Questions

1. A 61-year-old male presents to your office with the chief concern of "coughing up blood and weakness" for the past 3 weeks. He reports several episodes every few days of coughing of bright red blood, approximately one to two tablespoons each time. The patient denies any chest pain, fevers, chills, or recent travel. He has mild dyspnea at baseline. He has recently developed lower extremity muscle cramps and has difficulty rising from a chair. Past medical history is significant for COPD diagnosed 5 years ago and HTN. He has a 40-pack-year smoking history and currently smokes 1 pack per day. Examination is notable for end-expiratory wheezing and a prolonged expiratory phase on lung auscultation. He has 3/5 hip flexion and decreased deep tendon reflexes bilaterally in lower extremities. Laboratory tests are normal including electrolytes. CXR reveals typical changes seen in COPD (flattened diaphragms, hyperinflation) and a perihilar mass. What is the most likely diagnosis?
   - A. Bronchial carcinoid
   - B. Adenocarcinoma
   - C. Large cell carcinoma
   - D. Squamous cell carcinoma
   - E. Small cell carcinoma

2. A 67-year-old male presents to the ED with LLQ pain that began a few hours ago. His PMH is significant for hypertension, CHF, and nephrolithiasis. He reports one episode of blood in his stools a few months ago. Vital signs are as follows: Temperature 101.1°F, BP 130/76, HR 70. On physical examination, he has moderate tenderness to palpation in the LLQ but no epigastric tenderness or flank tenderness. His examination is otherwise unremarkable. A digital rectal examination shows normal stool. Urinalysis is unrevealing. Laboratory

tests reveal a leukocyte count of 16,000 cells/μL and normal electrolytes and renal function. What is the next step in managing this patient?

A. Check a serum lactate
B. Obtain a retroperitoneal ultrasound
C. Prepare the patient for colonoscopy
D. Obtain contrast-enhanced CT of the abdomen
E. Proceed to the operating room

3. A 64-year-old female with a history of HTN, CAD, and CHF presents to the ED with a chief concern of left-sided chest pain that began 4 to 5 hours ago. She has a history of periodic episodes of chest pain for which she takes sublingual nitroglycerin, but today's episode has been more severe, lasted longer, and is not relieved by nitroglycerin. She denies nausea, vomiting, any radiation of the pain, or diaphoresis. Temperature 97.8°F, BP 136/76, HR 105, RR 20. Physical examination includes clear lungs on auscultation, no JVP elevation, and no LE swelling. ECG shows Q waves in lateral leads and no ST elevation. Troponin is 0.50 ng/mL. Aspirin is given. What is the best next intervention at this time?

A. Alteplase
B. Heparin
C. Hydralazine
D. Furosemide
E. Digoxin

4. A 64-year-old male presents to the ED with symptoms of RUE weakness and slurred speech. His symptoms started 6 hours ago and have not improved. He has a medical history significant for hypertension and diabetes. Neurologic examination confirms RUE paresis and dysarthria. Rest of examination is normal. Vitals: BP 190/100 mm Hg, HR 75. Labs are notable for glucose of 135 mg/dL, A1c 7.3%. CT head shows an area of ischemia without associated hemorrhage. Home medications include metformin and lisinopril. What is the most important intervention at this point?

A. Insulin
B. Heparin
C. Aspirin
D. Alteplase
E. Labetalol

5. A 58-year-old male presents to your office with weakness in his legs and a history of frequent falls over the past few months. He also complains of fatigue at the end of the day. He denies any back pain. He does not drink alcohol or smoke. His medical history is significant for gastric carcinoma for which he underwent total gastrectomy 2 years ago and there are no signs of recurrence. On physical examination, he is found to have conjunctival pallor, increased deep tendon reflexes, and mild weakness of his lower extremities, along with diminished vibratory sense in his toes. Cerebellar testing is normal. His examination is otherwise unremarkable. What would be the best test in confirming the cause of his symptoms?

A. Serum folate level
B. CBC with mean corpuscular volume
C. Intrinsic factor Ab
D. MRI lumbar spine
E. Methylmalonic acid level

6. A 37-year-old nulliparous female presents to your office with chronic progressive weakness. Her symptoms have developed gradually over the past year and she has largely ignored them. She reports a recent weight gain of 25 lb over the past year and has been feeling melancholy for the past few months. She has also had back pain for the past several months. Her medical history is significant for mild HTN and diabetes on insulin, both of which she was diagnosed with over the past year. Physical examination reveals mild obesity, with fat deposition mainly around the trunk and the posterior neck. You note some facial hair and scattered purple striae on the abdomen. Radiographs reveal a compressed fracture at the level of T11. Vital signs are as follows: BP

140/85 mm Hg, HR 70. What would be the most appropriate next test in this patient?

A. Serum ACTH
B. MRI brain
C. CT abdomen
D. 24-hour urine-free cortisol
E. CRH stimulation test

7. A 56-year-old male with a history of cigarette smoking and hyperlipidemia is brought to the ED with severe, crushing chest pain that has lasted for 90 minutes. He states that he felt ill all day and then started experiencing pain in his jaw, which progressed to chest pain with radiation to the right arm associated with nausea. Vital signs are as follