowing, verbal utterances, etc.). Post-ictal somnolence is common after complex partial seizures and may persist for hours.

Post-traumatic seizures can occur acutely as a result of blunt or penetrating head trauma, but they frequently occur several hours after an injury (answer E). In fact, early post-traumatic seizures are defined as occurring within 1 week of injury (late post-traumatic seizures occur after 1 week).

References:

1. McMullan JT, Duvivier EH, Pollack Jr CV. Seizure Disorders. In: Marx, John A et al. Rosen's Emergency Medicine Concepts and Clinical Practice. 8th Ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. McMullan JT, Davitt AM, Pollack Jr CV. Seizures. In: Marx, John A et al. Rosen's Emergency Medicine Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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7. Correct Answer: A. This patient was likely bitten by a Copperhead snake. The Copperhead is part of the Crotalid (or Pit Viper) family. Crotalidae are characterized by triangular heads, the presence of heat sensing pits, elliptical eyes, and a single row of subcaudal scales. These bites can cause significant local tissue damage and necrosis, resulting in diffuse pain and neurologic abnormalities. Severe cases may result in thrombocytopenia, cardiac dysrrhythmias, and shock.

Initial treatment should involve pain management, limb elevation, and monitoring for evidence of compartment syndrome. Patients with significant tissue involvement or systemic symptoms should be given CroFab anti-venom. Observation alone would not be appropriate in this patient given the degree of tissue involvement. An orthopedic consultation and fasciotomy may be considered, but studies have demonstrated that rapid administration of CroFab may reduce the need for emergent fasciotomy. Platelet transfusion is generally unnecessary unless the patient is severely thrombocytopenic or about to undergo a major surgery.

References:

1. Dart RC, Daly FF. Reptile Bites. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Otten EJ. Venomous Animal Injuries. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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8. Correct Answer: E. Transfusion-associated graft-versus-host disease (GVHD) occurs when immunocompetent T-lymphocytes engraft in an immune-suppressed patient. The following table includes a list of patients at increased risk for this disorder. GVHD typically presents with fever, skin rash, diarrhea, pancytopenia, and liver dysfunction. Pancytopenia typically develops in approximately 16 days. Neutropenia develops progressively, with death due to infections usually occurring within 3 weeks. The mortality of transfusion-associated GVHD is >90%. Irradiation of all blood products should occur for patients at increased risk for transfusion-associated GVHD. Current methods of leukoreduction filtration appear insufficient to prevent transfusion-associated graft-versus-host disease in every patient. Therefore it is important to request irradiated blood products in these patients. Requesting blood products from a related donor will not reduce the risk of GVHD and may, in fact, increase the risk of developing GVHD.

HIV, hepatitis C, and CMV infections from blood products, though possible, are rare. These acute infections would likely not cause pancytopenia or death in this time frame.

Risk factors for transfusion-associated GVHD
Significantly Increased Risk
Congenital and acquired immunodeficiency syndromes (excludes HIV)
History of bone marrow transplantation
Transfusions from blood relatives
Intrauterine transfusions
Newborn exchange transfusions
Transfusions with fresh whole blood
Premature infants receiving any sort of transfusion
Human leukocyte antigen–matched platelet transfusions
Hodgkin disease (even in remission)
Leukemia (not in remission)
Treatment with purine analog chemotherapeutic agents
Minimally Increased Risk
Non-Hodgkin lymphoma
Leukemia (in remission)
Solid tumors treated with intensive chemotherapy or radiotherapy
Exchange transfusions
Preterm infants
Solid-organ transplant recipients

References:

1. Meredith JT. Zoonotic Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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9. Correct Answer: C. Patients with myasthenia gravis may present with generalized weakness, most notable in the proximal extremity muscle groups, neck extensors, and facial or bulbar muscles. At initial presentation, patients may present with ptosis or diplopia due to ocular palsies, which are more evident in the evening or with prolonged use or activity, such as during prolonged reading. Patients may also present with bulbar weakness, including dysphagia, dysarthria, and dysphonia. Additionally, myasthenia gravis can present with severe weakness of respiratory muscles. Patients may have dyspnea, hypoxia, or hypercapnia. They may progress to respiratory failure requiring mechanical ventilation. Myasthenia gravis patients will have normal sensory, reflex, and cerebellar exams. Disequilibrium can be seen with Parkinson's disease and others, but is not a typical finding in a myasthenia gravis patient.

References:

1. Sloan EP, Handel DA, Gaines SA. Chronic Neurologic Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Ulane C. Myasthenic Crisis and Peripheral Neuromuscular Disorders. In: Arbo JE, Ruoss SJ, Geoffrey KL, Jones MP. eds. Decision Making in Emergency Medicine Critical Care. 1st ed. Philadelphia, PA: Wolters Kluwer, 2015.

3. Shearer P, Jagoda A. Neuromuscular Disorders. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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10. Correct Answer: C. Nausea and repetitive vomiting can cause mild abdominal pain or tenderness; however, the abdominal pain should not be severe and should not be the patient's primary complaint. This is unusual in hyperemesis gravidarum and should prompt further evaluation and consideration of another etiology for the presentation.

Because of the repetitive vomiting, bilious vomiting may be observed and is not a red-flag finding in hyperemesis gravidarum (answer A).

Hypokalemia, ketonemia, and ketonuria are commonly seen in hyperemesis gravidarum and are due to a combination of frequent vomiting, decreased oral intake, and volume depletion (answer B).

Often the vomiting is so severe, the patients require intravenous fluids for volume repletion (answer D). These patients should receive glucose in the IV fluids because of the starvation ketosis.

Most pregnant women will experience nausea and vomiting during the first trimester, however it is usually mild and self-resolves. Hyperemesis gravidarum occurs in 2% of pregnancies and is most common in the first trimester (answer E).

References:

1. Krause RS, Janicke DM, Cydulka RK. Ectopic Pregnancy and Emergencies in the First 20 Weeks of Pregnancy. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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11. Correct Answer: C. The patient presents with stable supraventricular tachycardia (SVT) at a rate of 172 beats per minute. The first line treatment for stable SVT is to perform vagal maneuvers such as carotid massage or valsalva (answer C). Should vagal maneuvers fail to convert the patient to a sinus rhythm, 6 mg IV adenosine would be the appropriate first line drug of choice. A 1 mg dose of adenosine is too low to be effective in most patients (answer A). Beta blockers (e.g. labetalol) or calcium channel blockers (e.g. diltiazem) are considered second-line pharmacotherapy (answer B). Defibrillation is not indicated for SVT (answer D). Synchronized cardioversion is the initial step in managing unstable SVT (answer E).

References:

1. Piktel JS. Cardiac Rhythm Disturbances. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Sinz E, Navarro K. Advanced Cardiovascular Life Support. Dallas, Tex.: American Heart Association; 2011.

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12. Correct Answer: E. Anal fissures are superficial linear tears of the anal canal. They begin at or below the dentate line and extend distally. Approximately 90% are located in the posterior midline. The second most common location is the anterior midline. A lateral anal fissure is concerning for an underlying systemic illness such as Crohn's, HIV, leukemia, tuberculosis or syphilis. Fissures develop most commonly from constipation when hard stool cause a superficial tear in the anoderm. On presentation, patients may complain of minor rectal bleeding and significant pain with defecation. The initial treatment should be conservative, including sitz baths, topical anesthetics, topical vasodilators, and stool softeners. It is important to note that if fissures are not treated, they may develop chronic changes, such as deep ulceration, sentinel pile formation (hypertrophic and edematous skin at the base), and enlarged anal papillae.

References:

1. Branecki C. Anorectal Disorders. In: Cline D, Ma O, Cydulka R, Thomas S, Handel D, Meckler G, ed. Tintinalli's Emergency Medicine: Just The Facts. 3rd ed. New York: McGraw-Hill Companies, Inc; 2013:170-175.

2. Burgess B, Bouzoukis J. Gastrointestinal Emergencies: Anorectal disorders. In: Tintinalli J, ed. Emergency Medicine: A Comprehensive Study Guide. 6th ed. New York: McGraw-Hill; 2004:539-551.

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13. Correct Answer: C. This patient is presenting with weakness and ECG changes suggestive of hypocalcemia and hyperkalemia after recent initiation of chemotherapy for a hematologoic malignancy, making tumor lysis syndrome (TLS) the most likely etiology of her symptoms. TLS is a constellation of severe electrolyte abnormalities resulting from rapid cell death (see Table). Lab abnormalities include hyperkalemia (from loss of cell membrane integrity), hyperuricemia (from DNA breakdown), and hyperphosphatemia (from protein breakdown). Hyperphosphatemia leads to hypocalcemia, which produces muscle cramps and possible tetany. Renal failure is a primary concern in patients with TLS.

Indications for emergent hemodialysis in TLS include any of the following:

- Potassium > 6 mEq/L
- Uric acid > 10 mg/dL
- Creatinine > 10 mg/dL
- Phosphorous > 10 mg/dL
- Volume overload
- Symptomatic hypocalcemia

Both hyperkalemia and hypocalcemia together produce dangerous dysrhythmias. Initial interventions should include intravenous fluids, calcium, albuterol, insulin, sodium bicarbonate, and urine alkalization with acetazolamide to facilitate uric acid excretion. However, these are all temporary solutions and most patients will require hemodialysis.

Allopurinol reduces the breakdown of nucleic acids into uric acid but does not reduce the level of uric acid already present in the serum. It is used for prophylaxis against TLS but will not reverse this abnormal metabolic state once it exists. Chemotherapy should be stopped in the setting of acute TLS. It would worsen the patient's electrolyte abnormalities and renal failure. Ondansetron will treat her nausea, but not the underlying electrolyte abnormalities. Sodium bicarbonate can be used in conjunction with other agents to treat hyperkalemia, but its efficacy is controversial and transient in nature. Furthermore, patients with TLS typically require more aggressive therapy, especially in the setting of cardiac dysrhythmias and renal failure.

Laboratory Findings in Tumor Lysis Syndrome
Hyperkalemia
Hyperphosphatemia
Hyperuricemia
Hypocalcemia
Lactic acidosis

References:

1. Janz T, Jamilton G. Anemia, Polycythemia, and White Blood Cell Disorders. In: Marx JA, Hockberger RS, Walls RM, et al (eds): Rosen's Emergency Medicine: Concepts and Clinical Practice, ed 7. St Louis, Mosby, Inc.

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14. Correct Answer: B. Paroxysmal nocturnal hemoglobinuria is a stem cell defect causing abnormal erythrocyte, neutrophil, and platelet sensitivity to complement. It most often presents with chronic hemolysis, leukopenia, and thrombocytopenia.

Glucose-6-phosphate dehydrogenase (G6PD) deficiency, sickle cell disease, and thalassemia only affect red blood cells. Of note, infection by parvovirus B19 can cause a transient red cell aplasia, but does not affect other cell lines. Parvovirus replicates only in erythroid progenitor cells. In the normal host, parvovirus infection may be identified by its characteristic reticular rash and slapped cheek appearance (erythema infectiosum or fifth disease). Often times, the red cell aplasia is so short lived that concomitant anemia is not discovered. However, in patients with chronic hemolytic anemias (sickle cell anemia, glucose-6-phosphate dehydrogenase deficiency, autoimmune hemolytic anemia) who experience rapid red cell turnover, even brief periods of red cell aplasia may result in severe anemia, often requiring transfusion.

References:

1. Janz TG, Hamilton GC. Anemia, Polycythemia, and White Blood Cell Disorders. In: Marx J, Rosen P. Rosen's Emergency Medicine: Concepts And Clinical Practice [e-book]. Philadelphia, PA: Saunders; 2013.

2. Place R, Lagoc AT, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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15. Correct Answer: A. Hemarthrosis is the most common complication in hemophiliacs and the most common presentation to the emergency department. All patients should have immediate factor replacement followed by a repeat infusion. Patients with hemophilia A should receive factor VIII replacement with a goal level of 50% (25 units/kg) followed by a repeat infusion in 12 hours due to the short half life.

Patients with hemophilia B should receive factor IX replacement of 50% (50 units/kg) followed by a repeat infusion in 24 hours. Patients should simultaneously use RICE (rest, immobilization, compression, and elevation) therapy. Arthrocentesis should be avoided in cases of obvious hemarthrosis. Ibuprofen should be avoided due to the potential to worsen bleeding. While warm compresses may be helpful, factor replacement remains the most important aspect of care.

References:

1. Place R, Lagoc AM, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Schwartz KR, Rubinstein M. Hemophilia and Von Willebrand Disease in children: Emergency department evaluation and management. Pediatric Emergency Medicine Practice 2015;12(9):1-20.

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16. Correct Answer: D. Fetal distress occurs during active labor and is monitored by way of fetal cardiotocographic monitoring. Indicators of fetal distress including late decelerations, defined as a persistent drop in fetal heart rate during contractions that lasts longer than 30 seconds after a contraction. Late decelerations are typically the result of utero-placental insufficiency and subsequent fetal hypoxia. This finding warrants urgent delivery with the anticipated need for neonatal resuscitation.

Variable decelerations are common, and occur at any time (answer E). They reflect fetal cord compression. Early decelerations, or those that precede contractions are followed by a quick recovery and are indicative of fetal head compression (answer C). In any instance, fetal bradycardia persisting for more than 5 minutes is an indication for immediate cesarean section.

References:

1. VanRooyen M, Scott J. Emergency Delivery. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Tripp M. Complications of Labor. In: Harrigan, Ufberg, Tripp, eds. Emergency Medicine Review: Preparing for the Boards. St Louis Elsevier, 2010.

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17. Correct Answer: C. The risk of acquiring human immunodeficiency virus (HIV) infection is related to the type of injury and the body fluid involved. Blood, semen, and vaginal secretions are associated with the highest transmissibility. Cerebrospinal fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluids are of moderate infectious risk. Vomit, feces, nasal secretions, saliva, sputum, sweat, tears, and urine are not considered to be infectious unless they have visible contamination with blood. Low-risk exposures involve solid needles (like suture needles), superficial injuries, and a low-risk source patient or body fluid. High-risk exposures involve hollow-bore needles (such as those used to draw blood), visible blood, and percutaneous injury from a needle that was in the vasculature of the source patient.

Mucocutaneous exposures (answers A, B, and E) are low risk unless they involve large volumes of blood from a source patient with a high viral load. A suture needle (answer D) is lower risk than a hollow bore needle (answer C).

References:

1. Takhar SS, O'Laughlin KN. HIV Infection and AIDS. Rosen's emergency medicine. 8th ed. John Marx. Philadelphia, PA: Elsevier Saunders; 2014: 1751-67.

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18. Correct Answer: D. In the evaluation of acute cholecystitis, the hepatobiliary iminodiacetic acid cholescintigraphy (HIDA) scan (answer D) is considered the most sensitive and specific test. The HIDA scan uses a radioactive isotope (technetium 99) which is excreted into the biliary tract and allows for radiographic visualization of a normal, non-obstructed, cystic duct and gallbladder. The sensitivity and specificity of cholescintigraphy are estimated at 96% and 90%, respectively. While HIDA scanning is considered the most sensitive and specific in evaluating for cholecystitis, obtaining a HIDA scan from the emergency department is often unnecessary and generally considered impractical because of the time needed to obtain the scan.

Abdominal ultrasound (answer A) is typically considered the initial test of choice in the emergency department. Ultrasound is 82% sensitive and 81% specific for the diagnosis of acute cholecystitis. In contrast to cholescintigraphy and ultrasound, computed tomography (CT) scanning (answer B) has not been as extensively studied specifically for the evaluation of acute cholecystitis. One study, however, estimated the sensitivity of CT at 94% and specificity at 59% for acute cholecystitis.

Abdominal radiography (answer E) is rarely helpful in the evaluation of acute cholecystitis. Endoscopic retrograde cholangiopancreatography (ERCP) (answer C) may be considered for obstructing stones within the biliary tract, but would not be used specifically for the evaluation of acute cholecystitis.

References:

1. Oyama LC. Disorders of the Liver and Biliary Tract, Chapter 90. In: Marx JA, ed. Rosen's Emergency Medicine: Concepts and Clinical practice. Philadelphia: Elsevier Saunders, 2014.

2. Atilla R, Oktay C. Pancreatitis and Cholecystitis, Chapter 82. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Kiewiet JJ, Leeuwenburgh MM, Bipat S, Bossuyt PM, Stoker J, Boermeester MA. A systematic review and meta-analysis of diagnostic performance of imaging in acute cholecystitis. Radiology. 2012;264(3):708-20.

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19. Correct Answer: D. Slow and progressive unilateral sensorineural hearing loss with unilateral tinnitus and vertigo is concerning for cranial nerve VIII pathology, specifically compression secondary to a mass. Although rare, cerebellopontine angle tumors should be on the differential for this constellation of symptoms, specifically a vestibular schwannoma. Although Meniere's disease can also cause unilateral tinnitus and vertigo, tinnitus in Meniere's is usually intermittent while tinnitus from the external compression of cranial nerve VIII is typically more constant. Audiometry and the initial head CT may be normal, so if there is clinical concern the definitive test is a brain MRI.

Symptomatic treatment with benzodiazepines may be utilized however this is unlikely to be effective if the patient had a cerebellopontine angle tumor (answer A). Although ENT clinic follow-up may be the correct disposition, the diagnosis should be obtained to facilitate appropriate further management (answer B). The definitive management for a schwannoma requires surgical intervention either by ENT or Neurosurgery.

References:

1. Stettler B. Brain and Cranial Nerve Disorders. In: Marx. John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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20. Correct Answer: D. Ciprofloxacin or doxycycline are the antibiotics of choice for anthrax prophylaxis in adults AND children. Although these antibiotics are often avoided in children for common infections due to side effects, they are considered first-line (irrespective of side effects) in cases of anthrax prophylaxis and treatment.

Azithromycin, cephalexin, and linezolid are not recommended for anthrax prophylaxis. Atovaquone-proguanil is indicated for malaria prophylaxis, and has no role in the treatment of anthrax.

References:

1. Schultz CH, Koenig KL. Weapons of Mass Destruction, Chapter 194. In: Marx JA, ed. Rosen's Emergency Medicine: Concepts and Clinical practice. Philadelphia: Elsevier Saunders, 2014.

2. Bradley JS, Peacock G, Krug SE, et al. Pediatric anthrax clinical management. Pediatrics. 2014;133(5):e1411-36.

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21. Correct Answer: C. The patient is presenting with secondary adrenal insufficiency leading to adrenal crisis. The most common cause of adrenal insufficiency is exogenous administration of glucocorticoids. The patient's chronic steroid use for rheumatoid arthritis puts her at risk of adrenal crisis if those steroids are not taken. For any patient with refractory hypotension on chronic steroids, adrenal crisis must be considered and intravenous corticosteroid treatment is the treatment of choice: dexamethasone 4 mg or hydrocortisone 100 mg (answer C).

Another 2 liters of normal saline will not likely improve this patient's blood pressure as this patient is in adrenergic crisis and needs prompt steroid administration. Although a push-dose vasopressor (i.e. phenylephrine) may transiently improve blood pressure, this will not fix the underlying pathology. Oral steroids (i.e. prednisone) are not recommended in patients in adrenal crisis.

References:

1. Sharma AN, Levy DL. Thyroid and Adrenal Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Kefer MP. Adrenal Insufficiency and Adrenal Crisis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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22. Correct Answer: A. The most likely diagnosis is drug-induced dystonia. Acute dystonic reaction is a hyperkinetic movement disorder characterized by intermittent uncoordinated involuntary contractions or spasms of muscles of the face, tongue, neck, trunk, or extremities. It is most commonly seen after exposure to dopamine receptor blockers, including drugs such as chlorpromazine (Thorazine), haloperidol (Haldol), metoclopramide (Reglan), and prochlorperazine (Compazine). When a careful history is not obtained, acute dystonias can be misdiagnosed as seizures, meningitis, or tetanus. In this case, prochlorperazine was likely used for headache treatment. Since prochlorperazine can cause dystonia, diphenhydramine should be administered as treatment.

The treatment of choice in this situation is diphenhydramine (25-50 mg) or benztropine (1 to 2 mg) either IM or IV. Benzodiazepines may serve as adjunctive therapy but is not used as primary therapy (answer D). Diphenhydramine or benztropine PO should be prescribed and continued for approximately 2 days due to the prolonged effects of some dystonia-inducing agents.

References:

1. Larkin G, Beautrais A. Behavioral Disorders: Emergency Assessment. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Martel M, Biros M. Psychotropic Medications and Rapid Tranquilization. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Levine M, Lovecchio F. Antipsychotics. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011. Richard IH. Acute, drug-induced, life threatening neurological syndromes. The Neurologist. 4:196, 1998.

4. Tarsy D, Simon DK. Dystonia. N Engl J Med. 2006;355(8):818-29.

5. Taggart E, Doran S, Kokotillo A, et al. Ketorolac in the treatment of acute migraine: a systematic review. Headache. 2013; 53:277.

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23. Correct Answer: C. This patient has a life-threatening gastrointestinal bleed in the setting of warfarin anticoagulation, and thus needs anticoagulation reversal. Warfarin is a vitamin K antagonist, and inhibits the synthesis of factors II, VII, IX, X, protein C, and protein S. These are the vitamin K-dependent factors in the coagulation cascade. Fresh frozen plasma (FFP) contains all the coagulation cascade factors and should be administered to patients with significant bleeding and an elevated INR. In patients with serious bleeding and an elevated INR, vitamin K should be administered intravenously for a shorter time to effect.

1. Elevated INR and life-threatening or serious bleeding present:
Administer prothrombin complex concentrates (PCC) 50 IU/kg IV infusion or use FFP 10-15 mL/kg IV infusion; may require additional doses.
2. No significant bleeding and INR > 10.0:
Hold the next warfarin doses. Administer oral vitamin K 2.0-2.5 mg PO. Administer more vitamin K as necessary. Resume appropriately adjusted warfarin dose when INR is therapeutic.
3. No significant bleeding and INR between 4.5 and 10.0:
Hold warfarin doses; if high risk of bleeding consider giving vitamin K 1-2 mg PO. Resume appropriately adjusted dose when INR is therapeutic.
4. No significant bleeding and INR between 3.0 and 4.5:
Lower dose or omit one dose in high-risk bleeding patients. Increase monitoring frequency. Resume appropriately adjusted dose when INR is therapeutic.

There is a high risk of bleeding in those older than 75 years who are taking concurrent antiplatelet drug use or have polypharmacy, liver or renal disease, alcoholism, recent surgery, or trauma.

Vitamin K should not be given IM (answer C) as absorption would be highly variable. Vitamin K should not be given orally (answer E) in patients with life-threatening or serious bleeding as its onset of action would be delayed.

References:

1. Slattery DE, Pollack Jr CV. Anticoagulants, antiplatelet agents, and fibrinolytics. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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24. Correct Answer: C. Middle East Respiratory Syndrome (MERS) is a novel coronavirus, which has caused an acute respiratory syndrome epidemic similar to the other widely known deadly corona virus, severe acute respiratory syndrome (SARS). The symptoms of MERS-CoV include fever, cough, and shortness of breath. Some people experience gastrointestinal symptoms such as nausea, vomiting, and diarrhea. The disease can progress to pneumonia with respiratory failure. Renal failure, pericarditis, and disseminated intravascular coagulation (DIC) have also been reported as late sequelae of the disease.

A rash is not a common finding in MERS. If seen, the differential diagnosis should be expanded.

References:

1. Query B, Poissy J, el Mansouf L, et al. MERS-CoV study group. Clinical features and viral diagnosis of two cases of infection with Middle East Respiratory Syndrome coronavirus: report of nosocomial transmission. Lancet. 2013; 381(9885):2265.

2. Haile-Mariam T, May L. Viral Illnesses. In: In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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25. Correct Answer: C. The above ECG demonstrates J-waves, also known as Osborn waves, which are characteristic of hypothermia. Hypothermia can produce a number of ECG abnormalities including prolonged PR, QRS, and QT intervals, as well as atrial and ventricular dysrhythmias. Frequently, the amplitude of the J-wave correlates with the degree of hypothermia. It is important to remember that J-wave is NOT pathognomonic of hypothermia and can be seen in other states (i.e. hypercalcemia).

The ECG changes of hyperkalemia are characterized by hyperacute T waves and widening of the QRS interval. Hypokalemia presents with U waves, a prolonged PR interval, and T wave flattening or inversion. Tricyclic antidepressant (TCA) overdoses are characterized by widened QRS intervals and a right axis deviation of the terminal QRS (terminal R wave). A third degree AV block is defined as separate atrial and ventricular beats due to the complete absence of atrioventricular conduction.

References:

1. Waters TA, Al-Salamah MA. Heat Emergencies. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Platt M, Vicario S. Heat Illness. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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26. Correct Answer: E. *Clostridium difficile* (*C. difficile*) is a spore-forming, gram positive bacterium which frequently causes colitis. People receiving frequent or prolonged antibiotic therapy are at highest risk. It is a significant cause of morbidity and mortality among elderly hospitalized patients, with more than 90% of deaths occurring in those 65 and older. Infection control is one of the most important tools for preventing *C. difficile* associated mortality. These measures include early detection and isolation, contact precautions, hand hygiene, environmental cleaning, and antibiotic stewardship.

Alcohol-based hand sanitizers do not eradicate *C. difficile* spores. Therefore, it is important to vigorously wash one's hands with soap and water when *C. difficile* is suspected.

References:

1. Boyce JM, Pittet D; Healthcare Infection Control Practices Advisory Committee; HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. Guideline for Hand Hygiene in Health-Care Settings. MMWR Recomm Rep. 2002;51(RR-16):1.

2. Padlipsky P. Infectious Diarrheal Disease and Dehydration. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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27. Correct Answer: B. The Monroe-Kellie hypothesis states that the volume of intracranial space is constant and made up of 3 compartments: brain, blood, and cerebrospinal fluid. An increase in one must be compensated by a decrease in the other two.

The head of the bed should be elevated to 30 degrees of reverse Trendelenburg to help with venous outflow (answer A). If the patient needs intubation, ensure measures to avoid coughing or bucking, which increases intracranial pressure (ICP). While atropine is a good pre-treatment for pediatric patients with high vagal tone or significant oral secretions, it is not indicated in the adult patient for elevated ICP (answer B). Lidocaine is given with fentanyl to protect against ICP elevations by inhibiting the sympathetic response to intubation.

Osmotic therapy with mannitol (answer C) can reduce brain volume by drawing free water out of tissues and into the circulation. It acts within 30 minutes and last for 6-8 hours. Hypertonic saline can also be used in a similar manner with tonicities in 7.2-23.4% range having been reported.

Keeping patients appropriately sedated (answer D) can reduce the sympathetic response responsible for increased blood pressure and tachycardia, thus reducing metabolic demand and ultimately decreasing ICP. Propofol is a good choice as it has a short half-life permitting frequent neurologic checks. Cerebral blood flow can be maintained at 60 mL/100 g tissue/min over a wide range (60-150 mmHg) of cerebral perfusion pressures (CPP). The CPP can be calculated using the formula CPP = MAP – ICP. The interventions above help to reduce the ICP and thus increase CPP to maintain adequate cerebral blood flow. Should the MAP decrease below 80 mmHg, the CPP may drop below 60 mmHg leading to worse neurologic outcomes. Permissive hypertension and initiating vasopressors (answer E) when the blood pressure is low can also help keep CPP > 60 mmHg.

References:

1. Schwarz S et al. Effects of body position on intracranial pressure and cerebral perfusion in patients with large hemispheric stroke. Stroke. 2002; 33: 497-501.

2. Lassen NA, Christensen MS. Physiology of cerebral blood flow. Br J Anaesth 1976; 48:719.

3. Munar F, Ferrer AM, de Nadal M, et al. Cerebral hemodynamic effects of 7.2% hypertonic saline in patients with head injury and raised intracranial pressure. J Neurotrauma. 2000; 17:41.

4. Suarez JI, Qureshi AI, Bhardwaj A, et al. Treatment of refractory intracranial hypertension with 23.4% saline. Crit Care Med. 1998; 26:1118.

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28. Correct Answer: D. Gout is a crystal-induced synovitis that typically affects middle aged and elderly adults. The classic site involved is the great toe or knee joint. Certain medications, such as thiazides (answer D), may exacerbate symptoms of gout by increasing uric acid levels. It is important to be aware of these medications and avoid them if possible.

Uric acid crystals (gout) appear needle-shaped with negative birefringence. Calcium pyrophosphate crystals (pseudogout) appear rhomboid-shaped with positive birefringence. Traditionally, it has been recommended that prophylactic agents such as allopurinol (answer A) be neither stopped nor initiated during an acute attack. However, in 2012 the American College of Rheumatology guidelines suggested that allopurinol can be started during an acute attack based on several cases studies and consensus opinion of experts. Serum uric acid levels (answer C) are not useful for diagnosis during an acute attack, as up to 30% of patients will have a normal uric acid level during an acute gout flare. Although indomethacin (answer E) is a first-line medication, this medication should be avoided in patient with renal insufficiency. In patients where NSAIDs, such as indomethacin, and colchicine are contraindicated, corticosteroids and ACTH (answer B) are alternative options.

References:

1. Frohna WJ, Della-Giustina D. Musculoskeletal Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Genes N, Adams B. Arthritis. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Raukar N, Zink B. Bone and Joint Infections. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

4. Hill EM, Sky K, Sit M, Collamer A, Higgs J. Does starting allopurinol prolong acute treated gout? A randomized clinical trial. J Clin rheumatol. 2015. Apr; 21(3): 120-5. PMID 2580790.

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29. Correct Answer: D. This patient's history and current presentation is concerning for an intracranial neoplasm that is now causing increased intracranial pressure (ICP). This is a life-threatening emergency and priority should be aimed at diagnosing the correct pathology and decreasing the intracranial pressure. The initial workup includes a stat head CT to help narrow the differential diagnosis list for this patient. A large neoplasm causing an elevated ICP should be fairly evident on non-contrast head CT. Temporary relief of elevated ICP can be achieved quickly with elevation of the head of the bed and through use of osmotic diuretics. Because an elevated ICP in the setting of a neoplasm can be from cerebral edema, administering a high-potency steroid, such as dexamethasone, has been shown to be beneficial. Administration of a prophylactic anti-epileptic is also important as these patients are prone to having seizures, which acutely elevate the ICP further and decrease oxygen delivery to the brain. Finally, a neurosurgery consult is required as these patients may require more definitive therapy including operative intervention.

If no intracranial mass is present on initial head CT, acute stroke becomes more likely in the differential, and discussion of tPA administration becomes relevant. Thrombolytics, however, should never be administered prior to a head CT (answer C). The presence of an intracranial tumor is an absolute contraindication to tPA administration. Evaluation for more life threatening etiologies is required before either answers A or B.

References:

1. Kwiatkowski T, Friedman B. Headache Disorders. In: Marx. John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Rangel-Castillo L, Gopinath S, Roberston CS. Management of Intracranial Hypertension. Neurol Clin. 2008 May;26(2):521-541.

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30. Correct Answer: D. The guidelines for antibiotic prophylaxis have changed drastically over the years. It is now recommended that only the most high-risk patients receive prophylaxis. These include patients with prosthetic heart valves, a history of previous infective endocarditis, repaired cyanotic congenital heart disease, repaired congenital heart defect with either residual defect or repair with prosthetic material, or cardiac transplant recipients with valve regurgitation due to structural abnormality. Prophylaxis should only be given to these populations for high-risk procedures such as dental procedures that manipulate the gingival tissue, peri-apical region or perforate the oral mucosa. In this question, only the patient with the prosthetic valve with an oral laceration meets both criteria.

References:

1. Kosowsky JM, Takhar SS. Infective Endocarditis and Valvular Heart DiseaseIn: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Rothman RD, Yang S, Marco CA. Infective Endocarditis In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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31. Correct Answer: A. Diffuse alveolar hemorrhage is a severe complication of Goodpasture's Syndrome, an autoimmune disorder characterized by deposition of anti-glomerular basement membrane antibodies. Pulmonary hemorrhage can range from mild to life-threatening. In addition to airway management, emergency treatment of severe pulmonary hemorrhage associated with this condition includes administration of methylprednisolone 10-15 mg/kg parenterally. Without a history of asthma, albuterol is unlikely to improve his condition. Heparin is contraindicated in this patient with active pulmonary hemorrhage. Renal biopsy, not lung biopsy, is the gold standard in making the initial diagnosis, but should be delayed until after the patient stabilizes. Fresh frozen plasma is unlikely to improve this condition as it is due to pulmonary hemorrhage, rather than coagulopathy.

References:

1. Chan AL, Louie SL. Cutting edge issues in Goodpasture's Disease. Clin Rev Allergy Immunol. 2011 Oct 41(2): 151-162.

2. Lara AL, Schwarz MD. Diffuse alveolar hemorrhage. Chest. 2010 May 137(5):1164-1171.

3. Lehrmann JF, Sercombe CT. Systemic Lupus Erythematosus and the Vasculitides. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Elsevier/ Saunders, 2010

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32. Correct Answer: A. This patient is presenting with fever, malaise, jaundice, right upper quadrant pain, and elevated liver enzymes after a recent trip to India (where she was likely exposed to contaminated water), making Hepatitis A the most likely etiology. Hepatitis A is transmitted by the fecal-oral route with contaminated drinking water being a common source of transmission. Liver biopsy and autoimmune hepatitis antibody testing could be considered, but would be much less likely in this patient. Autoimmune hepatitis typically presents with a more indolent course and no fever. The thick and thin blood films are used to diagnose malaria, which is much less likely since she took malaria prophylaxis. Direct and indirect Coombs testing would be helpful in diagnosing autoimmune hemolytic anemia, which may cause an elevated bilirubin, but should not cause fever, vomiting, or abdominal pain.

References:

1. Oyamam LC. Disorders of the Liver and Biliary Tract. Rosen's emergency medicine. 8th ed. John Marx. Philadelphia, PA: Elsevier Saunders; 2014: 1186-1204.

2. Becker BM, Cahill JD. Parasitic Infections. Rosen's emergency medicine. 8th ed. John Marx. Philadelphia, PA: Elsevier Saunders; 2014: 1768-1784.

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33. Correct Answer: A. The patient is suffering from symptomatic bradycardia with signs of shock: decreased mental status and cool extremities. This patient has a high likelihood of requiring transcutaneous pacing. Immediate efforts to improve perfusion and stabilize the patient should take precedence over cardiac consultation or warming (answers C and E). In the setting of complete heart block, IV atropine may serve as a temporizing measure until pacing can be achieved (answer A). IV infusion of epinephrine (1-10 mcg/min) or dopamine (1-10 mcg/kg/min) can also be considered if atropine is ineffective. One mg of IV epinephrine and chest compressions are indicated only in the setting of cardiac arrest (answers B and D).

References:

1. Piktel JS. Cardiac Rhythm Disturbances. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Sinz E, Navarro K. Advanced Cardiovascular Life Support. Dallas, Tex.: American Heart Association; 2011.

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34. Correct Answer: C. This patient is presenting with classic symptoms of Lyme disease. In the acute setting, the treatment options include 100 mg of doxycycline twice daily for 14 days, amoxicillin 500 mg three times daily for 14 days, or cefuroxime axetil 500 mg twice daily for 20 days. However, doxycycline is relatively contraindicated in pregnancy, making amoxicillin a better choice. A single dose of doxycycline or ceftriaxone was previously recommended for prophylaxis, though this would not be indicated in this symptomatic patient. Patients should be treated as soon as the diagnosis is suspected, irrespective of confirmatory testing or pregnancy status.

References:

1. Meredith JT. Zoonotic Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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35. Correct Answer: B. Infective endocarditis (IE) is a microbial infection of the endothelium of a heart valve, typically occurring in those with predisposing abnormalities. In addition to direct damage to the heart valves, it can also lead to several embolic and immunologic phenomena that can involve nearly every organ system. The estimated risk for endocarditis in intravenous drug users is 2-5% per year, with a predilection for the tricuspid valve. IE is diagnosed using the Duke Criteria, which has a sensitivity of approximately 90%. These are subcategorized into two major criteria and several minor criteria (see Table). Two major criteria, one major and three minor criteria, or five minor criteria can all yield a diagnosis of IE.

Answers A (Roth spots), C (Janeway lesions), D (splinter hemorrhages), and E (Osler nodes) are all minor criteria for diagnosing IE. Although night sweats may be seen in patients with IE, it is not included in the minor criteria and, therefore, is least helpful in establishing a diagnosis.

Duke Criteria for Infective Endocarditis

Major Criteria
Positive blood culture with a microbe implicated in infective endocarditis
Evidence of echocardiographic involvement (oscillating intra-cardiac mass, abscess, or new partial dehiscence of a prosthetic valve)

Minor Criteria
Predisposing heart condition or intravenous drug use
Temperature > 38.0° C
Vascular phenomena (major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, and Janeway lesions)
Immunologic phenomena (glomerulonephritis, Osler's nodes, Roth spots, and rheumatoid factor)
Microbiologic evidence (positive blood culture not meeting the major criteria above)
Echocardiographic evidence (echocardiographic findings not meeting the major criteria above)

References:

1. Baumann BM, Shepherd SM. Injection Drug Users. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Kosowsky JM. Infective Endocarditis and Valvular Heart Disease. In: Marx JA, Hockberger RS, Walls RM. Eds. Rosen's Emergency Medicine- Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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36. Correct Answer: B. The patient's injury is due to a fragment of machinery that was accelerated due to the blast. This is an example of a secondary blast injury, which is defined as an injury due to forces associated with the blast itself. Typically, this is caused by fragmentation of an explosive device container or from elements from the surrounding environment that are propelled toward the patient.

A **primary blast injury** is caused by the blast wave as it passes through the body. This can result in barotrauma to the inner ear, lungs, or gastrointestinal system.

A **tertiary blast injury** occurs when an individual is propelled through the air or displaced secondary to a blast wave.

Quaternary blast injuries consist of additional injuries beyond primary, secondary, or tertiary blast injuries. These can include building collapse, fire, or release of toxic chemicals.

A **quinary blast injury** consists of the residual hyperinflammatory state due to environmental contaminants from the blast.

References:

1. Catlett CL, Baker Rogers JE. Radiation Injuries. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Colwell CB. Radiation Injuries. In: Marx J, ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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37. Correct Answer: D. The patient is most likely suffering from hypoglycemia due to quinidine toxicity. Because of its availability and effectiveness, quinidine sulfate is the initial drug of choice for chloroquine-resistant *Plasmodium falciparum* in the United States. However, this drug has a large side effect profile. Minor side effects are referred to as "cinchonism" (nausea, headache, tinnitus, dizziness and visual disturbances), while severe side effects include hypotension, cardiac dysrhythmias, hemolysis, neuromuscular paralysis, and hypoglycemia. Quinidine is a potent insulin inducer, which can lead to severe hypoglycemia, especially when given parenterally.

Checking a point-of-care glucose and giving dextrose will likely reverse the effects. Aspirin and nitroglycerin are indicated for acute coronary syndrome. Despite the potential for dysrhythmias, quinidine does not have a significant effect on cardiac vasculature and without chest pain, acute coronary syndrome would be much less likely. While hypotension is a known side effect from quinidine, the patient is already receiving fluids and a change in fluid type is unlikely to affect this. Hypocalcemia is not a known complication of either medication and calcium is unlikely to improve this patient's symptoms. Primaquine is used to prevent relapses of specific malarial-causing strains, but has no role in the acute management of this patient.

References:

1. Szela JJ, et al. Malaria. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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38. Correct Answer: C. Cocaine use increases dopamine, norepinephrine, epinephrine, and serotonin release. The norepinephrine causes vasoconstriction because of its alpha adrenergic properties. Epinephrine increases myocardial contraction and heart rate via beta stimulation.

Beta-blockers should be avoided as this can lead to unopposed alpha activity and worsening hypertension. The other medication choices are all acceptable for treatment in this situation.

References:

1. Levy P. Hypertension. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Rao RB, Hoffman RS. Cocaine and Other Sympathomimetics. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Cline DM, Machado AJ. Systemic and Pulmonary Hypertension. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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39. Correct Answer: C. The patient has ECG findings suggestive of posterior-wall ST elevation myocardial infarction (STEMI) as an etiology for his arrest. Nitroglycerin is contraindicated in posterior wall MI as there is associated right ventricular dysfunction, causing impaired left-heart filling (answer C). Nitroglycerin will decrease right ventricular preload and will cause hypotension and potentially shock. The patient should undergo percutaneous coronary intervention and receive aspirin for his STEMI (answers A and D). The patient is post-arrest, and depending on the literature reviewed, hypothermia or normothermia is indicated (answer E).

References:

1. Ward K, Kurz M, Neuromar R. Adult Resuscitation In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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40. Correct Answer: B. This patient is suffering from a retrobulbar hematoma. This is a collection of blood posterior to the orbit that places traction on the optic nerve and pressure on the globe itself. It causes proptosis, pain, significant increase in intraocular pressure, and decreased visual acuity. This is a vision-threatening condition and requires immediate intervention with a lateral canthotomy to decompress the hematoma in an attempt to preserve the patient's vision.

Lateral canthotomy should not be delayed for imaging. Ocular ultrasound will not be of significant use in this situation as retrobulbar hematoma is a clinical diagnosis. Anterior chamber paracentesis is typically used to treat central retinal artery occlusion. Therapeutic lumbar puncture is used for treatment of idiopathic intracranial hypertension, which will present with headache and bilateral blurred vision.

References:

1. Bailitz J. Trauma to the Face. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Mayersak RJ. Facial Trauma. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

4. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

5. Wright JL, Wightman JM. Red and Painful Eye. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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41. Correct Answer: A. This patient is presenting with babesiosis. Babesiosis is a malaria-like illness, caused by either *Babesia microti* or *Babesia equi*. The major zoonotic reservoirs are domesticated mammals, rodents, and deer. Ixodes ticks function as the principal vector. Patients typically present with generalized malaise, anorexia, fever, and chills that can progress to intermittent sweats, myalgias, headaches, and hemolytic anemia. Splenectomy and immunosuppression are risk factors. Laboratory tests demonstrate hemolysis, liver dysfunction, anemia, thrombocytopenia, and renal failure. A peripheral smear demonstrating "Maltese crosses" will confirm the diagnosis. Of note, approximately 20% of patients with babesiosis will also have a concurrent infection with Lyme disease.

Lyme disease may present similarly to a mild form of babesiosis infection but the severe symptoms and lab abnormalities seen in this case are not typical of Lyme disease.

Plasmodium vivax and *Plasmodium falciparum* cause milder and more severe forms of malaria, respectively. Although there is some overlap in symptomatology, malaria would present with ring-like structures, rather than "Maltese crosses", on peripheral smears.

Tularemia is contracted through tick bites or through open wounds while dressing an infected zoonotic host. The clinical presentation depends on the route of inoculation, with three main types of syndromes: ulceroglandular, typhoidal, and pneumonic. The ulceroglandular form is the most common and is characterized by an ulcer at the site of the tick bite and painful regional adenopathy. The typhoidal form consists of fever, chills, cephalgia, and abdominal pain. The pneumonic form presents with predominantly pulmonary symptomatology.

References:

1. Bolgiano EB, Sexton J. Tick-Borne Illnesses. In: Marx J, Rosen P. Rosen's Emergency Medicine: Concepts And Clinical Practice [e-book]. Philadelphia, PA: Saunders; 2013.

2. Meredith JT. Zoonotic infections. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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42. Correct Answer: C. Ebstein's anomaly is a rare disorder responsible for only a fraction of congenital heart disease. For congenital heart disease of the tricuspid valve, Ebstein's anomaly accounts for up to 40% of cases. It has a widely variable presentation – including in-utero death, the cyanotic neonate, or as an incidental finding in an asymptomatic adolescent or adult. The diagnosis requires echocardiographic confirmation demonstrating apical displacement of the valve, a redundant anterior valve leaflet, and the atrialization (thinning, dilation, and dysfunction) of the right ventricle.

In this case there are several findings classic for the disorder. The appreciation of a holosystolic murmur best heard in the tricuspid area can clue the provider to the location of disease, however, the apical displacement of the tricuspid valve can be so severe that it is in line with the mitral valve and auscultative findings can be misheard as mitral regurgitation. Regurgitation of flow in the right atrium creates a large dilated right atrium responsible for the "balloon shaped heart" on chest x-ray and the development of an accessory bypass conduction tract. This accessory tract predisposes patients to a variety of pre-excitation dysrhythmias such as reentrant tachycardia, atrial flutter, and atrial fibrillation.

Ebstein's anomaly has a strong association with in-utero lithium exposure.

Valproate is a mood stabilizer also known for severe teratogenicity, but most often associated with neural tube defects.

Haloperidol is category C for pregnant patients. It is not a known teratogen, but may be associated with limb defects.

References:

1. Walsh MJ. Neonatal Congenital Heart Disease. In: Lefebvre C, et al, eds. Atlas of Cardiovascular Emergencies. New York, NY: McGraw-Hill; 2015.

2. Ammash NM, et al. Mimics Of Ebstein'S Anomaly. American Heart Journal 134.3 (1997): 508-513.

3. Celermajer DS, et al. Ebstein's Anomaly: Presentation And Outcome From Fetus To Adul'. JACC. 1994; 23(1):170-176.

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43. Correct Answer: C. This patient is suffering from anaphylaxis, a Type 1, IgE-mediated hypersensitivity response resulting from massive release of anaphylactic and inflammatory mediators. There was a clear source from the bee sting, to which the patient had a multiple-organ system response (skin and pulmonary). The first line treatment is epinephrine administered intramuscularly, preferably to the anterolateral thigh.

Pediatric dosing can be challenging. In this case, the correct dose of epinephrine is 0.01 mg/kg (1:1000 concentration) of epinephrine. This dose can be repeated every 3-5 minutes as needed. The remaining doses are incorrect because they involve either incorrect doses (answers A, B, and E) or concentration (answer D). Answer choice E is the intravenous dose for anaphylactic shock. Of note, the weight limit is 30 kg for the 0.15 mg (1:1000) Peds Epi-Pen auto-injector. For children weighing over 30 kg, they can use the 0.3 mg (1:1000) IM auto-injector.

References:

1. Rowe BH, Gaeta TJ. Anaphylaxis, Acute Allergic Reactions, and Angioedema. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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44. Correct Answer: E. Rheumatoid arthritis is generally a progressive disease that is symmetrical and classically involves MCP and PIP joints with ulnar deviation of the MCP joint (answer E) and swan neck finger deformities. Rheumatoid arthritis classically spares the DIP joints.

Osteoarthritis may involve the DIP joints as well as the PIP and first carpometacarpal joints (answer D). Discomfort with both passive and active motion of joint (answer A) is a classic finding found in all true types of arthritis. Nail pitting (answer B) is typically present in psoriatic arthritis. Osteoarthritis is distinguished from rheumatoid arthritis by its lack of multisystem involvement and/or constitutional symptoms (answer E).

References:

1. Frohna WJ, Della-Giustina D. Musculoskeletal Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Genes N, Adams B. Arthritis. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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45. Correct Answer: E. Rhabdomyolysis may occur due to many potential causes including drugs, toxins, excessive muscle activity, electrical current injury, electrolyte abnormalities, infection, or hyperthermia. Hyponatremia is NOT one of the common complications of rhabdomyolysis (answer E).

Acute renal failure is a late complication as myoglobin can become concentrated along the renal tubules along with uric acid to form obstructive casts (answer A). A massive influx of potassium, calcium, and sodium from muscle breakdown can lead to cardiac arrhythmias (answer B). Furthermore, muscle damage and associated edema can lead to high intra-compartmental pressures (answer C). Thromboplastin and other prothrombotic substances may be released from injured muscle tissue, leading to activation of the coagulation cascade and DIC (answer D).

References:

1. Parekh R. Rhabdomyolysis. In: Marx JA et al, eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Counselman F, Lo BM. Rhabdomyolysis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Zhang, M. Rhabdomyolysis and its pathogenesis. World J Emerg Med. 2012; 3(1): 11–15.

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46. Correct Answer: A. Signs of imminent placenta delivery include all of the following: lengthening of the umbilical cord, a gush of vaginal blood, and a change in the shape of the uterine fundus.

Answer B is incorrect, because any female presenting in the third trimester of pregnancy with bleeding should first undergo an ultrasound to rule out placenta previa prior to receiving a speculum exam. Failure to do so could result in life-threatening hemorrhage.

Answer C is incorrect, because postpartum hemorrhage is considered to be bleeding >500 mL for a vaginal delivery and >1000 mL for a cesarean delivery.

Answer D is incorrect, because episiotomies are not recommended during routine pregnancies, as they are actually associated with causing high-degree tears.

Answer E is incorrect, because "fetal presentation" is defined as the body part palpable at the cervix.

References:

1. Tintinalli J, Kelen G, Stapczynski J. Emergency Medicine. New York: McGraw-Hill, Medical Pub. Division; 2004.

2. Adams J. Emergency Medicine. Philadelphia, Pa: Elsevier/Saunders; 2013.

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47. Correct Answer: B. This patient has hyper-leukocytosis resulting in leukostasis, most likely secondary to undiagnosed acute myeloid leukemia. Leukostasis is caused by excessive leukocytes (in this case, blast cells) accumulating intravascularly, resulting in vascular stasis or occlusion. The most common sites affected by this are the brain, eyes, and lungs, although the kidneys, penis, heart, and extremities may also be affected. In patients who are symptomatic or have white blood cell counts greater than 100,000, leukapheresis is indicated. Hematology consultation is also warranted for consideration of induction therapy.

Fluid resuscitation will not significantly reduce the degree of leukostasis and emergent leukapheresis remains the treatment of choice. The significantly elevated white blood cell count with a predominance of blasts is more consistent with malignancy than infection. Additionally, the anemia and thrombocytopenia also point towards bone marrow pathology. This patient's clinical picture is not consistent with pulmonary edema and diuresis will increase the blood viscosity, worsening his condition. While transfusion is not strictly contraindicated, it should be avoided in the setting of hyper-leukocytosis as it may cause an increase in blood viscosity.

References:

1. Blackburn P. Emergency Complications of Malignancy. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

2. Zuckerman T, Ganzel C, Tallman M, Rowe J. How I treat hematologic emergencies in adults with acute leukemia. Blood. 2012;120(10):1993-2002.

3. Lewis M, Hendrickson A, Moynihan T. Oncologic emergencies: Pathophysiology, presentation, diagnosis, and treatment. CA: A Cancer Journal for Clinicians. 2011.

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48. Correct Answer: D. This patient is suffering from cavernous sinus thrombosis. Cavernous sinus thrombosis is often a direct extension of a polymicrobial sinusitis that is either untreated or partially treated. The extension of the infection will then result in acute thrombosis of the cavernous sinus. The cavernous sinus contains cranial nerves III, IV, V, and VI. Thrombosis of the cavernous sinus typically results in proptosis of the eye, headaches, fever, and cranial nerve palsies involving any of the cranial nerves that course near the cavernous sinus. A sixth nerve palsy is the most common. An MRI/MRV of the head can aid in diagnosing this condition as it will reveal opacification of the cavernous sinus, suggesting venous thrombosis. Treatment involves broad-spectrum IV antibiotics and admission to the hospital.

CT of the orbits is helpful in differentiating orbital versus periorbital cellulitis. Neither disease process, however, would present with cranial nerve deficits. A dilated eye exam will not aid in diagnosing cavernous sinus thrombosis as it is not a disease of the optic fundus. Oral acetazolamide is used to lower intraocular pressure in patients with acute angle closure glaucoma. High-dose corticosteroids are used to treat patients with temporal arteritis.

References:

1. Denny CJ, Schull MJ. Headache and Facial Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Kwiatkowski T, Friedman BW. Headache Disorders. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Melio FR, Berge LR. Upper Respiratory Tract Infections. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

4. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

5. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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49. Correct Answer: C. Young, healthy adults, and adolescents are at highest risk for exertional heat stroke. When considering heat illness it is helpful to consider the difference between classic heat injury due to long-term exposure to high environmental heat stress and exertional heat illness that occurs as a result of physical activity. Classic heat injury often occurs over a period of hours to days as high environmental temperature gradually overwhelm the body's heat removal processes. High-risk groups for these illnesses are the very young, elderly, and those with either immature heat loss mechanisms or on medications that impair those mechanisms (such as beta-blockers which can blunt the tachycardia associated with higher core temperatures). In contrast, exertional heat illness is typically seen in young healthy athletes who have increased their basal metabolism in a setting of high heat stress. This combination rapidly overwhelms the body's ability to dissipate heat and can lead to development of heat stroke.

References:

1. Waters TA, Al-Salamah MA. Heat Emergencies. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Platt M, Vicario S. Heat Illness. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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50. Correct Answer: D. The ABCD2 score was developed and validated to risk stratify the likelihood of subsequent stroke in patients diagnosed with a TIA. More specifically, the original authors of the study using the ABCD2 score examined the 2-, 7-, and 30-day stroke risk for patients after a TIA. The criteria used as part of the ABCD2 score include:

1. Age (answer A)

2. Blood pressure (answer B)

3. Clinical features of the TIA (i.e. unilateral weakness, speech disturbance without weakness, etc.)

4. Duration of symptoms (answer E)

5. Diabetes history (answer C)

Each of these criteria are weighted with different points. A history of a prior stroke (answer D) is not part of the ABCD2 score. The summation of these points provides a score to stratify patients at low, medium, or high risk for a subsequent stroke.

References:

1. Johnston SC, Rothwell PM, Nguyen-Huynh MN, Giles MF, Elkins JS, Bernstein AL, Sidney S. Validation and refinement of scores to predict very early stroke risk after transient ischaemic attack. Lancet. 2007;369(9558):283-92.

2. Josephson SA, Sidney S, Pham TN, Bernstein AL, Johnston SC. Higher ABCD2 score predicts patients most likely to have true transient ischemic attack. Stroke. 2008;11:3096-8.

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Practice Test #4

1. Correct Answer: C. This patient presents with the triad of palpable purpura, abdominal pain and arthralgias, consistent with Henoch-Schönlein Purpura (HSP). HSP is an immune complex vasculitis, most commonly seen in children. This condition often follows an upper respiratory illness. Given this patient's normal renal function and non-toxic appearance, she can be treated as an outpatient with symptomatic measures as long as she can tolerate oral hydration. Antibiotics and blood cultures are not indicated in this disease. Admission is inappropriate in this well-appearing patient with normal renal function and an infectious disease consultation is unlikely to alter management. Arthrocentesis is not indicated in this patient.

References:

1. Audemard-Verger A, Pillebout E, Guillevin L, Thervet E, Terrier B. IgA vasculitis (Henoch Schöenlein Purpura) in adults: Diagnostic and therapeutic aspects. Autoimmun Rev. 2015 Jul 14(7)579-85.

2.Lehrmann JF, Sercombe CT. Systemic Lupus Erythematosus and the Vasculitides. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Elsevier/ Saunders, 2010

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2. Correct Answer: C. This patient is at risk for *Clostridium difficile* colitis. *C. difficile* is an anaerobic spore-forming gram-positive bacillus. *C. difficile* colitis typically occurs after a course of antibiotics due to alteration of the normal enteric flora. The spores are highly transmissible via a fecal-oral route and are commonly spread in hospital settings. Oral metronidazole (Choice C) or oral vancomycin are considered first line therapy for patients with *C. difficile*. Trials show both drugs have similar response rates in non-severe disease. However, metronidazole costs significantly less than vancomycin (Choice E) and there are concerns over increasing vancomycin resistance. For these reasons, oral metronidazole is the best treatment in patients with mild disease. Oral vancomycin can be considered in patients with moderate to severe disease or if they do not respond to metronidazole. Intravenous vancomycin (Choice A) is not used in the treatment of *C. difficile* because it does not reach effective intraluminal concentrations. Oral fidaxomicin (Choice B) is a promising new treatment, with a narrower antimicrobial spectrum than metronidazole or vancomycin, leading to less disruption of normal flora. However, due to its high cost, it is not typically considered first line therapy. Oral rifaximin (Choice D) is also currently being studied as an effective treatment for *C. difficile*, but is not currently considered first line treatment.

References:

1. Craig SA. Gastroenteritis. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Mullane K. Fidaxomicin in Clostridium difficile infection: latest evidence and clinical guidance. Ther Adv Chronic Dis. 2014;5(2):69-84.

3. Zar FA, Bakkanagari SR, Moorthi KM, Davis MB. A comparison of vancomycin and metronidazole for the treatment of Clostridium difficile-associated diarrhea, stratified by disease severity. Clin Infect Dis. 2007;45(3):302-7.

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3. Correct Answer: E. Significant injury to the upper extremity occurs during electrical trauma and often requires fasciotomy and exploration. Most often this occurs with high voltage injury (> 1000 volts). However, cases have occurred in injuries with as little as 120 volts.

Indications for fasciotomy are signs of acute compartment syndrome, which include any of the following:

- Absolute compartment pressure of 30 mmHg or more
- Delta pressure (diastolic blood pressure − intra-compartment pressure) < 20 mmHg
- Interrupted arterial perfusion for ≥4 hours

Clinical signs of compartment syndrome include the 6 Ps:

- Pain
- Pallor
- Paresthesias
- Paralysis
- Pulselessness
- Poikilothermia (cool temperature)

In the above case, the prolonged capillary refill suggests decreased blood flow and would be an early sign of compartment syndrome.

Although circumferential burns may require escharotomy, this is typically with full thickness burns and require evidence of vascular impairment. A full thickness burn that is not circumferential would be unlikely to require surgical decompression. While significant electrical injury may cause joint dislocation or fracture, these alone are not indications for surgical decompression. Myoglobinuria may suggest rhabdomyolysis, but in isolation, is not an indication for surgical decompression.

When a limb with an electrical or thermal burn does not require fasciotomy, the limb should be splinted with the wrist in about 40 degrees of extension and the metacarpophalangeal joints in 90 degrees of flexion, decreasing space for swelling and edema.

References:

1. Fish RM. Electrical Injuries. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.
2. Price TG, Cooper MA. Electrical and Lightning Injuries. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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4. Correct Answer: E. Options A, C, and D are all part of traditional recommendations for those ascending to higher altitude. Dexamethasone (Answer B) can prevent acute mountain sickness, though it is typically reserved as a treatment. Other potential therapies include maintaining good hydration and taking gingko biloba, though neither have strong evidence supporting their use. Acclimatization may be INHIBITED by ethanol, sleep medications (zolpidem, zaleplon, eszopiolone), caffeine, cocoa, prochlorperazine, and progesterone consumption.

References:

1. Hackett PH, Hargrove J. High-Altitude Medical Problems. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Yaron M, Paterson RD, Davis CB. High-Altitude Medicine. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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5. Correct Answer: A. Middle East Respiratory Syndrome Coronavirus (MERS-CoV) is a novel virus, which causes an acute respiratory syndrome epidemic similar to the other widely known, deadly corona virus, severe acute respiratory syndrome (SARS). The first case of MERS-CoV was confirmed in April 2012. MERS-CoV should be considered in people with acute respiratory infection and history of travel to the Middle East/Arabian Peninsula or with close contact with a symptomatic traveler within 14 days of presentation.

Countries considered in the Arabian Peninsula or nearby include: Bahrain, Iran, Iraq, Israel, the West Bank, Gaza, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emerates (UAE), and Yemen. Since May 2015, the Republic of Korea has also been investigating an outbreak of MERS-CoV. There have been no reported cases in Brazil.

References:

1. World Health Organization. http://www.who.int/
2. Centers for Disease Control and Prevention. http://www.cdc.gov/
3. Haile-Mariam T, May L. Viral Illneses. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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6. Correct Answer: E. Both strangulated and incarcerated hernias are non-reducible and more common with small abdominal wall defects. Strangulated hernias are differentiated from incarcerated hernias by compromised blood flow. Whereas incarcerated hernias should have reduction attempted in the emergency department, strangulated hernias should not be reduced in the emergency department as the necrotic bowel may then release systemically, leading to sepsis.

References:

1. Adams J. Emergency Medicine. Philadelphia, PA: Elsevier/ Saunders, 2013. Print.

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7. Correct Answer: E. Coronary Perfusion Pressure (CPP) is measured as aortic diastolic pressure minus left ventricular end-diastolic pressure (DP – LVEDP). Higher CPP, especially values over 15 mmHg, have been associated with increased rates of return of spontaneous circulation (ROSC). Monitoring CPP can be logistically difficult, requiring both a central venous catheter and an arterial line. Epinephrine will directly stimulate the sino-atrial node, but this is not a primary goal of CPR. Dislodging of a intracoronary thrombus and reversal of metabolic acidosis are goals of post-resuscitation care. While CPR will increase MAP and subsequently cerebral perfusion pressure, it is unclear whether this will influence intracranial pressure and this is not a primary goal of CPR.

References:

1. Reynolds J, Salcido D, Menegazzi J. Coronary Perfusion Pressure and Return of Spontaneous Circulation after Prolonged Cardiac Arrest. Prehospital Emergency Care. 2009;14(1):78-84.

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8. Correct Answer: A. Ammonia presents with upper respiratory irritant symptoms: mucus membrane irritation, coughing, sore throat, and hoarseness soon after exposure. Patients can get delayed pulmonary edema.

Cyanide is cellular poison expected to cause hypotension, alterations in consciousness, and a significant lactic acidosis. In less severe exposures, patients experience headaches, anxiousness, and dyspnea. Excess carbon dioxide may lead to respiratory depression, but does not affect mucus membranes. Phosgene and nitrogen dioxide cause delayed pulmonary edema, but produce minimal irritation to other mucus membranes.

References:

1. Gresham C, LoVecchio F. Industrial Toxins. In Tintinalli JE et al eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw Hill, 2011.

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9. Correct Answer: A. A common bile duct diameter >6 mm (Choice A) is suggestive of a retained stone in the common bile duct and should prompt consideration of ascending cholangitis. Gallbladder wall thickness >3 mm (answer B) is considered abnormal and should suggest acute cholecystitis in the correct clinical picture. Pericholecystic fluid (answer C), although less sensitive, is moderately specific for cholecystitis. Sonographic Murphy's sign (answer E), defined as maximal tenderness over the ultrasound-located gallbladder, has an approximately 92% positive predictive value if positive in the setting of gallstones within the gallbladder (answer D).

References:

1. Atilla R, Oktay C. Pancreatitis and Cholecystitis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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10. Correct Answer: A. This patient likely had a transient ischemic attack (TIA). Antiplatelet therapy is indicated for patient with TIAs. Aspirin (answer A) is the most common antiplatelet agent used for secondary stroke prevention after a TIA. Prior trials including CAST (Chinese Acute Stroke Trial) and IST (International Stroke Trial) found that aspirin not only reduced rates of stroke recurrence, but also significantly reduced patient mortality. Aspirin irreversibly inhibits cyclooxygenase activity thereby decreasing the synthesis of thromboxane A2, decreasing platelet aggregation.

The use of rivaroxaban (answer B), unfractionated heparin (answer D), and warfarin (answer E) are not indicated in the initial treatment of TIA. While thrombolytics (answer C) may be considered for select patients presenting with an acute stroke, it should not be administered to patient with a TIA.

References:

1. CAST (Chinese Acute Stroke Trial) Collaborative Group. CAST: Randomised placebo-controlled trial of early aspirin use in 20,000 patients with acute ischaemic stroke. Lancet. 1997;349 (9066): 1641.

2. International Stroke Trial Collaborative Group: The International Stroke Trial (IST): A randomized trial of aspirin, subcutaneous heparin, both, or neither among 19,435 patients with acute ischaemic stroke. Lancet. 1997; 349: 1569.

3. Go S, Daniel J. Worman DJ. Stroke Syndromes. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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11. Correct Answer: B. Hypoglycemia is a common metabolic cause of reactive seizures. Ictal activity can occur when the plasma glucose level is less than 45 mg/dL. A rapid bedside glucose test is an important part of the evaluation of a patient exhibiting seizure activity. Hypoglycemic seizures respond to glucose therapy; anticonvulsants and benzodiazepines are often unnecessary.

The most common cause of status epilepticus is discontinuation of an anticonvulsant agent and not withdrawal from ethanol (answer D). Postpartum eclampsia represents 25% of eclamptic seizures, and can occur up to 8 weeks after delivery (answer A).

Severe or rapid-onset hyponatremia may cause seizure or status epilepticus. Serum sodium levels less than 120 mEq/L are associated with a higher risk for seizures; however, the rate of drop in serum sodium presents a higher risk for seizure than does the absolute value of serum sodium. For a status epilepticus patient with a very low sodium, providers should give 100 to 200 mL of intravenous hypertonic (3%) saline over 1 to 2 hours. The goal of treatment is cessation of seizure, rather than any specific serum value of sodium (answer C). Practitioners must be vigilant to raise the serum sodium no more than 12 mEq in a 24 hour period to avoid osmotic demyelination syndrome.

Status epilepticus is defined as serial seizure activity without inter-ictal recovery, or prolonged, continuous seizure activity. Traditionally, status epilepticus had been defined as 30 minutes of continuous seizure, as that was the presumed time at which seizure activity leads to significant neuronal injury. However, clinicians now hypothesize a direct correlation between time seizing and active neuronal injury. In addition, an ongoing seizure becomes less responsive to pharmacologic intervention over time. As a result, a new operational definition of status epilepticus describes status epilepticus as continuous seizure activity lasting more than 5 minutes (rather than 30 minutes), or more than 2 discrete seizures without intervening recovery of consciousness (answer E).

References:

1. McMullan JT, Duvivier EH, Pollack Jr CV. Seizure Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.
2. McMullan JT, Davitt AM, Pollack Jr CV. Seizures. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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12. Correct Answer: D. This patient has multiple myeloma resulting in hypercalcemia. Her corrected calcium is 15.3 and her CT findings are consistent with multiple myeloma (punched out lesions). Symptoms of hypercalcemia are nonspecific, but include weakness, mood changes, nausea, vomiting, and constipation. Diagnosis is best made by measuring the ionized calcium level. Total calcium can be used, but must be corrected for low albumin. The correction formula is: Corrected Calcium = Total Calcium + 0.8 * (4 - Serum Albumin). In this case, 15.3 = 13.4 + 0.8 (4 - 1.6).

For treatment, hydration with normal saline should be initiated first. Bisphosphonates may be given, but these do not affect calcium levels for at least 48 hours. Calcitonin is a useful adjunct until bisphosphonates take effect. In the setting of heart failure or renal disease, hemodialysis may be necessary after more conservative therapy fails. Hydrochlorothiazide should not be given because it can worsen hypercalcemia.

References:

1. Blackburn P. Emergency Complications of Malignancy. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

2. Zuckerman T, Ganzel C, Tallman M, Rowe J. How I treat hematologic emergencies in adults with acute leukemia. Blood. 2012;120(10):1993-2002.

3. Lewis M, Hendrickson A, Moynihan T. Oncologic emergencies: Pathophysiology, presentation, diagnosis, and treatment. CA: A Cancer Journal for Clinicians. 2011. doi:10.3322/caac.20124.

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13. Correct Answer: C. This patient is presenting with acute rhabdomyolysis. The diagnosis is typically confirmed with an elevated serum CK, which is an enzyme found in skeletal and cardiac muscle that correlates with muscle injury.

Electrolyte abnormalities also occur in rhabdomyolysis. Hyperkalemia, hyperphosphatemia, and hyperuricemia initially occur because of massive muscle tissue breakdown, and may be worsened by renal dysfunction. Hyperphosphatemia can subsequently cause early hypocalemia.

The classic urine profile for rhabdomyolysis is a positive urine screen for blood and zero red blood cells on microscopy. Myoglobin, an oxygen-binding protein found in skeletal and cardiac muscle, is released into the plasma after muscle tissue injury. Myoglobin is excreted in the urine when the plasma concentration is >1.5 mg/dL and causes a reddish brown discoloration of the urine when the concentration is >100 mg/dL. Because myoglobin contains the heme moiety, it will turn qualitative tests (such as dipstick) positive for blood but no red blood cells will be present on microscopic exam.

References:

1. Parekh R. Rhabdomyolysis. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.
2. Counselman F, Lo BM. Rhabdomyolysis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.
3. Zhang M. Rhabdomyolysis and its pathogenesis. World J Emerg Med. 2012; 3(1): 11–15.

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14. Correct Answer: D. The most common cause of acute pericarditis is idiopathic, but widely considered to be likely due to a viral etiology. Recent URI symptoms may support a likely diagnosis of acute pericarditis in the right setting, but does not suggest a high-risk presentation. Without other high risk factors, these presentations are typically self-limiting.

Immunosuppressed patients (answer A) are at significant risk of developing pericarditis due to non-viral/non-idiopathic etiologies. These patients should be further evaluated for signs/symptoms of infection, especially in a neutropenic state.

Warfarin (answer B) is not associated with a specific etiology of pericarditis, but patients who are on anticoagulation during an acute presentation of pericarditis should be further evaluated for a pericardial effusion. If a significant effusion is present, a hemorrhagic effusion should be considered and the patient should be closely monitored for possible indication for diagnostic or therapeutic pericardiocentesis.

Elevated troponin (answer C) may be present in up to 20-30% of pericarditis cases, presumably as a result of epicardial involvement in the inflammatory process (all causes of pericarditis are also potential causes of myocarditis). An elevated troponin supports a diagnosis of acute myopericarditis, which is associated with a higher complication rate. It is important to note that acute pericarditis is a diagnosis of exclusion in the emergency department setting. In the setting of elevated troponin with a high-suspicion of acute pericarditis, it is important to first rule-out an underlying ischemic process and monitor for signs/symptoms of possible fulminant myocarditis.

While most cases of acute pericarditis have some degree of mild leukocytosis, presentations with significantly elevated white blood cell counts (>13000/mm^3) suggests an etiology other than viral/idiopathic and warrant further investigation (answer E).

References:

1. Harris NS. The Cardiomyopathies, Myocarditis and Pericardial Disease. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Jouriles NJ. Pericardial Disease. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Imazio M, Gaita F, LeWinter M. Evaluation and Treatment of Pericarditis: A Systematic Review. JAMA. 2015; 314(14): 1498-1506.

4. LeWinter MM. Clinical Practice. Acute Pericarditis. N Engl J Med. 2014; 371(25): 2410-6.

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15. Correct Answer: D. This patient is presenting with primary adrenal insufficiency, also known as Addison's disease. Symptoms are usually nonspecific including nausea/vomiting, abdominal pain, weakness, and dizziness. One hallmark feature includes skin hyperpigmentation, due to lack of mineralocorticoid secretion. Lab abnormalities include hyponatremia and hyperkalemia due to sodium loss and volume depletion from loss of cortisol and aldosterone secretion.

Although DKA and HHS (answers A and B) may also present with nonspecific symptoms as described by the patient, the glucose of 122 makes these less likely. Clinical features of hypothyroidism (answer C) include fatigue/weakness, lethargy, weight gain, cold intolerance, brittle hair, and facial edema. Skin pigmentation is not typically seen. Secondary adrenal insufficiency (answer E) would not manifest with hyperpigmentation and hyperkalemia, as mineralocorticoid secretion is preserved.

References:

1. Sharma AN, Levy DL. Thyroid and Adrenal Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Kefer MP. Adrenal Insufficiency and Adrenal Crisis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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16. Correct Answer: C. The patient presents with a ruptured abdominal aortic aneurysm (AAA). The patient needs emergent operative repair. Vascular surgery consultation should be obtained immediately (answer C) and should not be delayed for formal CT imaging (answer E). The patient should be counseled against smoking, but that does not take priority in the emergent setting (answer B). Esmolol is likely to harm this patient who is already hemodynamically unstable (answer D). The patient should be resuscitated with blood and fluid products; however, one should avoid overly aggressive fluid resuscitation which can be harmful in this setting (answer A).

References:

1. Prince LA, Johnson GA. Aneurysms of the Aorta and Major Arteries. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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17. Correct Answer: C. Although there are very rare case reports of postpartum splenic rupture, it is not a common postpartum complication.

Peripartum cardiomyopathy (PPCM) is a pregnancy-induced dilated cardiomyopathy (Answer A). PPCM clinically presents as dyspnea, edema, orthopnea, and paroxysmal nocturnal dyspnea.

Postpartum fever is defined as a temperature greater than 38.0°C on any 2 of the first 10 days following delivery, excluding the first 24 hours (Answer B). The most common cause is endometritis, which results from the ascension of genital/gastrointestinal tract bacteria into the uterus. Patients typically present with abdominal pain, uterine tenderness, and vaginal discharge. Risk factors include prolonged rupture of membranes, retained placenta requiring manual removal, and internal fetal monitoring. Other common causes of postpartum infection include wound cellulitis, mastitis, and cystitis.

Throughout pregnancy and immediately postpartum, women are at increased risk for thromboembolic disease (Answer D). This is the result of a simultaneous increase in procoagulants and decrease in anticoagulants. Also, delivery results in venous stasis from inferior vena cava obstruction by the uterus and post-surgical bed rest as seen in patients who have undergone cesarean-section. Lastly, the trauma of delivery causes endothelial damage. Thromboembolic disease most commonly presents as deep vein thrombosis or pulmonary embolism.

Painless thyroiditis occurs 2-6 months following delivery (Answer E). Typically, patients have a hyperthyroid period that lasts 1-2 months and is followed by hypothyroidism. It is thought to be secondary to immunologic suppression that occurs during pregnancy.

References:

1. Echevarria MA, Kuhn GJ. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York, NY: McGraw-Hill; 2011.

2. Houry DE, Salhi BA. Acute Complications of Pregnancy. In: Marx JA, Hockberger RS, Walls RM, Rosen P. Rosen's Emergency Medicine: Concepts and Clinical Practice. 8th ed. Philadelphia, Pa: Saunders/Elsevier; 2014.

3. Lanska DJ, Kryscio RJ. Risk Factors for Peripartum and Postpartum Stroke and Intracranial Venous Thrombosis. Stroke. 2000;31(6):1274-282.

4. Stagnaro-Green A. Recognizing, Understanding, And Treating Postpartum Thyroiditis. Endocrinology and Metabolism Clinics of North America. 2000 June; 29(2):417-430.

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18. Correct Answer: E. *Yersinia enterocolitica* (answer E) replicates in the mucosa of the ileum, causing right lower quadrant pain associated with nausea, vomiting, and diarrhea. This is commonly confused with acute appendicitis. *Salmonella enterica* (answer C) and *Shigella* (answer D) are examples of invasive gastroenteritis and do not commonly cause right lower quadrant pain. *Clostridium difficile* (answer A) is a spore forming bacteria and patients present with significant diarrhea. This occurs commonly as a nosocomial infection among hospitalized patients and those recently treated with antibiotics.

References:

1. Brooks GF, Carroll KC, Butel JS, Morse SA, Mietzner TA. Yersinia and Pasteurella. In: Brooks GF, Carroll KC, Butel JS, Morse SA, Mietzner TA. eds. Jawetz, Melnick, & Adelberg's Medical Microbiology, 26e. New York, NY: McGraw-Hill; 2013.

2. Kman NE, Werman HA. Disorders Presenting Primarily with Diarrhea. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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19. Correct Answer: C. Although *Staphylococcus aureus* (answer E) is the most common cause of septic arthritis overall, *Neisseria gonorrhea* remains the most common cause of septic arthritis in the sexually active population or adults under 30 years of age (answer C). When suspecting *Neisseria*, providers should obtain cervical, urethral, rectal and pharyngeal cultures. The other listed options are not as common as the aforementioned.

Of note, *Pseudomonas* (answer D) should be considered in patients who abuse intravenous drugs, and *Haemophilus influenzae* (answer B) should be considered in children.

References:

1. Frohna WJ, Della-Giustina D. Musculoskeletal Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Genes N, Adams, B. Arthritis. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Raukar N, Zink B. Bone and Joint Infections. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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20. Correct Answer: A. The patient has peptic ulcer disease (PUD) secondary to chronic use of non-steroidal anti-inflammatories (NSAIDs) for symptomatic relief of arthritis. The abrupt change in symptoms in association with shoulder pain suggests ulcer perforation. A chest x-ray (answer A) may reveal free air under the diaphragm; however, negative radiographs can occur in 10-20% of cases and therefore does not rule out the diagnosis. If clinical suspicion is high, further testing such as CT or US (answers B and D) should be considered for further evaluation. A right shoulder x-ray (answer C) would not be helpful in this case. Although endoscopy (answer E) is the gold standard to diagnose PUD and evaluate ulcer hemorrhage, it is not usually readily available in the emergency department.

References:

1. Matthew C. Gratton. Peptic Ulcer Disease and Gastritis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Hess JM, Lowell MJ. Esophagous, Stomach, and Duodenum. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Grassi R, et al. Gastro-duodenal perforations: conventional plain film, US, and CT findings in 166 consecutive patients. European J Radiology 2004; 50:30.

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21. Correct Answer: D. The patient presents with a sore throat and has 2/4 Centor Criteria. Centor criteria include the following:

1. Fever

2. Absence of cough

3. Tonsillar exudates

4. Cervical lymphadenopathy

Use of the Centor criteria allows the clinician to determine the pretest probability that the etiology of the patient's symptoms is due to streptococcal pharyngitis. If a patient has a Centor score of 0 or 1, they do not need antibiotics or testing and should only receive symptomatic therapy. Patients with a score of 2 should undergo rapid strep testing and only be treated for positive results. Patients with a score of 3-4 should receive empiric treatment without undergoing testing. Of note, in pediatric patients, a culture should be sent on all negative rapid strep tests.

Answers B and C are incorrect, because the patient does not demonstrate evidence of a peritonsillar abscess or epiglottitis.

References:

1. Melio FR. Upper Respiratory Tract Infections. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Mosby/Elsevier, 2010.

2. Cannon TY, Sah RN, Shores C. Infections and Disorders of the Neck and Upper Airway. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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22. Correct Answer: E. Peripartum cardiomyopathy (PPCM) is typically seen in women with no history of heart disease.

PPCM is a pregnancy-induced dilated cardiomyopathy that presents with similar symptoms as those seen in heart failure, such as, dyspnea, edema, orthopnea, and paroxysmal nocturnal dyspnea. The exact etiology of PPCM is unknown. If left unidentified, the patient is at risk for thromboembolic events or arrhythmias.

The diagnostic criteria for PPCM includes:

1. Occurring during the last month of pregnancy or first 5 months after delivery

2. Absence of an identifiable cause for cardiac failure

3. Absence of heart disease prior to the last 5 months of pregnancy

4. Echocardiogram shows left ventricular systolic dysfunction with an ejection fraction <45%

Risk factors for PPCM include multiparity, age >30 years, obesity, hypertension, maternal cocaine abuse, and long-term tocolytic therapy.

References:

1. Echevarria MA, Kuhn GJ. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York, NY: McGraw-Hill; 2011.

2. Shaikh N. An obstetric emergency called peripartum cardiomyopathy! J Emerg Trauma Shock. 2010 Jan-Mar; 3(1):39–42.

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23. Correct Answer: D. Even though this patient has a history of rheumatoid arthritis, which occasionally occurs in her knees and may be responsible for her symptoms, it is the clinician's responsibility to exclude septic arthritis as a cause. Arthrocentesis for analysis of joint fluid is the most useful diagnostic tool for evaluation of a possible septic joint.

Colchicine and indomethacin (answers A and B) are used for acute gouty flares, but should not be given unless there is a clear diagnosis of the disease, typically by identifying crystals in the synovial fluid. Steroids (answer C) should not be instilled unless septic arthritis has been excluded. A knee MRI is rarely indicated in the emergency department (answer E) and is typically more sensitive for diagnosing osteomyelitis, periarticular abscess, or ligament injuries.

References:

1. Frohna WJ, Della-Giustina D. Musculoskeletal Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Genes N, Adams B. Arthritis. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

3. Raukar N, Zink B. Bone and Joint Infections. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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24. Correct Answer: C. The patient presents after an envenomation from a Black Widow spider (*Latrodectus*). Patients with significant envenomation can experience severe muscle spasms, as well as autonomic and central nervous system dysfunction. They can also present with severe abdominal pain that can mimic an acute abdomen. Envenomation does not usually result in local skin necrosis, although a mild local reaction may occur.

Basic laboratory testing may demonstrate a leukocytosis as well as electrolyte abnormalities, though the lab results are unlikely to significantly alter management. A creatinine kinase level should be obtained as the severe muscle spasms may cause rhabdomyolysis. Although imaging and a surgical consultation may be considered without a history of a preceding spider bite, *Latrodectus* anti-venom should be promptly given in the appropriate clinical scenario, such as the above case. Children, pregnant women, and symptomatic adults should be admitted for observation.

References:

1. Schneir AB. Bites and Stings. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Otten EJ. Venomous Animal Injuries. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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25. Correct Answer: C. The most likely diagnosis is drug-induced dystonia. Acute dystonic reaction is a hyperkinetic movement disorder characterized by intermittent, uncoordinated, involuntary contractions or spasms of muscles of the face, tongue, neck, trunk or extremities. It is most commonly seen after exposure to dopamine receptor blockers, including drugs such as chlorpromazine (thorazine), haloperidol (haldol), metoclopramide (reglan), and prochlorperazine (compazine).

References:

1. Larkin G, Beautrais A. Behavioral Disorders: Emergency Assessment. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Martel M, Biros M. Psychotropic Medications and Rapid Tranquilization. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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26. Correct Answer: A. Spontaneous bacterial peritonitis (SBP) is seen in individuals with liver disease such as cirrhosis. It is an acute bacterial infection of ascitic fluid causing abdominal pain, fever, or encephalopathy. This is a diagnosis that should be considered in all individuals with liver disease who have abdominal pain, even if clinically apparent ascites is not present.

SBP is the most common life threatening complication of ascites. Although the pathophysiology of SBP is controversial, some suggest it may be related to portal hypertension causing bowel mucosal edema and translocation of intestinal flora. Gram-negative bacteria, like *E. coli*, are most frequently identified in SBP. Abdominal paracentesis is necessary to obtain peritoneal fluid for analysis in cases of suspected SBP.

An ascitic fluid neutrophil count of greater than 250 cells/mm^3 is diagnostic of SBP. Third-generation cephalosporins, like cefotaxime, are first-line agents for SBP. Alternatives include extended-spectrum penicillins (e.g. ampicillin-sulbactam) or aminoglycosides (e.g. gentamicin).

References:

1. Broder J, Evans R. Gastrointestinal Emergencies: Hepatic disorders and Hepatic Failure. In: Tintinalli J, ed. Emergency Medicine: A Comprehensive Study Guide. 6th ed. New York: McGraw-Hill; 2004:566-573.

2. Gentges, J. Hepatic Disorders, Jaundice, and Hepatic Failure. In: Cline D, Ma O, Cydulka R, Thomas S, Handel D, Meckler G, ed. Tintinalli's Emergency Medicine: Just The Facts. 3rd ed. New York: McGraw-Hill Companies, Inc; 2013:175-181.

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27. Correct Answer: C. The early recognition and diagnosis of cerebral venous sinus thrombosis (CVT) is important for the initiation of treatment and prevention of complications. Current treatment recommendations include intravenous heparin, followed by oral anticoagulation, and symptomatic management. Identification of the etiology and prevention of further thrombosis are also key in disease management.

Approximately 40% of patients with CVT develop intracranial hypertension from venous outflow obstruction. Patients may demonstrate papilledema and cranial nerve six palsy due to the elevated intracranial pressure. Progression of papilledema can lead to optic nerve atrophy and vision loss in up to 2-4% of patients. As the arachnoid granulation function may also become impaired, approximately 6% of patients will also develop communicating hydrocephalus. Seizures occur in up to one-third of patients. Persistent occlusion and increased venous pressure has been shown to cause dural arteriovenous fistulas in a very small percentage of patients.

References:

1. Denny CJ, Schull MJ. Headache and Facial Pain. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Crocco TJ, Goldstein JN. Stroke. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Stam J. Thrombosis Of The Cerebral Veins And Sinuses. N Engl J Med. 2005;353(3): 314-315.

4. Saposnik G, Barinagarrementeria F, Brown R, Bushnell C, Cucchiara B, Cushman M, DeVeber G, Ferro J, Tsai F. Diagnosis And Management Of Cerebral Venous Thrombosis: A Statement For Healthcare Professionals From The American Heart Association/American Stroke Association. Stroke 42.7 (2011): 1158-1192

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28. Correct Answer: C. Giant cell (temporal) arteritis is the most common vasculitis. It is seen more frequently in women, especially in the sixth and seventh decades of life. Clinical presentation of giant cell arteritis includes headache, polymyalgia rheumatica, jaw claudication, visual disturbance, fever, and weight loss. The American College of Rheumatology Criteria for the Classification of Temporal Arteritis are used to support the diagnosis: onset of disease at age >50 years, new headache, abnormal temporal artery on physical examination, erythrocyte sedimentation rate >50 mm/hr and abnormal findings on temporal artery biopsy. Severe temporal arteritis with visual loss requires admission and high dose intravenous corticosteroids. CT and lumbar puncture are not helpful in confirming the diagnosis. Treatment should not be delayed for temporal artery biopsy.

References:

1. Lehrmann JF, Sercombe CT. Systemic Lupus Erythematosus and the Vasculitides. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Elsevier/ Saunders, 2010

2. Salvarani C, Fabrizio C, Hunder G. Polymyalgia rheumatica and giant-cell arteritis. Lancet. 2008 Jul: 372(9634):234-235.

3. Weyand CM, Goronzy JJ. Giant-cell arteritis and polymyalgia rheumatica. N Engl J Med. 2014 Jul;3:371(1):50-7.

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29. Correct Answer: B. This patient has sudden onset of room-spinning dizziness that is severe and worse with change in head position. This highly suggests a peripheral cause of vertigo.

Peripheral vertigo is usually of sudden onset, severe, lasts from a couple seconds to minutes with symptom-free intervals between episodes. The dizziness is worsened by position and head movement. There are usually no associated neurological findings. Nystagmus, if present, is horizontal or horizontal-rotary, and up-beating (fast phase beats toward forehead).

Central vertigo is usually of gradual onset and mild in nature. It can be present continuously for weeks to months. Central vertigo is usually not positional, and there may be associated neurological deficits on exam. Central nervous system causes should be considered when the pattern of nystagmus is purely vertical, down-beating (fast phase beating toward the nose), non-fatigable, or when the nystagmus is neither provoked nor relieved by repositioning maneuvers.

The Dix-Hallpike test (also referred to as the Nylen-Barany test) is performed by turning the head 45 degrees to one side and then having the patient move from an upright seated position to a supine position with the head overhanging the edge of the gurney. The eyes are observed for nystagmus, which fatigues with time, and the patient is queried for the occurrence of vertigo. The patient is then brought back up to a seated position and the test is repeated with the head turned 45 degrees to the opposite side.

References:

1. Chang AK, Olshaker JS. Dizziness and Vertigo. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Goldman B. Vertigo and Dizziness. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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30. Correct Answer: D. Indirect hernias (answer D) protrude into the scrotum due to a persistent processus vaginalis defect. They pass lateral to the inferior epigastric vessels.

Direct hernias (answer A) protrude directly through the abdominal wall via a defect in the transversalis fascia in the Hesselbach triangle and are located medial to the inferior epigastric vessels. Since direct hernias do not have a guiding path, they seldom extend into the scrotum. Femoral hernias (answer B) pass through the femoral canal medial to the femoral vein. They occur most commonly in older women and have a high risk of incarceration and strangulation. Incisional or ventral hernias (answer C) occur due to fascial defects following abdominal surgery. Testicular neoplasms (answer E) often present as slow growing and non-tender scrotal masses.

References:

1. Vicario SJ, Price TG. Bowel Obstruction and Volvulus. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

2. Tavakkoli A, Ashley SW, Zinner MJ. Small Intestine. In: Brunicardi F, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, Pollock RE. eds. Schwartz's Principles of Surgery, 10e. New York, NY: McGraw-Hill

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31. Correct Answer: C. This patient has sustained penetrating trauma to the chest and is hemodynamically unstable. Ultrasound findings and ECG are consistent with cardiac tamponade. Answer choice C describes the correct intervention, emergency pericardiocentesis.

She has pulses, and is therefore not a candidate for thoracotomy. Her physical exam findings are not consistent with tension pneumothorax and thus needle or tube thoracostomy are not indicated at this time. Although the patient is unstable and has a positive FAST, laparotomy is not appropriate at this time.

References:

1. Synovitz CK, Brown EJ. Pericardiocentesis. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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32. Correct Answer: B. Posterior epistaxis is estimated to comprise 10% of nosebleeds and is much more common in adults than children. The most common origin of the bleeding is the sphenopalatine artery. Differentiating between posterior and anterior nosebleeds is essential due to the significant differences in management and potential complications. Posterior nosebleeds should be suspected when anterior packing is ineffective, or where use of vasoconstrictors or cautery fail to control the bleeding. Various systems are available for posterior packing. It is important to recognize that due to the location of the posterior packing, there is potential for infection, hypoxia, and pressure necrosis of nasal structures. Additionally, patients may develop cardiac dysrhythmias (most commonly, bradycardia) and should be admitted for cardiac monitoring.

Antibiotics should be given to cover staphylococcal organisms due to the risk of toxic shock syndrome and otolaryngology should be consulted for further management. Surgical intervention such as arterial ligation or embolization is generally not emergently required unless bleeding cannot be stabilized or if there is concern for more serious trauma to the nasal structures leading to epistaxis. Although hypertension is seen more commonly in patients with epistaxis, current scientific evidence has not clearly established a causal relationship between hypertension and epistaxis. As a result, treatment of hypertension in epistaxis patients remains controversial. Patients who present to the emergency department with nosebleeds may be hypertensive due to the stress of the situation. Blood pressure should be addressed, but does not have to be aggressively reduced as this is not a hypertensive emergency.

References:

1. Pfaff, JA, Moore GP. Otolaryngology. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Mosby/Elsevier, 2010.

2. Summers SM, Bey T. Epistaxis, nasal fractures, and rhinosinusitis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Barnes M, Spielmann P, White P. Epistaxis: A Contemporary Evidence Based Approach. Otolaryngologic Clinics of North America. 2012 Oct; 45(5):1005-1017.

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33. Correct Answer: C. Polymyositis (PM) and dermatomyositis (DM) are the most common inflammatory disorders of the muscle tissue that can produce pain, tenderness, and generalized weakness. For both conditions, proximal muscle groups are more commonly involved (especially the shoulder and hip girdle), causing pain and weakness. Because the shoulder and hip girdle musculature are commonly involved, patients may complain of difficulty getting up out of a chair or lifting their arms above their head. In both PM and DM, patients typically have elevated CK levels without acute kidney injury or rhabdomyolysis. The management includes oral steroids.

Dermatomyositis is associated with a classical periorbital heliotrope rash and swelling of the extensor surfaces of the joints. This diagnosis is less likely in this patient given the absence of skin and joint findings (answer A).

Transverse myelitis (answer E) more commonly presents with distal muscle weakness and can involve loss of control of bladder or bowel function. Myasthenia gravis (answer B) more classically presents with facial (especially ocular) muscle weakness. Furthermore, patients with myasthenia gravis have intermittent weakness relieved by rest. In this case, the symptoms are progressively worsening with no particular time of day associated. Tick paralysis (answer D) is an acute ascending flaccid motor paralysis, but there was no mention of any tick exposures (e.g. outdoor activity).

References:

1. Shearer P, Jagoda A. Neuromuscular Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

2. Iaccarino L, Pegoraro E, et. al. Assessment of patients with idiopathic inflammatory myopathies and isolated creatine-kinase elevation. Auto Immun Highlights. 2014 Dec; 5(3): 87–94.

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34. Correct Answer: E. Any patient who has undergone CPR requires admission, as well as a basic evaluation, which includes a possible chest radiograph and labs. Arterial blood gases are painful and rarely alter management in the absence of significant hypoxemia. Patients with oxygen saturations <95% or a GCS <13 should prompt admission to the intensive care unit.

Supplemental oxygenation should be started with a goal oxygen saturation ≥95%. Intubation should be considered when patients have significant respiratory distress or refractory hypoxemia. Despite the associated risk of aspiration with drowning events, broad spectrum antibiotics are not recommended unless a patient exhibits evidence of an associated pneumonia (e.g. fever, cough, focal rales, or a new infiltrate).

References:

1. Causey AL, Nichter MA. Drowning. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Richards DB, Jacquet GA. Drowning. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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35. Correct Answer: D. Bowel or bladder incontinence is a serious symptom that raises concern for an epidural compression syndrome, such as spinal cord compression, cauda equina syndrome, or conus medullaris syndrome. If a patient has back pain and a history of urinary incontinence (acute or chronic), but an otherwise completely normal history and evaluation, measure the postvoid residual volume with bedside ultrasound. A large postvoid residual volume (>100 mL) indicates overflow incontinence, which suggests neurologic compromise and an epidural compression syndrome.

A normal rectal tone is not as sensitive as urinary retention in excluding a spinal cord compression syndrome. X-rays, bone scans, and CTs of the lumbar spine are not sensitive enough to diagnose a spinal cord compression (answers A, B, and C). The gold standard is a MRI of the lumbar spine.

References:

1. Janz TG, Hamilton GC. Anemia, Polycythemia, and White Blood Cell Disorders. In: Marx J, Rosen P. Rosen's Emergency Medicine: Concepts And Clinical Practice. Philadelphia, PA: Saunders; 2013.

2. Place R, Lagoc AT, Mayer TA, Lawlor CJ. Oncology and Hematology Emergencies in Children. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

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36. Correct Answer: B. The approach to neck trauma begins with visual inspection to see what zone is involved. Typically, this is divided into 3 zones:

Zone	Anatomic Description
Zone 1	Between the clavicles and the cricoid cartilage.
Zone 2	Between the cricoid cartilage and the angle of the mandible
Zone 3	Between the angle of the mandible and the mastoid process

Although conventional angiography is still considered the "gold standard" for evaluating vascular injury, in many centers CT angiography is the initial diagnostic screening study for stable patients with penetrating neck injuries that violate the platysma. Neck wounds should never be probed as this maneuver may disrupt hemostasis. Physical examination is not accurate for detecting esophageal injuries. Subcutaneous emphysema is a soft sign of penetrating neck trauma. Bleeding vessels should not be clamped because subsequent injury to vascular or nervous structures may result.

References:

1. Ilgen JS. Trauma. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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37. Correct Answer: B. The patient has an acute, atraumatic, monoarticular arthritis, with the differential including (but not limited to) trauma-induced arthritis, septic arthritis, and gout. Because the most dangerous cause of acute joint pain in the emergency department is septic arthritis due to bacterial invasion, the next steps should focus on ruling-out septic arthritis. Unfortunately, not all patients with septic arthritis have a fever or an abnormal white blood cell count. Thus, arthrocentesis of the knee joint is the most useful diagnostic tool for evaluation of septic arthritis.

Arthroscopy (answer C) is not indicated in the diagnosis of acute monoarticular joint arthritis. Serum uric acid levels (answer A) are an unreliable marker for acute gouty arthritis and, additionally, will not rule out septic arthritis. Patients with acute monoarticular arthritis without a pre-existing condition of rheumatoid arthritis or gout should not be discharged (answers D and E) without an evaluation for septic arthritis.

References:

1. Frohna WJ, Della-Giustina D. Musculoskeletal Disorders. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Genes N, Adams, B. Arthritis. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Raukar N, Zink B. Bone and Joint Infections. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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38. Correct Answer: D. Indications for peri-mortem c-section are maternal cardiac arrest at gestational age >24 weeks and positive fetal heart tones. Answer A and B include fetuses less than 24 weeks, which are associated with unlikely fetal viability. In answer C, the mother is not in cardiac arrest and would benefit from less invasive treatments first.

References:

1. Marx JA, et al. Rosen's Emergency Medicine. Philadelphia: Elsevier, Saunders, 2014. Print.

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39. Correct Answer: E. Sporotrichosis occurs worldwide, but is commonly found in tropical and sub-tropical regions. This fungus is found in soil and is a common disease of florists, gardeners, and agricultural workers. The lymphocutaneous type is the most common presentation with a painless nodule or papule at the site of inoculation that later develops subcutaneous nodules with clear skip areas along local lymphatic channels. Itraconazole (100-200 mg daily for 3-6 months) is the treatment of choice.

Bartonella henselae causes cat-scratch disease after a cat bite or scratch. Presentation includes painful, matted masses of lymph nodes, low-grade fever, malaise, fatigue, headache, nausea, and anorexia. Cutaneous anthrax is most common in areas in close contact with livestock. Hands and fingers are commonly affected and a pruritic macule develops at the inoculum site. The macule develops into an ulcerative site with multiple serosanguinous vesicles and later progresses to a painless black eschar which falls off within 2 weeks. Dermatophytes are a group of fungi which infect keratinized cutaneous structures such as nails and hair. Cutaneous leishmaniasis is transmitted by a sandfly bite. Leishmaniasis is a common and serious infectious disease mostly found in tropical and sub-tropical regions. Although there are many varieties of this disease, the typical cutaneous ulcer is painless and covered in an exudative crust.

References:

1. Kelly EW, Magilner D. Soft Tissue Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Barros MBL, Paes RA, Schobach AO. Sporothrix schenckii and sporotrichosis. Clinical Microbiology Reviews. 2011 Oct; 24(4):633-654.

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40. Correct Answer: D. At high altitude, people must undergo a variety of adaptive measures (referred to as acclimatization) to compensate for the lower partial pressure of oxygen. Much of the initial physiological response is driven by a process called the hypoxic ventilatory response (HVR). HVR triggers an increase in minute ventilation (answer E) which will result in increased oxygen delivery and a respiratory alkalosis. In order to compensate for the respiratory alkalosis, people will excrete bicarbonate from their kidneys (answer B). Additional adaptive measures include increased hemoglobin, decreased plasma volume (answer A), and increased 2-3 diphosphoglycerate (answer C). Increased 2-3 diphosphoglycerate shifts the oxyhemoglobin dissociation curve to the right, resulting in more oxygen release at the tissue level. During acute acclimatization, patients will increase their heart rate to improve cardiac output. Over time, this compensatory tachycardia should resolve. People with persistent resting tachycardia are suggested to have poor HVR and are at increased risk of acute mountain sickness and high altitude pulmonary edema.

References:

1. Hackett PH, Hargrove J. High-Altitude Medical Problems. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Yaron M, Paterson RD, Davis CB. High-Altitude Medicine. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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41. Correct Answer: A. Caustic substances are classified broadly as acidic (pH<7) or alkaline (pH>7). Common alkaline items include household bleach, detergents, drain cleaners and oven cleaners. Acidic compounds are found in automobile batteries, fertilizers, swimming pool cleaners, and hair products. Alkaline ingestions cause immediate cellular destruction with high penetrance to the deep tissues, leading to liquefactive necrosis. Acidic ingestions cause delayed cellular death through the coagulation cascade, resulting in eschar formation and coagulative necrosis. There is less tissue penetrance with acidic ingestion when compared to alkaline ingestions due to formation of a thick eschar. Both types of ingestions can lead to serious complications such as esophageal and gastric perforation.

Activated charcoal is not indicated as it binds poorly to caustic substances and can interfere with endoscopy. Induction of vomiting with ipecac is also contraindicated as it re-exposes the esophageal mucosa to the caustic substance and increases the risk of perforation. Accidental or unintentional exposures are more common than intentional exposures, however intentional exposures are associated with more serious injuries. There is no evidence supporting the use of prophylactic antibiotics following an ingestion.

References:

1. Bouchard NC, Carter WA. Caustics. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Cibisev A, Nikolova-todorova Z, Bozinovska C, Petrovski D, Spasovski G. Epidemiology of severe poisonings caused by ingestion of caustic substances. Prilozi. 2007;28(2):171-83.

3. Poley JW, Steyerberg EW, Kuipers EJ, et al. Ingestion of acid and alkaline agents: outcome and prognostic value of early upper endoscopy. Gastrointest Endosc. 2004;60(3):372-7.

4. Chyka PA, Seger D, Krenzelok EP, Vale JA. Position paper: Single-dose activated charcoal. Clin Toxicol (Phila). 2005;43(2):61-87.

5. Mamede RC, De mello filho FV. Treatment of caustic ingestion: an analysis of 239 cases. Dis Esophagus. 2002;15(3):210-3.

Click here to return to the question.

42. Correct Answer: E. This patient is presenting with a perforated tympanic membrane (TM). The most common etiologies are trauma and infection. Amongst traumatic cases, cotton swabs are the most frequent mechanism of injury. Perforated TMs will typically heal without intervention. This patient's perforation will not require any medications, though he should be instructed not to allow water into the ear canal and to follow-up with his primary physician in 1-2 weeks.

Antibiotic ear drops are only necessary if there is a retained foreign body in the TM or evidence of infection. High dose amoxicillin is the appropriate treatment for otitis media. Fluticasone spray can be useful in cases of allergic rhinitis, but it has no utility in tympanic membrane perforation secondary to trauma.

References:

1. Silverberg M, Lucchesi M. Common Disorders of the External, Middle, and Inner Ear. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Pfaff JA, Moore GP. Otolaryngology. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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43. Correct Answer: E. This patient is presenting with sequelae of coarctation of the aorta (CoA), including leg claudication and syncope. Common exam findings in these patients include hypertension, weak or absent lower extremity pulses, pulse differential between upper and lower extremities, and murmur which radiates to the back. Chest X-ray often shows the "reverse E" or "3 sign" produced by indentation of the aorta at the site of coarctation. In older children and adults, posterior rib notching can often be seen in the 3rd through 8th ribs as a result of the development of collateral circulation. An EKG may show left ventricular hypertrophy. Although some patients with CoA present as infants with signs of heart failure, a great number present in childhood or even adulthood. Repair is indicated for patients with a pre-to-post-coarctation gradient of 20 mm Hg or other evidence of severe disease.

All patients with CoA, regardless of repair, require life-long cardiology follow-up due to significant risk of other cardiovascular sequelae of their disease. These include hypertension, premature coronary artery disease, other aortic disease including thoracic aortic aneurysm and aortic dissection, cerebrovascular accidents due to the rupture of cerebral aneurysm, and infective endocarditis. Coarctation without repair puts patients at risk for left ventricular failure. Those patients who have surgery are also subject to re-coarctation. CoA is also commonly seen with aortic valve anomalies, especially bicuspid aortic valve.

References:

1. Brickner M, Hillis L, Lange R. Congenital Heart Disease in Adults. New England Journal of Medicine. 2000;342(4):256-263.

2. Horeczko T, Young KD. Congenital Heart Disease. In: Schafermeyer R, Tenenbein M, Macias CG, Sharieff GQ, Yamamoto LG. eds. Strange and Schafermeyer's Pediatric Emergency Medicine, 4e. New York, NY: McGraw-Hill; 2015.

3. Jenkins N. Coarctation of the aorta: natural history and outcome after surgical treatment. QJM. 1999;92(7):365-371.

4. Warnes C, Williams R, Bashore T, et al. ACC/AHA 2008 Guidelines for the Management of Adults With Congenital Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation. 2008;118(23):e714-e833.

5. Yue EL, Meckler GD. Congenital and Acquired Pediatric Heart Disease. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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44. Correct Answer: D. Steroids, including betamethasone and dexamethasone, are only administered antenatally before 34 weeks of gestation. Administration before 34 weeks speeds fetal lung maturity and decreases the incidence of fetal respiratory distress syndrome, as well as the incidence of necrotizing enterocolitis and intraventricular hemorrhage. The current recommended regimen is a single intramuscular dose of betamethasone.

Ampicillin and erythromycin are routinely given to any patient with premature rupture of membranes or preterm labor to decrease the risk of neonatal infections, prolong latency, and reduce postpartum endometritis, chorioamnionitis, neonatal pneumonia, neonatal sepsis, and intraventricular hemorrhage (answers A, D). Atosiban and nifedipine are tocolytics, commonly given antenatally in complicated preterm labor. Tocolytics, although not mandatory, are routinely given to delay labor long enough to allow steroids to take effect or to allow transfer to an obstetrics unit.

References:

1. Echevarria M, Kuhn G. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Chattergee J, et al. The management of preterm labor. Arch Dis Child Fetal Neonatal Ed. 2007 Mar; 92(2):F88-93.

3. Tripp M. Complications of Labor. In: Harrigan, Ufberg, Tripp, eds. Emergency Medicine Review: Preparing for the Boards. St Louis Elsevier, 2010.

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45. Correct Answer: C. Nasal foreign bodies are commonly seen among pediatric patients. Frequent symptoms include pain and persistent, foul-smelling mucopurulent discharge that is unilateral. Epistaxis may also be seen with nasal foreign bodies. Button batteries and magnets are nasal foreign bodies that are especially important to recognize, as they can quickly lead to septal necrosis and perforation.

Acute sinusitis is most common in children 12-23 months of age and is characterized by purulent nasal discharge, cough, and headache. High fever is more suggestive of a bacterial etiology, especially in severe cases with purulent nasal discharge. Treatment consists of antibiotics for bacterial infections and supportive care for viral infections. Allergic rhinitis is often seen in children over the age of two years and its prevalence increases through early adolescence. Children with a history of asthma are also likely to have allergic rhinitis. Other symptoms consistent with allergic rhinitis include clear nasal discharge, nasal pruritus, and sneezing. Septal hematomas occur as a result of blunt trauma. They result from the rupture of small blood vessels with subsequent bleeding between the septal perichondrium and nasal cartilage. Blood is typically trapped between these two layers leading to the formation of a bluish, boggy mass resting on the nasal septum. Complications of septal hematoma include cartilage necrosis and infection.

References:

1. Pfaff, JA, Moore GP. Otolaryngology. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Mosby/Elsevier, 2010.

2. Cohen, JS, Agrawal D. The Nose and Sinuses. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011

3. Wald E, Applegate K, Bordley C, et al. Clinical Practice Guideline for the Diagnosis and Management of Acute Bacterial Sinusitis in Children Aged 1 to 18 Years. Pediatrics. 2013;132(1):e262-e280.

4. Stoner M, Dulaurier M. Pediatric ENT Emergencies. Emergency Medicine Clinics of North America. 2013;31(3):795-808.

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46. Correct Answer: A. The patient demonstrates clinical findings consistent with anaphylaxis. Clinical criteria for anaphylaxis consists of involvement of at least two organ systems following exposure to an allergen. There are 3 definitions of anaphylaxis, any can be used for diagnosis:

1. Acute onset of illness (minutes to several hours) involving the skin or mucosal tissue combined with respiratory compromise, hypotension, or other associated organ dysfunction.

2. Involvement of 2 or more of the following organ systems occurring rapidly after exposure to an antigen: skin or mucosal involvement, respiratory compromise, hypotension, or persistent gastrointestinal symptoms.

3. Hypotension immediately following ingestion of an allergen.

Immediate recognition and treatment with epinephrine is crucial. The appropriate dose is 0.3 mg of epinephrine delivered intramuscularly in the anterolateral thigh because this route has demonstrated the fastest, most consistent, and highest peak plasma concentrations of epinephrine. Intravascular epinephrine is indicated only for anaphylactic shock.

References:

1. Rowe BH, Gaeta TJ. Anaphylaxis, Acute Allergic Reactions, and Angioedema. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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47. Correct Answer: D. There are three types of etiologies for necrotizing soft tissue infections (NSTI), based on the culprit organism, referred to as type I, II, or III. The most common is type I infections which are polymicrobial (55-75% of all infections). The causative microbes are a combination of gram-positive cocci, gram-negative rods, and anaerobes. Type II accounts for 10-15% of NSTIs and is primarily caused by *Staphylococcus aureus*. Type III is the least common type of NSTI. The infectious causes for Type III are controversial and may include *Vibrio vulnificus* and clostridial species.

Early NSTI can present with very little overlying skin changes (answer C) because thrombosis of a large number of capillary beds must occur before skin changes can develop. Antibiotics alone are rarely effective and the mortality from NSTIs is very high without concurrent surgical debridement (answer A).

Classically, pain is out of proportion to the findings on physical examination for NSTIs (answer E). This is possibly the single most important feature in making an early diagnosis. Early in the course of the infection, NSTIs may initially present as seemingly uncomplicated cellulitis. However, with more progression, crepitus may be palpated as gas forms in the necrotic tissue and this can indicate a more severe infection. Of note, the absence of crepitus does not rule out a deep space NSTI.

The diagnosis of NSTI is clinical. A plain film x-ray may reveal subcutaneous gas, but is a poor screening tool. CT imaging is more sensitive (80%) but also not the gold standard (answer B). Operative exploration and surgical debridement remains the diagnostic and therapeutic standard, respectively.

References:

1. Kelly EW, Magilner D. Soft Tissue Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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48. Correct Answer: A. Coarctation of the aorta (CoA) is an acyanotic lesion which can present at any age, depending on the severity of the lesion, and often has signs of congestive heart failure including poor feeding, sweating while feeding, respiratory distress, rales, and hepatomegaly. Hypoplastic left heart syndrome (HLHS), total anomalous pulmonary venous return (TAPVR), and transposition of the great arteries (TGA) are all ductal-dependent lesions which most commonly present in the first or second week life with cardiogenic shock (answers C, D, and E). TGA and TAPVR are cyanotic lesions, whereas HLHS is acyanotic. Ebstein's anomaly is a cyanotic congenital heart defect in which the septal and posterior leaflets of the tricuspid valve are displaced towards the apex of the right ventricle of the heart (answer B).

References:

1. Horeczko T, Young KD. Congenital Heart Disease. In: Schafermeyer R, Tenenbein M, Macias CG, Sharieff GQ, Yamamoto LG. eds. Strange and Schafermeyer's Pediatric Emergency Medicine, 4e. New York, NY: McGraw-Hill; 2015.

2. Yue EL, Meckler GD. Congenital and Acquired Pediatric Heart Disease. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. New York, NY: McGraw-Hill; 2011.

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49. Correct Answer: B. The patient has plantar fasciitis. This is an overuse injury affecting the plantar fascia and is the most common cause of hindfoot or heel pain. The pain is typically worse during the first few steps after a period of rest, but can also be persistent during weight bearing. Point tenderness is typically present on the medial aspect of the calcaneus at the origin of the plantar fascia. X-rays are typically normal, although a calcaneal spur may be noted. The bone spur is not a cause of the pain, but rather a stress-related ossification that is disproportionately present in patients diagnosed with plantar fasciitis. A bedside ultrasound can be used to evaluate for plantar fasciitis. A thickened aponeurosis of >5 mm is often diagnostic. The treatment for plantar fasciitis is conservative with stretching exercises, though physical therapy may be needed. Night splints (which essentially encourages prolonged stretching) and orthotics to relieve strain on the plantar fascia can also be recommended.

Retained foreign bodies (FB) can be a cause of nonspecific heel pain, but they will typically have pain that does not extinguish with ambulation. The history of pain that is worse during the first several steps is more typical of plantar fasciitis. X-rays may demonstrate retained FBs if they are made of metal or glass, but wood is not radiopaque. If the point tenderness was not in a location typical of plantar fasciitis, if the exam showed a skin defect or healing wound, or if the patient had a history of stepping on glass or wood splinters, then this diagnosis would be more likely (answer A). Bedside ultrasound is helpful to evaluate for foreign bodies.

A calcaneal stress fracture is the second most common stress fracture of the foot (after metatarsal fractures) and often occurs following a significant increase in physical activity. Pain is located more often just inferior to the posterior talocalcaneal articulation. It is often present at rest and does not improve after taking several steps in the morning. There is often swelling and ecchymosis on exam. These fractures may not appear on plain films (especially in the early stages), so additional imaging such as MRI or a radionuclide bone scan may be appropriate if the clinical suspicion is high. However, there is rarely any emergent indication for a bone scan in the emergency department (answer E). A stirrup splint is used to immobilize the ankle joint and prevent inversion/eversion. A splint is not indicated in plantar fasciitis.

An MRI of the foot and ankle is usually unnecessary to diagnose an acutely ruptured Achilles tendon, because the history and physical exam are usually sufficient. The patient will usually describe a sudden "popping" sensation followed by severe pain. There are many physical exam maneuvers used to detect an acute Achilles tendon rupture: a positive Thompson's test, a palpable defect - usually 2-6 cm above the calcaneus (this is very specific, but sensitivity can be blurred in the setting of major swelling or hematoma), and the complete inability to stand on a plantar-flexed foot.

References:

1. Abu-Laban R, Rose N. Ankle and Foot. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Barrett SJ, O'Malley R. Plantar fasciitis and other causes of heel pain. American Family Physician. 1999; 59(8), 2200-2206.

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50. Correct Answer: E. Several studies cited in a Cochrane review showed that inter-professional education produced positive outcomes in emergency department culture, patient satisfaction, and collaborative team behavior. It also reduced clinical error rates and care management for survivors of domestic violence.

References:

1. Perry SJ, Wears RL, Croskerry P, Shapiro MJ. Process Improvement and Patient Safety. In:Marx J, Hockberger R, Walls R. Rosen's Emergency Medicine – Concepts and Clinical Practice, 8e. Elsevier Health Sciences; 2014.

2. Reeves S, Perrier L, Goldman J, Freeth D, Zwarenstein M. Interprofessional education: effects on professional practice and healthcare outcomes (update). Cochrane database Syst Rev. 2013;3:CD002213.

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Practice Test #5

1. Correct Answer: E. Upper gastrointestinal (GI) bleeding is defined as hemorrhage occurring proximal to the ligament of Treitz, which is located where the duodenum and jejunum meet at the duodenojejunal flexure. It can present as coffee-ground emesis, hematemesis, melena, or even hematochezia.

Peptic ulcer disease is the most common cause of upper GI bleeding. Ulcers can be esophageal, gastric, or duodenal. Risk factors for peptic ulcer disease include H. pylori infection and NSAID use. Gastritis is erosive inflammation of the lining of the stomach, and when very severe can lead to ulcerations. Inflammation causes upper GI bleeding less often than ulcers. Esophageal varices are found in patients with liver cirrhosis due to portal hypertension causing venous distention. Varices only account for about 7% of upper GI bleeding, but have a high re-bleeding and mortality rate. Mallory-Weiss syndrome is a longitudinal mucosal tear that does not involve the muscular layer and usually occurs at the gastroesophageal junction. The classic presentation is bouts of vomiting followed by bright red hematemesis. Neoplasms are an uncommon cause of upper GI bleeding. Esophageal neoplasms commonly present with dysphagia, not GI bleeding.

References:

1. Overton DT. Upper Gastrointestinal Bleeding. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Rockall TA, Logan RF, Devlin HB, et al. Incidence of and mortality from acute upper gastrointestinal hemorrhage in the United Kingdom: Steering Committee and members of the National Audit of Acute Upper Gastrointestinal Haemorrhage. BMJ 311: 222, 1995.

3. Wilcox CM, Alexander LN, Cotsonis G. A prospective characterization of upper gastrointestinal hemorrhage presenting with hematochezia. Am J Gastroenterol 92: 231, 1997.

4. Chen ZJ, Freeman ML. Management of upper gastrointestinal bleeding emergencies: evidence-based medicine and practical considerations. World J Emerg Med. 2011;2(1):5-12.

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2. Correct Answer: C. Vessels, nerves, and muscles have the least resistance and therefore conduct electricity the most easily, which results in more damage to these structures. Bones, fat, and tendons have more electrical resistance and thus undergo less damage in an electrical injury. Skin has intermediate resistance. However, the resistance of skin can significantly decrease when wet. Of note, normal skin findings can significantly underestimate underlying damage.

Complications from an electrical burn include rhabdomyolysis, renal failure, autonomic dysfunction, cataracts, and cardiac dysrhythmias. High voltage injuries (>1000V) requires admission for cardiac monitoring for 12-24 hours. Low voltage injuries require an electrocardiogram (ECG) and urinalysis. Patients who are asymptomatic and have a normal ECG do not require admission for observation.

References:

1. Fish RM. Electrical Injuries. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Price TG, Cooper MA. Electrical and Lightning Injuries. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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3. Correct Answer: E. A sigmoid volvulus occurs when the sigmoid colon twists on itself, potentially causing vascular compromise. Left untreated, this leads to gangrene or perforation with mortality rates exceeding 50%. Patients are often elderly or from a nursing home and present with abdominal distention, pain, and constipation. If the patient exhibits signs of bowel infarction, including fever, peritonitis, or vital sign instability, immediate surgical consultation is necessary (answer E). Endoscopic decompression (answer B) is a possible approach in patients without evidence of gangrenous bowel. Spontaneous reduction is rare, and therefore supportive care and expectant management (answer D) are not recommended. Further imaging with CT or barium enema is not necessary in this case (answers A and C).

References:

1. Lou Z, Yu ED, Zhang W, Meng RG, Hao LQ, Fu CG. Appropriate treatment of acute sigmoid volvulus in the emergency setting. World J Gastroenterol. 2013;19(30):4979-83.

2. Peterson MA. Disorder of the Large Intestine. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Weingrow D, Mccague A, Shah R, Lalezarzadeh F. Delayed presentation of sigmoid volvulus in a young woman. West J Emerg Med. 2012;13(1):100-2.

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4. Correct Answer: E. This patient is suffering from a peripheral facial nerve (cranial nerve VII) palsy, also known as Bell's palsy. Multiple etiologies exist, but most commonly this condition is due to viral infection (especially Herpes virus) or is idiopathic in nature. Oral corticosteroids have been shown to shorten time to resolution. Addition of antiviral medication (acyclovir or valacyclovir) is controversial, but has been advocated in patients with significant palsies.

Given the lack of forehead wrinkling in the left face, this patient has a peripheral nerve palsy. Because the forehead is innervated by both hemispheres, a central lesion would result in an isolated lower face droop with preservation of the forehead. Therefore, it is unlikely the patient is having a stroke and he does not require an MRI (answer B). Lyme disease is a well-known, albeit less common, cause of Bell's palsy. It should be considered in patients with bilateral facial nerve palsy, a classic rash or symptoms consistent with Lyme disease, or a travel history that puts the patient at risk for this tick-transmitted infection (answer C). While acyclovir may be beneficial in the treatment of acute Bell's Palsy, steroids remain more important (answer D). Finally, attention must be given to eye protection since patient with facial palsy often cannot fully close the eye. Artificial tears or lubricants can help keep the cornea moist and healthy.

References:

1. Stettler BA. Brain and Cranial Nerve Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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5. Correct Answer: D. Epiglottitis is a potentially life-threatening diagnosis presenting with difficulty talking, difficulty breathing, and eventually respiratory arrest if appropriate interventions are not undertaken. The diagnosis is often suspected by history and physical examination, though radiography and visualization with fiberoptics may assist with confirmation. These patients should remain upright and be given empiric antibiotics (ceftriaxone 2 grams intravenous) and steroids. Anesthesia and otolaryngology should be emergently consulted for operative intubation.

Portable soft tissue radiographs of the neck can be helpful in visualizing the classic 'thumbprint' sign suggesting an edematous epiglottis. Due to the potential for sudden airway collapse, these patients should not be laid flat nor sent to the CT scanner given this highly unstable condition. Otolaryngology should get involved as soon as the diagnosis is suspected given the high potential for morbidity and mortality.

References:

1. Cannon TY, Sah RN, Shores C. Infections and Disorders of the Neck and Upper Airway. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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6. Correct Answer: C. All of the answers have been associated with meningococcemia except hypothyroidism. Adrenal crisis (also known as Waterhouse-Friderichsen Syndrome), disseminated intravascular coagulation, myocarditis, and septic shock are all potential deadly complications of this disease.

Poor prognostic findings associated with meningococcal disease include: a seizure on presentation, hyperpyrexia, platelet count below 100,000, metabolic acidosis, purpura fulminans, petechial rash within 12 hours of admission, shock, low ESR, and extremes of age.

References:

1. Marx JA, Hockberger RS, Walls RM, Adams J. Bacteria. Rosen's Emergency Medicine: Concepts and Clinical Practice. 7th ed. St. Louis: Mosby, 2013. 1710-1714.

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7. Correct Answer: A. The first step in the management patients with Guillain-Barré syndrome (GBS) includes airway assessment for impending respiratory failure. As weakness occurs to the muscles of respiration, there is an increased incidence of aspiration and other complications. Airway protection or respiratory support with mechanical ventilation may be needed. Obtaining initial and serial pulmonary function testing and arterial blood gases can assist the physician in determining the need for intubation or impending respiratory failure. Patients with progressive disease or concerning signs of respiratory failure require ICU admission for careful monitoring and frequent re-assessments.

After initial stabilization and management, GBS is treated with intravenous immunoglobulin (IVIG) and plasmapheresis. These have been shown to provide an equivalent reduction in duration of symptoms. Corticosteroids are of no benefit in GBS, and may be harmful.

References:

1. Andrus P, Jagoda A. Acute Peripheral and Neurologic Lesions. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Ulane C. Myasthenic Crisis and Peripheral Neuromuscular Disorders. In: Arbo JE, Ruoss SJ, Geoffrey KL, Jones MP. eds. Decision Making in Emergency Medicine Critical Care. 1st ed. Philadelphia, PA: Wolters Kluwer, 2015.

3. Hughes RA, Swan AV, van Koningsveld R, et al. Corticosteroids for Guillain-Barre syndrome. Cochrane Database System Rev. 2006:CD001446.

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8. Correct Answer: A. Patients presenting to the Emergency Department with a Glasgow Coma Scale (GCS) > 13, normal pulmonary examination, and an oxygen saturation ≥ 95% are considered to be at low risk for adverse events and can typically be discharged after 4-6 hours of observation. Multiple reviews have shown that if deterioration will occur, it will most commonly happen during the 4-6 hour observation period. Any abnormality of the above factors (either on presentation or during the course of observation) should prompt admission for further monitoring. Additionally, patients who receive CPR are considered high risk and should typically be admitted to an intensive care unit.

References:

1. Causey AL, Nichter MA. Drowning. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Richards DB, Jacquet GA. Drowning. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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9. Correct Answer: C. Lung transplant patients are extremely susceptible to pneumonia. Although some patients will manifest the classic syndrome of fever, cough, and an infiltrate on chest x-ray, most patients will present atypically. These patients may present with mild symptoms, such as cough, fatigue, or mild shortness of breath without a fever, leukocytosis, or infiltrate on chest x-ray. Despite the atypical history, one should have a low threshold for starting antibiotics and contacting her transplant team, as she is at high risk for an occult pneumonia.

Discharging such a high-risk patient home is inappropriate unless you have discussed the patient with her transplant team and arranged close out-patient follow-up. One should never adjust a patient's transplant medications without discussing it with the transplant team first. While cytomegalovirus (CMV) pneumonia is a possible cause of the patient's symptoms, this is much less common than typical bacterial pathogens. Methylprednisolone would be indicated in the case of acute rejection, but this should only be started after discussion with the patient's transplant team.

References:

1. Fish RM, Massad MG. The Transplant Patient. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Keadey MT. The Solid Organ Transplant Patient. In: Marx JA, Hockberger RS, Walls RM. Eds. Rosen's Emergency Medicine- Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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10. Correct Answer: B. Uterine rupture most commonly occurs during the first stage of labor, and is more common in women undergoing vaginal birth after cesarean (VBAC). There is additional risk with a previous classical (vertical) incision or if the mother has undergone more than three prior C-sections. Uterine rupture can range from simple scar separation to expulsion of the fetus, and can be painless and present only as fetal distress. Fetal mortality rates can be as high as 20%. Treatment consists of emergent C-section.

Uterine inversion, conversely, typically occurs in the third stage of labor and presents with extreme pain and life-threatening hemorrhage. Attempts should be made to replace the uterus with counter pressure, but if attempts are unsuccessful, operative repair is indicated.

References:

1. Echevarria M, Kuhn G. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Tripp M. Complications of Labor. In: Harrigan, Ufberg, Tripp, eds. Emergency Medicine Review: Preparing for the Boards. St Louis Elsevier, 2010.

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11. Correct Answer: E. Women with a history of tubal ligation or other pelvic surgery are at increased risk for ovarian torsion. Most (approximately 60%) of cases of ovarian torsion occur on the right side and not the left (answer B).

Benign tumors of the ovary are more likely to cause torsion than malignant tumors (answer A). A benign tumor or cyst may act as a swivel point at which twisting of the ovary can occur. Malignant ovarian tumors are more likely to have adhesions which serve to tether the ovary to surrounding structures, reducing the risk of torsion. An enlarged corpus luteum cyst is likely the cause of the increased risk of ovarian torsion in early pregnancy (answer C).

The diagnostic test of choice is color Doppler sonography. The combination of enlargement of the affected ovary secondary to edema and venous congestion, free fluid in the pelvis, and a lack of venous and arterial flow are highly suggestive of torsion; however, the presence of arterial flow on Doppler imaging does not exclude the diagnosis (answer D). Early in the course of ovarian torsion, sonography may only show a lack of venous flow secondary to the lower pressure in the venous system and subsequent easier compressibility of the veins when compared to arteries. Additionally, if the patient's ultrasound is done during a temporary period of detorsion, color Doppler sonography may even show a normal ovary, and the diagnosis can be missed. Patients with ovarian torsion require emergent gynecologic surgery to attempt salvage of the ovary.

References:

1. Bider D, Mashiach S, Dulitzky M, Kokia E, Lipitz S, Ben-Rafael Z. Clinical, surgical and pathologic findings of adnexal torsion in pregnant and nonpregnant women. Surg Gynecol Obstet. 1991 Nov; 173(5):363-6.

2. Chiou SY, Lev-Toaff AS, Masuda E, Feld RI, Bergin D. Adnexal torsion: new clinical and imaging observations by sonography, computed tomography, and magnetic resonance imaging. J Ultrasound Med. 2007 Oct;26(10):1289-301.

3. Mashiach R, Melamed N, Gilad N, Ben-Shitrit G, Meizner I. Sonographic diagnosis of ovarian torsion: accuracy and predictive factors. J Ultrasound Med. 2011 Sep; 30(9):1205-10.

4. Rha SE, Byun JY, Jung SE, Jung JI, Choi BG, Kim BS, Kim H, Lee JM. CT and MR imaging features of adnexal torsion. Radiographics. 2002 Mar-Apr;22(2):283-94.

5. Sommerville M, Grimes DA, Koonings PP, Campbell K. Ovarian neoplasms and the risk of adnexal torsion. Am J Obstet Gynecol. 1991 Feb;164(2):577-578.

6. Tibbles CD. Selected Gynecologic Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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12. Correct Answer: A. This patient developed a low grade fever after blood transfusion consistent with a febrile transfusion reaction. Treatment involves stopping the blood transfusion, giving acetaminophen, and then resuming the transfusion.

Empiric antibiotics may be given when a bacterial contamination is suspected. However, this is much less common and patients are typically very ill-appearing or septic. Furosemide may be given for transfusion-associated circulatory overload (TACO), but these patients are typically short of breath with evidence of fluid overload. Steroids are unlikely to be of benefit in this case. Repeating the type and crossmatch may be considered if one suspects that the first blood sample was incorrect.

References:

1. Coil CJ, Santen SA. Transfusion Therapy. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Emery M. Blood and Blood Components. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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13. Correct Answer: B. This patient is suffering from thyroid storm. The treatment of thyroid storm during pregnancy is similar to treatment outside of pregnancy. Initial treatment focuses on supportive care, with IV fluids and acetaminophen. Third-trimester pregnant patients should additionally be placed in the left lateral decubitus position to limit venous obstruction. Inhibition of thyroid hormone release is accomplished with thioamides including propylthiouracil (PTU) or methimazole.

Methimazole is contraindicated during the first trimester of pregnancy due to a marked increase in birth defects. There is still some debate about PTU versus methimazole during the second and third trimesters, as PTU is also associated with a risk of hepatotoxic sequelae.

Inhibition of thyroid hormone production requires iodine, which must be given after thioamide therapy. Other focuses of treatment are beta blockade and decreasing peripheral conversion of T4 to T3. Beta blockade is usually accomplished with propranolol, since propranolol also decreases peripheral conversion of T4 to T3. Dexamethasone or hydrocortisone can be given to help prevent this peripheral conversion, but also to offset potential relative adrenal insufficiency. Dexamethasone, potassium iodine, propranolol, and PTU are all relatively safe in the first trimester of pregnancy.

References:

1. Dyne P, Waxman M. Comorbid Diseases in Pregnancy. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Idros AM. Thyroid Disorders: Hyperthyroidism and Thyroid Storm. In: Tintinalli JE et al, eds Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Hackmon R, Blichowski M, Koren, G. The safety of methimazole and propylthiouracil in pregnancy: a systematic review. J Obstet Gynaecol Can. 2012 Nov;34(11):1077-86.

4. Leung A. Thyroid and Pregnancy: Higher risk of birth defects in women treated with methimazole vs propylthiouracil during pregnancy. Clinical Thyroidology. July 2012; 5(10): 6.

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14. Correct Answer: E. In this case, the patient demonstrates functions of moderate sedation. Moderate sedation is the drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is always maintained.

Minimal sedation is anxiolysis. Patients respond normally to verbal commands. Although cognitive functions and coordination may be impaired, ventilatory and cardiovascular functions are unaffected.

Dissociative sedation is a trancelike cataleptic state induced by the dissociative agent ketamine. Ketamine provides analgesia and amnesia while protecting the airway reflexes, spontaneous respirations, and cardiopulmonary stability.

In deep sedation, patients cannot be easily aroused but respond purposefully after repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired and they may require assistance in maintaining a patent airway. Patients may lose spontaneous ventilation though cardiovascular function is usually maintained.

General anesthesia is when patients are not arousable even with painful stimulation. The ability to independently maintain ventilatory function is often impaired, thus requiring assistance to maintain a patent airway and ventilation. Cardiovascular function may be impaired.

References:

1. Burbulys D. Procedural Sedation and Analgesia. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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15. Correct Answer: C. The correct order is: engagement, flexion, descent, internal rotation, extension, and external rotation.

1. Engagement is the entering of the biparietal diameter into the pelvic inlet.

2. The baby's head then flexes so that the chin meets the chest, allowing for the smallest diameter of the baby's head to present into the pelvis.

3. As the baby's head flexes, it is moving deeper and deeper into the pelvic cavity during the cardinal movement known as descent.

4. Once in the pelvic inlet, the baby's head continues to descend and internally rotates to align its widest parts with the widest parts of the pelvic outlet.

5. Now that the head is passed fully through the pelvis, the neck extends, allowing for the head, face, and chin to be delivered.

6. Lastly, the shoulders are externally rotated at the pelvis, allowing for the rest of the baby to be delivered.

References:

1. Tintinalli J, Kelen G, Stapczynski J. Emergency Medicine. New York: McGraw-Hill, Medical Pub. Division; 2004.

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16. Correct Answer: C. The patient likely has patellofemoral pain syndrome (PFPS). It is the most common cause of atraumatic knee pain. The pain is usually vague, the onset is typically gradual, and the symptoms are made worse with prolonged knee flexion (sitting at a desk all day) and with climbing or running. PFPS is also known as "runner's knee". Affected patients are often young, although PFPS can also occur in elderly patients with patellofemoral arthritis. On exam, patients ambulate with an antalgic gait and have pain with the patellar grind test. They may also demonstrate tight lateral structures, which cause maltracking of the patella, evidenced by a positive patellar tilt test and a hypomobile patella on medial glide testing. Treatment is conservative - activity modification and NSAIDS for pain and physical therapy to strengthen the quadriceps.

Medial tibial stress syndrome (MTSS) or "shin splints" (answer A) is an extremely common overuse injury to the distal lower extremity. Pain is often vague and diffuse, and symptoms often arise in athletes who have recently increased their training regimen. When considering this diagnosis it is important to rule out a tibial stress fracture. Treatment of MTSS is conservative and often involves activity modification and correction of gait abnormalities.

Patellar tendonitis or "jumper's knee" (answer B) is pain and inflammation of the patellar tendon, which originates at the inferior aspect of the patella and inserts on the proximal tibia. The patellar tendon serves as part of the knee extensor mechanism. Tendonitis is evidenced by pain at the inferior pole of the patella, which will be exquisitely tender on exam. Treatment is conservative. Because PFPS is the most common cause of atraumatic knee pain and the patient has a significant risk factor for PFPS (sitting all day at work), PFPS is more likely.

Pes anserine bursitis (answer D) is a painful inflammation of the pes anserine bursa, which is located a few centimeters below the medial joint line, overlying the proximal tibia at the insertion site of the sartorius, gracilis, and semitendinosus tendons. The pain is usually abrupt in onset. It is usually a self-limited condition and management is conservative.

Quadriceps tendonitis (answer E) refers to inflammation of the distal quadriceps tendon, an extension of the quadriceps femoris muscle, at its insertion on the superior aspect of the patella. It is a common cause of anterior knee pain. The quadriceps tendon is a crucial part of the knee extension mechanism. Patients with quadriceps tendonitis have pain at the superior aspect of the patella and pain with patellar inhibition testing. This is performed by pinching the distal quadriceps tendon while the knee is extended and preventing superior translation of the patella while the patient flexes his or her quad muscle. Pain elicited during this maneuver is consistent with quadriceps tendonitis.

References:

1. Glaspy J. Knee and Leg Injuries In: Tintinalli JE et al, eds. Emergency Medicine: Just the Facts. 2nd ed. New York: McGraw-Hill, 2004.

2. Pallin D. Knee and Lower Leg. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Dixit S, Burton M, Mines, B. Management of Patellofemoral Pain Syndrome. Am Fam Physician. 2007 Jan; 75(2):194-202.

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17. Correct Answer: E. This patient is suffering from a corneal ulcer secondary to prolonged contact use. This is a serious infection involving multiple layers of the cornea. The infection in this patient was most likely caused by prolonged contact use, which causes breakdown in the epithelial barrier allowing infectious agents to gain access to the corneal stroma. The widespread increase in contact lens use is associated with a rise in *Pseudomonas* infection. Diagnosis is made by visualization of a corneal defect on fluorescein staining of the eye.

Methicillin-resistant Staph aureus, *Bacteroides fragilis*, *Moraxella catarrhalis*, and *Candida albicans* are not commonly associated with corneal ulcers.

References:

1. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Wright JL, Wightman JM. Red and Painful Eye. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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18. Correct Answer: D. A patient currently being treated with antibiotics for an uncomplicated infection does not necessarily predispose him/her to a spinal infection. A notable exception would be in the case of sepsis.

The remaining answer choices all contain patients with risk factors that do predispose patients to spinal infections such as an epidural abscess. For answer A, although the patient is on antiretroviral therapy, having HIV nonetheless makes the patient high risk given his potentially immunocompromised state. For answer B, a history of substance use, including alcohol and especially IV drug use, is a significant risk factor for spinal infections. For answer C, the patient is at higher risk because chronic steroid use may cause an immunocompromised state and the injections are considered instrumentations to his back, which are both significant risk factors for spinal infections. Finally, for answer E, diabetes and renal dysfunction are known risk factors for spinal infections.

References:

1. Mahoney B. Back Pain. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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19. Correct Answer: C. This patient is suffering from orbital cellulitis, a post-septal infection of the tissues of the orbit. Once post-septal involvement occurs, it is considered orbital cellulitis and is an ophthalmologic emergency. Orbital cellulitis is associated with periorbital swelling and erythema, as well as fever, proptosis of the globe, pain with extraocular movements, and decreased visual acuity. The diagnosis is typically clinical, although a CT of the orbits can be helpful in equivocal cases. Treatment for orbital cellulitis is immediate broad spectrum antibiotics and an emergent ophthalmology consultation. Periorbital cellulitis is associated with periorbital erythema and swelling and is a pre-septal infection.

Amoxicillin is an appropriate treatment for periorbital cellulitis, which can be managed as an outpatient with close follow-up. CT of the orbits is not necessary to diagnose orbital cellulitis unless there is ambiguity present as to whether there is post-septal involvement. You should not admit to the hospitalist without first consulting ophthalmology. Additionally, levofloxacin is also not broad enough as it does not fully cover staphylococcal species. Finally, topical erythromycin is given for bacterial conjunctivitis, but insufficient for the treatment of orbital cellulitis.

References:

1. Mayer TA, Fullerton K, Bosley B. Eye Problems in Infants and Children. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Sharma R, Brunette DD. Ophthalmology. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

3. Walker RA, Adhikari S. Eye Emergencies. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

4. Wright JL, Wightman JM. Red and Painful Eye. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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20. Correct Answer: D. Pretest probability drives the diagnostic testing process in weighing the likelihood of positive diagnosis versus the risks and costs of testing. Wells' criteria is a validated scoring system for pulmonary embolism that categorizes patients into high, moderate or low risk.

Wells' Criteria for Pulmonary Embolism (PE)
Suspected DVT (+3)
Alternative diagnosis less likely than PE (+3)
HR >100 beats per minute (+1.5)
Prior venous thromboembolism (+1.5)
Immobilization within the prior 4 weeks (+1.5)
Active malignancy (+1)
Hemoptysis (+1).

Classification	
> 6 points	High risk (78.4% have a PE)
2-6 points	Moderate risk (27.8% have a PE)
< 2 points	Low risk (3.4% have a PE)

References:

1. Kline JA. Thomboembolism. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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21. Correct Answer: E. While lower genital tract lacerations can cause postpartum hemorrhage, the most common cause is uterine atony. Other causes include uterine rupture, uterine inversion, retained products of placenta, and coagulopathy.

Postpartum hemorrhage can be defined as a 10% drop in the hematocrit, a need for transfusion of packed red blood cells, or volume loss that causes symptoms of hypovolemia. Primary postpartum hemorrhage occurs in the first 24 hours of delivery. However, secondary postpartum hemorrhage occurs up to 6 weeks postpartum. Due to physiologic changes seen in pregnancy, there is up to a 40% increase in plasma volume by the end of the third trimester. As a result, the patient may lose up to 30% of total blood volume before their vital signs alert you to hemodynamic instability. When treating PPH, one should simultaneously address hypovolemia and look for the cause of hemorrhage. As uterine atony is the most common cause, the first line treatment is oxytocin 10 mg slow intravenous push to cause uterine contraction. Ergotamines and prostaglandins may be given as a secondary option.

References:

1. Echevarria MA, Kuhn GJ. Emergencies after 20 Weeks of Pregnancy and the Postpartum Period. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York, NY: McGraw-Hill; 2011.

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22. Correct Answer: B. This patient presents with a form of primary adrenal crisis known as Addisonian crisis. Patients with primary adrenal insufficiency will suffer from hyponatremia due to sodium loss and volume depletion from loss of cortisol and aldosterone secretion. In addition, 60% of patients with primary adrenal sufficiency will present with hyperkalemia due to lack of mineralocorticoids (aldosterone).

Answers A, C, and D are incorrect for the reasons described above. Answer E is also incorrect in that adrenal insufficiency may manifest in a mild hyperchloremic state.

References:

1. Sharma AN, Levy DL. Thyroid and Adrenal Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Kefer MP. Adrenal Insufficiency and Adrenal Crisis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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23. Correct Answer: A. A definite intrauterine pregnancy (IUP) seen on ultrasound practically excludes ectopic pregnancy. Heterotopic pregnancies occur in only 1 in 3000 pregnancies in the general population. The risk increases for patients undergoing in vitro fertilization, and thus it is important to obtain this information from your patient. However, in patients who have not undergone treatment to enhance fertility, IUP on ultrasound effectively rules out an ectopic pregnancy. If an IUP is visualized, other investigations should be performed to identify the etiology of the patient's symptoms.

Although it is true that absolute levels of β-hCG are lower and doubling times longer in ectopic pregnancy and other abnormal pregnancies, β-hCG varies widely in different women and there is no single value in which an ectopic pregnancy can be excluded in a pregnant female (answer B).

Some manufacturers are creating tests that may also be performed on serum. If unable to obtain urine, consider using serum to expedite the diagnosis (answer C).

A 2-day doubling time of β-hCG is only a guide (answer D). The rise in normal pregnancy may be as low as 53% in 48 hours. One study showed the median rise in β-hCG levels was 53% in 1 day and 124% in 2 days. The β-hCG is best used when trended and in combination with repeat ultrasonography to confirm IUP.

Whenever ectopic pregnancy is suspected, an ultrasound must be performed, as an ectopic pregnancy cannot be excluded even at very low β-hCG levels (answer E).

References:

1. Krause RS, Janicke DM, Cydulka RK. Ectopic Pregnancy and Emergencies in the First 20 Weeks of Pregnancy. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

2. Barnhart KT, Samuel M, Rinaudo P, et al. Symptomatic patients with an early viable intrauterine pregnancy: hCG curves redefined. Ob Gyn. 104: 50, 2004

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24. Correct Answer: A. This patient has a leg cellulitis. In cellulitis, the skin is warm, red, swollen, and tender to the touch. There usually are no sharp demarcations differentiating the cellulitis from the uninvolved skin. Dimpling can occur in the skin due to edema around hair follicles resulting in an orange peel appearance also known as "peau d'orange". Symptoms usually develop over a few days.

A deep vein thrombosis (answer B) is less likely given an antecedent event of a skin injury from shaving with associated skin erythema. More typically a deep vein thrombosis presents with asymmetric extremity swelling without erythema. Erysipelas (answer C) generally has a more acute onset of symptoms with fever, chills, malaise, and nausea representing the prodromal phase. Typically there is a raised border that is sharply demarcated from surrounding normal skin. Folliculitis (answer D) is easily identified on exam and typically has a central pustular lesion which emanates from an affected hair follicle which may or may not have a surrounding cellulitis. Necrotizing fasciitis (answer E) typically has a more severe presentation with an ill appearing, febrile patient with pain out of proportion to exam. Findings may also include crepitus, purpura, bullae, and areas of necrosis.

References:

1. Kelly EW, Magilner D. Soft Tissue Infections. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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25. Correct Answer: C. Significant electrolyte imbalances are uncommon after transfusions, however they can occur with patients that have underlying pathology (such as renal impairment or decreased hepatic function) or after large volume transfusions. Packed red blood cells contain the preservative anticoagulant citrate, which chelates calcium. In a patient with normal hepatic function, the citrate is metabolized by the liver to bicarbonate. This function is impaired in patients with liver failure causing citrate accumulation and subsequently hypocalcemia as a result of calcium chelation. Hyperchloremia, hypochloremia, and hypercalcemia are uncommon after blood transfusions. Hyperkalemia may be seen with hemolysis or in older blood products, but hypokalemia is unusual.

References:

1. Coil CJ, Santen SA. Transfusion Therapy. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Emery M. Blood and Blood Components. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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26. Correct Answer: E. In light of her history of malignancy, the clinician should consider malignant spinal cord compression (MSCC). The mechanism of action is secondary to a mass compressing of the epidural venous complex, compromising the blood-spinal barrier. This compromise leads to increased inflammation and vasogenic edema that may hasten the compressive phenomenon. The acute treatment for MSCC requires a multipronged approach. Immediate treatment may include high dose corticosteroids to decrease edema, if present. Immediate oncology, radiation oncology, and neurosurgical consults should be obtained to determine possible definitive and palliative treatments.

A new neurologic deficit and negative head CT may initially prime the clinician to choose to either administer a fibrinolytic (answer A) or obtain a MRI brain (answer D) given the concern for an acute stroke. Both answers are incorrect, as the lesion in this stem is located in the spinal cord. Clues that this patient has spinal cord pathology more so than a stroke is that her neurologic deficits are bilateral. The patient's urinary incontinence also suggests a spinal cord compression syndrome.

Although neurology consult will eventually be required (answer B), an MRI and possible neurosurgical or radiation oncology consult should take precedence. Malingering is always a diagnosis of exclusion (answer C).

References:

1. Perron AD, Huff JS. Spinal Cord Disorders. In: Marx. John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

2. Ugras-Rey SS. Selected Oncologic Emergencies. In: Marx. John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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27. Correct Answer: D. Recurrent unilateral epistaxis, especially in older male patients and smokers, should raise concern for nasopharyngeal carcinoma. Nasopharyngeal carcinoma is a rare disease, which often presents with advanced disease and associated local invasion with metastatic spread to regional lymphatics. The indolent nature of the disease occurs secondary to the non-specific early symptoms, which can be easily ignored. These include persistent unilateral epistaxis, otitis media secondary to obstruction, unilateral hearing loss, or nasal obstruction. Late symptoms can include cranial nerve palsies and bilateral fixed lymphadenopathy. Therefore, patients presenting with a recurrence of any of the above symptoms should be given an urgent otolaryngology referral.

Primary care follow up and advice on supportive care may be valuable, but are of significantly less importance, as the diagnosis will likely be significantly delayed. Topical antibiotics and prophylactic packing are not indicated once bleeding has ceased.

References:

1. Pfaff, JA, Moore GP. Otolaryngology. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Mosby/Elsevier, 2010.

2. Tan L, Loh T. Benign and Malignant Tumors of the Nasopharynx. In: Flint PW, Haughey BH, Lund VJ, eds Cummings Otolaryngology: Head & Neck Surgery, 3 Volume Set. 5th ed. Philadelphia, PA: Elsevier - Health Sciences Division; 2010.

3. Licitra L, Bernier J, Cvitkovic E, et al. Cancer of the Nasopharynx. Crit Rev Onc and Hem. 2003; 45: 199-214.

4. Chan AT, Gregoire JL, Licitra L, et al. Nasopharyngeal cancer: EHNS-ESMO-ESTRO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann. Of Onc. 2012; 23(7): vii83-vii85.

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28. Correct Answer: E. This patient is exhibiting symptoms of CNS depression secondary to benzodiazepine toxicity, sufficient to require definitive airway management. Benzodiazepine toxicity may cause CNS depression but it rarely causes coma unless taken in very high quantities or co-ingested with other depressants. However, if benzodiazepine toxicity does occur in a patient with chronic dependence the correct management is supportive care. In this case, that would be intubation followed by supportive care.

Flumazenil is the antidote to benzodiazepine toxicity, however, reversal of toxicity should be avoided in someone with dependence to benzodiazepines since this may elicit seizure activity. Flumazenil therapy is best reserved for benzodiazepine overdose during procedural sedation or in children with accidental ingestion (answer A). This patient needs supportive care via intubation, but flumazenil should be avoided to prevent seizure (answer C). Fomepizole is the treatment for toxic alcohol overdose and has no role in benzodiazepine overdose (answers B and D).

References:

1. Quan D. Benzodiazepines. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Gussow L, Carlson A. Sedative Hypnotics. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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29. Correct Answer: E. Extrapyramidal symptoms caused by psychiatric medications are common with use of older (high-potency, first generation, typical) antipsychotics, such as fluphenazine, haloperidol, loxapine, perphenazine, pimozide, thiothixene, and trifluoperazine. They are divided into three major patterns: early-onset reversible symptoms, delayed-onset reversible syndromes, and potentially irreversible syndromes.

Early-onset symptoms include acute dystonia, akathisia, and akinesia. Acute dystonia, hyperkinentic involuntary contractions of muscles, may appear as early as several hours after initial hours to 3 days after antipsychotic therapy is started. Akathisia, a subjective sensation of motor restlessness, and akinesia, loss or impairment of the power of voluntary movement, typically occur minutes to months after initiating or increasing her antipsychotic medication. These can be treated by diphenhydramine or benztropine.

Parkinsonism is a delayed-onset reversible syndrome occurring days to weeks after antipsychotic initiation. Parkinsonism can be treated by medication regimen adjustment or adding agents such as anticholinergics or dopaminergics. Potentially irreversible syndromes include tardive dyskinesia and typically begin months to years after therapy.

References:

1. Levine M, Lovecchio F. Antipsychotics. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Weisberg LA, Strub RL, Garcia CA. Abnormal Involuntary Movement Disorders (Dyskinesias). In: Essentials of Clinical Neurology. Baltimore: University Park Press. 1983.

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30. Correct Answer: C. Triage classifies patients into treatment priorities; the guiding principle is to maximize resources in order to help the most amount of patients. The most common triage classification in the U.S. involves assigning patients to one of four color-coded categories depending on injury and prognosis. This patient has tachycardia and altered mental status, classifying her as red (answer C).

If she had a major extremity injury with normal vitals and mental status, yellow (answer E) would be more appropriate. Green (answer B) would apply for very minor injuries, while black (answer A) suggests current or imminent risk of death. White (answer D) is not a triage designation.

Level 1: Red (Critical)
Level 2: Yellow (Priority)
Level 3: Green (Delayed)
Level 4: Black (Dead or Expectant)

References:

1. Horowitz BZ, Hendrickson RG. Disaster Preparedness and Response. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. Ed. Judith E. Tintinalli. New York: McGraw-Hill, 2011. 29-33.

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31. Correct Answer: B. In this clinical scenario, the patient is suspected to have a tension pneumothorax. The tension pneumothorax should be relieved prior to applying positive pressure ventilation which would contribute to hemodynamic collapse. Rapid sequence intubation should occur after chest tube thoracostomy or can occur simultaneously. Needle decompression of a tension pneumothorax should not be delayed by a portable chest x-ray, the FAST exam, or obtaining IV access and initiating transfusion.

References:

1. Vissers RJ, Danzl DF. Tracheal intubation and mechanical ventilation. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Brunett PH, Yarris LM, Cevik AA. Pulmonary trauma. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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32. Correct Answer: B. This patient has neutropenic enterocolitis, also known as typhlitis. This condition is believed to be caused by bacterial invasion of damaged gastrointestinal mucosal in the setting of neutropenia. This typically occurs 10 to 16 days after chemotherapy. Symptoms include nausea, vomiting, abdominal distention, and diarrhea. They may be febrile and tender in the right lower quadrant. CT imaging typically shows distention of the cecum with edema of the wall. Unless diagnosed and addressed early, mortality rates can approach 80%.

Treatment involves bowel rest, nasogastric decompression, and fluid resuscitation. Broad spectrum antibiotics are required given bacterial invasion of the intestinal wall. Although surgical intervention has become less frequent with early aggressive medical management, consultation is required, given the significant potential for perforation. Radiation oncology consult is not appropriate, as this disease is not caused by malignant obstruction and radiation therapy would worsen the illness.

References:

1. Blackburn P. Emergency Complications of Malignancy. In: Tintinalli JE, Stapczynski J, Ma O, Cline DM, Cydulka RK, Meckler GD, T. eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 7e. New York, NY: McGraw-Hill; 2011.

2. Zuckerman T, Ganzel C, Tallman M, Rowe J. How I treat hematologic emergencies in adults with acute leukemia. Blood. 2012;120(10):1993-2002.

3. Lewis M, Hendrickson A, Moynihan T. Oncologic emergencies: Pathophysiology, presentation, diagnosis, and treatment. CA: A Cancer Journal for Clinicians. 2011.

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33. Correct Answer: B. Inhalation anthrax is a potentially fatal infection caused by *Bacillus anthracis*. It can be acquired handling animal hides, but is also a known bioterrorism agent. Symptoms initially appear similar to influenza, but rapidly progress to respiratory failure over 2 to 3 days. Classically, anthrax causes a mediastinitis, resulting in mediastinal widening and hilar adenopathy on chest radiograph. Diffuse pulmonary edema, focal infiltrates, pleural effusions, and pneumothoraces are uncommon in patients with anthrax.

References:

1. Kitch BB, Meredith JT. Zoonotic Infections. In: Tintinalli J, ed.Emergency Medicine: A Comprehensive Study Guide. 8th ed. New York: McGraw-Hill; 2004.

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34. Correct Answer: E. When similar voltages are used, alternating current is considerably more dangerous than direct current. Direct currents cause a brief, isolated electrical injury, while alternating currents cause the muscles to contract leading to a prolonged exposure. Additionally, alternating currents have been associated with higher rates of ventricular fibrillation.

Posterior shoulder dislocations (not anterior dislocations) are more commonly associated with electrical injuries (answer A). Cardiac dysrhythmias will generally occur immediately after the incident (answer B). Delayed dysrhythmias in asymptomatic patients with normal ECGs are exceedingly rare. Lhermitte's sign refers to severe paresthesias that traverse the spine, seen in patients with multiple sclerosis (answer C). Lichtenberg figures are branchlike skin findings that can be seen after a lightning injury. Finally, the most important complication from oral commissure burns is delayed bleeding (answer D). Therefore, it is important to warn parents and provide appropriate otolaryngology follow up.

References:

1. Bailey C. Electrical Injuries. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 8th ed. New York: McGraw-Hill, 2015.

2. Price TG, Cooper MA. Electrical and Lightning Injuries. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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35. Correct Answer: A. Post-resuscitation care aims to optimize cardiac output and oxygen delivery. Studies have suggested potential benefit to therapeutic hypothermia at 32-34 degrees Celsius in comatose survivors of out-of-hospital witnessed ventricular fibrillation arrest (answer C). However, other studies have suggested hypothermia produces similar outcomes to maintaining normothermia. For testing purposes, hypothermia is still likely an acceptable answer. Certainly, hyperthermia has been associated with poor outcomes (answer A). FiO2 should be titrated to a SpO2 of 94-98% to avoid oxidative injury to sensitive tissues recovering from ischemia (answer E). Vasoactive agents should be used as needed to support cardiac output and tissue perfusion (answer B). Intravenous heparin may be utilized by your cardiologist in management of STEMI or NSTEMI, however it is not indicated routinely in post-arrest care in the absence of these entities (answer D).

References:

1. Bernard S, Gray T, Buist M, et al. Treatment of Comatose Survivors of Out-of-Hospital Cardiac Arrest with Induced Hypothermia. New England Journal of Medicine. 2002;346(8):557-563.

2. Hypothermia after Cardiac Arrest Study Group. Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. N Engl J Med. 2002 Feb 21;346(8):549-56.

3. Bernard S, Smith K, Cameron P, et al. Induction of Therapeutic Hypothermia by Paramedics After Resuscitation From Out-of-Hospital Ventricular Fibrillation Cardiac Arrest: A Randomized Controlled Trial. Circulation. 2010;122(7):737-742.

4. Kilgannon J. Association Between Arterial Hyperoxia Following Resuscitation From Cardiac Arrest and In-Hospital Mortality. JAMA. 2010;303(21):2165.

5. Ward K, Kurz M, Neuromar R. Adult Resuscitation In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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36. Correct Answer: A. This patient is experiencing High Altitude Cerebral Edema (HACE). Among high altitude illnesses, this is the rarest (incidence < 1-2%) and most deadly. Changes in mentation and ataxia are the highly sensitive findings for the early recognition of HACE. When ataxia is present, immediate descent or portable hyperbaric oxygen therapy need to occur. If HACE progresses to coma, the mortality rate can exceed 60%. However, if it is treated early, there is generally a good outcome. Options B-E are non-specific findings and may signify either acclimatization or early HACE.

References:

1. Hackett PH, Hargrove J. High-Altitude Medical Problems. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Yaron M, Peterson RD, Davis CB. High-Altitude Medicine. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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37. Correct Answer: B. Endometriosis is an underdiagnosed cause of recurrent pelvic pain in women. Patients with endometriosis may present to the emergency department with a broad array of symptoms such as dyschezia (pain with defecation), dyspareunia, urinary tract infection symptoms, or abdominal pain with exercise. Infertility is common. Emergency department management of these patients is centered around adequate pain control as well as ruling out other causes of pelvic pain including pregnancy, urinary or pelvic infection, and ovarian cyst/torsion. Follow up with a gynecologist is essential because definitive diagnosis is achieved by surgery (exploratory laparoscopy). A laparoscopy will show endometriosis lesions in various locations, most commonly the ovaries. Endometriosis lesions can be found on many other areas including the rectum, bladder, ureter, liver, and lung.

References:

1. Mounsey AL, Wilgus A, Slawson DC. Diagnosis and management of endometriosis. Am Fam Physician. 2006 Aug; 74(4):594-600.

2. Ozawa Y, Murakami T, Terada Y, Yaegashi N, Okamura K, Kuriyama S, Tsuji I. Management of the pain associated with endometriosis: an update of the painful problems. Tohoku J Exp Med. 2006 Nov;210(3):175-88.

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38. Correct Answer: E. The patient is likely suffering from optic neuritis. Patients with this diagnosis have a 20% risk of developing multiple sclerosis (MS) within 2 years, and a 45-80% risk of developing MS within 15 years. Optic neuritis is often the first symptom of MS.

Behcet's is a rare systemic small-vessel vasculitis that can cause painful vision loss in the form of uveitis (answer A). Nearly all patient with this disease have other symptoms, especially mucocutaneous ulcerations. Diabetics are at risk for developing retinopathy causing decreased vision and mononeuropathy that often affects cranial nerve III, but this is typically painless (answer B). Graves' disease, if left untreated, can cause an autoimmune mediated ophthalmopathy characterized by lid lag and exophthalmos (answer C). Some forms of Guillain-Barre syndrome can cause ophthalmoplegia, especially the Miller-Fisher variant, which preferentially affects cranial nerves, but would not be expected to cause painful vision loss (answer D).

References:

1. Stettler BA. Brain and Cranial Nerve Disorders. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/ Saunders, 2014.

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39. Correct Answer: B. Transient ischemic attacks (TIA) involving the middle cerebral artery presents as contralateral weakness and numbness affecting the face and arm more so than the leg. Aphasia may also be present if the dominant hemisphere is involved.

TIAs of the anterior cerebral artery (answer A) cause contralateral leg weakness greater than arm weakness, often with cortical sensory deficits. Pontine artery TIAs can present with variable findings depending on the region of the pontine involvement (e.g. lateral, inferior medial, ventral) but typically brainstem TIAs present with ipsilateral cranial nerve palsy and contralateral hemiplegia/hemiparesis and sensory loss. TIAs of the posterior cerebral artery (answer D) present with visual changes secondary to occipital lobe involvement, typically sparing motor involvement. TIAs involving the vertebrobasilar artery (answer E) usually causes hemiplegia or quadriplegia along with visual changes (hemianopsia, blindness, diplopia), vertigo, sensory disturbance, dysphagia, and/or dysarthria.

References:

1. Go S, Daniel J, Worman DJ. Stroke Syndromes. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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40. Correct Answer: D. Clinical symptoms of vulvovaginal candidiasis include leukorrhea, severe vaginal pruritus, external dysuria, and dyspareunia; however, vaginal pruritus is the most common and specific symptom. Self-medication with over-the-counter preparations should be advised for women who have been diagnosed previously with vulvovaginal candidiasis and experience recurrence of the same symptoms. Vulvovaginal candidiasis occurs frequently during pregnancy and may be more difficult to cure. Only topical azole therapies, applied for 7 days, are recommended for use during pregnancy. Oral fluconazole is contraindicated in pregnancy. The sensitivity of microscopic examination using a sample prepared with normal saline is only 40% - 60%. Adding two drops of 10% KOH to the vaginal secretions increases the sensitivity of microscopic examination to 80% and yields almost 100% specificity. Lugol's solution is an iodine-based solution to help detect abnormalities on colposcopy and is not indicated in the evaluation of candidiasis. Vulvovaginal candidiasis in HIV-positive patients is not considered complicated and should be treated as uncomplicated vulvovaginal candidiasis.

References:

1. Kuhn GJ, Wahl RP. Vulvovaginitis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Birnbaumer DM, Anderegg C. Sexually Transmitted Diseases. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Elsevier/Saunders, 2011.

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41. Correct Answer: C. This patient is at risk for decompression sickness (DCS) due to the rapid ascent. Usually on slow, controlled ascent, inert gases are washed out of the tissues on pace with pressure normalization. With a rapid ascent, this does not occur at a fast enough rate, resulting in the inert gases remaining in the tissues and expanding under the decreased pressure at sea level.

The most common symptoms of DCS are myalgias, arthralgias, and paresthesias. Arterial gas embolism is due to microscopic pulmonary injury resulting in air bubbles entering the pulmonary arteries and embolization to various end organs. This may cause focal neurologic findings, such as ataxia or focal motor weakness. Barotrauma is usually caused by pressure differences and may cause tympanic membrane or sinus injury, resulting in headache, vertigo, hearing loss, or nausea and vomiting.

References:

1. Snyder B, Neuman T. Dysbarism and Complications of Diving. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Byyny RL, Shockley LW. Scuba Diving and Dysbarism. In: Marx, John A et al. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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42. Correct Answer: D. This patient is presenting with malignant otitis externa, a severe ear infection which most commonly affects elderly, diabetic, and immunocompromised individuals. The most common causative organism is *Pseudomonas aeruginosa*. CT is often necessary to determine the extent of disease. Patients will typically require hospital admission. Intravenous ciprofloxacin is the treatment of choice given its ability to provide pseudomonas coverage.

Amoxicillin and cephalexin are used more commonly for acute otitis media, but do not provide adequate coverage in this patient. Vancomycin provides methicillin-resistant *staphylococcus aureus* (MRSA) coverage, but does not provide pseudomonas coverage. Carbamide peroxide is a topical agent used to remove ear wax, and is insufficient in this patient.

References:

1. Silverberg M, Lucchesi M. Common Disorders of the External, Middle, and Inner Ear. In: Tintinalli J, ed. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill; 2011.

2. Pfaff JA, Moore GP. Otolaryngology. In: Marx, J ed. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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43. Correct Answer: E. For patients with a prosthetic valve, initial therapy should consist of vancomycin 15 mg/kg IV, gentamicin 1-3 mg/kg IV, and rifampin 300 mg PO. Vancomycin and gentamicin are needed for possible MRSA or coagulase-negative staphylococci. Rifampin is added for penetration of the biofilm that can accumulate on prosthetic material.

Nafcillin, gentamicin, and vancomycin (answer C) are appropriate for injection drug users, those with congenital heart disease, hospital-acquired endocarditis, when MRSA is suspected, or for patients already on antibiotics. Ultimately, all antibiotic choices should be tailored to blood culture results. Therefore, it is very important to obtain cultures before starting antibiotics. It is recommended to get three sets of blood cultures from three different locations with one hour separating the first and last culture. However, antibiotic treatment should not be delayed in patients in septic shock.

References:

1. Rothman RD, Yang S, Marco CA. Infective Endocarditis In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Baddour L. Infective Endocarditis: Diagnosis, Antimicrobial Therapy, and Management of Complications: A Statement for Healthcare Professionals From the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, Council on Cardiovascular Disease in the Young, and the Councils on Clinical Cardiology, Stroke, and Cardiovascular Surgery and Anesthesia, American Heart Association: Endorsed by the Infectious Diseases Society of America. Circulation. 2005;111(23):e394-e434.

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44. Correct Answer: D. The patient in this vignette has heat stroke. Immediate cooling is key to treatment. Heat illness occurs when the internal production of heat combined with external environmental factors overwhelm the body's mechanisms for cooling.

Heat illness includes a spectrum of presentations:

- **Minor heat illness:** heat cramps, heat edema, heat syncope
- **Heat exhaustion:** weakness, nausea, vomiting, dehydration
- **Heatstroke:** mental status change, end organ damage

The onset of heatstroke is sudden, with altered mental status (coma, seizures, delirium) being a hallmark symptom. The core temperature is usually above 40.5°C (105°F), but may be lower, especially as some cooling may have occurred during transport to the emergency department. Additional manifestations include liver failure, dysrhythmias, renal failure, rhabdomyolysis, pulmonary edema, and disseminated intravascular coagulation (DIC). Rapid cooling is imperative. The preferred approach is cooling via ice water immersion or by cool mist with fans. Adjunct cooling methods include ice packs to axilla and groin, cooling blankets, gastric/rectal/peritoneal lavage, and cardiopulmonary bypass.

Various tachyarrhythmias commonly occur during heatstroke. Beta blockers (answer B) are not indicated, as most of these tachyarrhythmias improve when the hyperthermia resolves. Electrical cardioversion (answer E) should be avoided until the myocardium is cooled and used only if needed when patient is cooled and dry. Cold intravenous fluids (answer C) may be used as an adjunct but is not rapid enough as a primary cooling mechanism. Antipyretics (answer A) are not indicated because the pathophysiology differs between heatstroke and fever, and may in fact be harmful. Large doses of acetaminophen may worsen hepatic damage. Salicylates can worsen hyperthermia by uncoupling oxidative phosphorylation and exacerbate coagulopathies.

References:

1. Platt M, Vicario S. Heat Illness. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 8th Ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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45. Correct Answer: B. Hemorrhoidal venous systems drain the anorectal area. The cause of enlarged hemorrhoids is not always known, but their formation is associated with straining and constipation. They are also prevalent during pregnancy.

Thrombosed external hemorrhoids cause pain that is most intense during the first 48 hours. Excision of the thrombus will benefit the patient the most. To do this, the area must first be injected with local anesthetic above the hemorrhoid just below the skin. Using forceps to elevate the skin overlying the thrombus, an elliptical incision should be made around the clot directed radially away from the anal orifice (answer B). The clot can then be removed with either digital pressure or forceps.

A cut should never be made through the thrombosed hemorrhoid or at the base (answers C and D). Reduction of the mass back into the rectum is done when there is no thrombosis present (answer E). Granulated sugar is utilized in rectal prolapse (answer A).

References:

1. Branecki C. Anorectal Disorders. In: Cline D, Ma O, Cydulka R, Thomas S, Handel D, Meckler G, ed. Tintinalli's Emergency Medicine: Just The Facts. 3rd ed. New York: McGraw-Hill Companies, Inc; 2013:170-175.

2. Burgess B, Bouzoukis J. Gastrointestinal Emergencies: Anorectal disorders. In: Tintinalli J, ed.Emergency Medicine: A Comprehensive Study Guide. 6th ed. New York: McGraw-Hill; 2004:539-551.

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46. Correct Answer: D. The most common cause of focal neurological deficits is stroke, but an appropriate broad differential diagnosis should be considered in the work-up. Patients presenting with focal neurological deficits should have their blood glucose level checked to assess for hypoglycemia (answer D). If the patient is found to be hypoglycemic (blood glucose <50 mg/dL), the appropriate next step would be to administer dextrose. Hypoglycemia can have a myriad of presentations, including focal neurological deficits, dysarthria, seizures, confusion, lethargy, and coma.

If there were focal neurologic deficits, brain imaging (answer E) such as CT scan or MRI should be obtained but only after a rapid assessment of blood glucose. Aspirin (answer A) may be used to prevent future stroke in patients with TIA, however it should not be administered until hemorrhage has been ruled out with brain imaging. Thrombolytics (answer B) are similarly not indicated at this time. An alcohol level (answer C) may be appropriate to obtain as part of the patient's clinical evaluation, but not before assessing her glucose level first.

References:

1. Go S, Daniel J. Worman DJ. Stroke Syndromes. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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47. Correct Answer: B. The nasal cavity is vascularized by branches of both the internal and external carotid arteries. The majority of nosebleeds (90%) are anterior and arise from Kiesselbach's plexus, located at the anterior nasal septum. This plexus is fed by several arteries, the terminal branch of the sphenopalatine artery, the superior labial branch of the facial artery, and the anterior ethmoidal artery. When applying direct nasal pressure in epistaxis, the patient should lean his or her head forward and pinch the cartilaginous tissue of the nose (the nasal ala) against the septum. Pressure should be applied constantly for a full 10 minutes.

Tilting the head backwards in epistaxis is not advised as patients may swallow blood, which can induce vomiting or possibly compromise the airway. Compressing only one nasal ala against the septum may not create adequate pressure to stop bleeding. Tilting the head sideways has not been shown to be an effective method of controlling epistaxis.

References:

1. Pfaff, JA, Moore GP. Otolaryngology. In: Marx, John A et al. Rosen's Emergency Medicine – Concepts and Clinical Practice. 7th ed. Philadelphia, PA: Mosby/Elsevier, 2010.

2. Summers, SM, Bey T. Epistaxis, nasal fractures, and rhinosinusitis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

3. Barnes M, Spielmann P, White P. Epistaxis: A Contemporary Evidence Based Approach. Otolaryngologic Clinics of North America. 2012 Oct; 45(5):1005-1017.

4. Schlosser, RJ. Epistaxis. New England Journal of Medicine. 2009 Feb; 360(8):784-9.

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48. Correct Answer: C. Hyperglycemia tends to artificially lower the serum sodium levels resulting in pseudo-hyponatremia. In addition, osmotic diuresis secondary to hyperglycemia leads to renal losses of sodium in the urine.

The correction factor is 1.6 mEq/L for every 100 milligrams increase in serum glucose over 100 mg/dL.

Measured serum Na + [1.6 x [(serum glucose-100)/100]] = corrected serum Na

In this case, serum glucose is measured to be 540 mg/dL and serum sodium is 130 mEq/dL. Using the above equation: 540 - 100 = 440. We then apply the correction factor 1.6 x (440/100) = 7.04. We then add 7.04 to the measured sodium to get the corrected sodium of 137.

References:

1. Chansky M, Lubkin C. Diabetic Ketoacidosis. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

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49. Correct Answer: E. In patients with neuromuscular disease, careful assessment of respiratory status and function should be a top priority. These patients may require mechanical ventilation as their weakness progresses to include the muscles of respiration. Obvious signs of the need for intubation may include: inability to handle secretions or protect the airway, paradoxical breathing, and aspiration. Tests of respiratory muscle strength (pulmonary function testing; PFTs) and gas exchange (arterial or venous blood gas) should be obtained and monitored for changes from baseline testing. This can be predictive of patients who will ultimately benefit from respiratory assistance with mechanical ventilation.

Normal pulmonary function test findings:

- Normal vital capacity (VC) = 40-70 mL/kg, with a critical cut-off 15-20 mL/kg highly indicative of needing endotracheal intubation

- Negative inspiratory force (NIF) > -60 cm H_2O, with a critical cut-off of > -20 cm H_2O as indicative of needing endotracheal intubation

A decline of greater than 30% from baseline PFTs has been shown to be a reliable indicator of the need for intubation. While blood gas abnormalities may not be present initially, hypercapnia >50 mmHg is usually indicative of poor gas exchange and the patient likely requires intubation. Hypoxia, measured by pulse oximetry, is usually a late finding and also indicates the need for emergent intubation.

Indications for an ICU admission may include: autonomic dysfunction, bulbar dysfunction, initial VC <20 mL/kg, initial NIF > -20 cm H_2O, decrease of >30% of VC or NIF, inability to ambulate, treatment with plasmapheresis, or patients requiring mechanical ventilation.

References:

1. Andrus P, Jagoda A. Acute Peripheral and Neurologic Lesions. In: Tintinalli JE et al, eds. Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 7th ed. New York: McGraw-Hill, 2011.

2. Ulane C. Myasthenic Crisis and Peripheral Neuromuscular Disorders. In: Arbo JE, Ruoss SJ, Geoffrey KL, Jones MP. eds. Decision Making in Emergency Medicine Critical Care. 1st ed. Philadelphia, PA: Wolters Kluwer, 2015.

3. Shearer P, Jagoda A. Neuromuscular Disorders. In: Marx JA, Hockberger RS, Walls RM. eds. Rosen's Emergency Medicine - Concepts and Clinical Practice. 8th ed. Philadelphia, PA: Elsevier/Saunders, 2014.

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50. Correct Answer: E. The patient is having an acute exacerbation of her multiple sclerosis (MS). The description of her ocular symptoms is consistent with optic neuritis, which often presents as unilateral eye pain with variable loss of vision. Uhthoff's phenomenon is the exacerbation of neurological symptoms in MS patients secondary to a rise in core body temperature. The treatment for acute optic neuritis is methylprednisolone 250-500 mg every 12 hours for 3-7 days.

Baclofen is used as an adjunctive supportive therapy for spasticity in multiple sclerosis (answer A). Glatiramer acetate (Copaxone), along with interferon-beta, are approved as suppressive treatments for relapsing-remitting multiple sclerosis (answer B). However, methylprednisolone is the first line treatment for optic neuritis in patients with MS. Hydroxychloroquine is an antimalarial medication, which may also be utilized as an immunosuppressant for patients with rheumatoid arthritis or lupus, but would not be indicated here (answer C). Intravenous immunoglobulin (answer D) is used in the treatment for Guillain-Barre syndrome and myasthenic crisis.

References:

1. Tintinalli JE. Neurology. In Tintinalli's emergency medicine: a comprehensive study guide. 7th ed. New York: McGraw-Hill; 2011.

2. Klein J, Ropper A, Samuels M. Major Categories of Neurologic Disease. In Adams and Victor's Principles of neurology. S.l.: [s.n.]; 2014.

3. Marx JA, Hockberger R, Walls R. Brain and Cranial Nerve Disorders. In Rosen's emergency medicine: concepts and clinical practice. 8th ed. Philadelphia: Elsevier, Saunders; 2014.

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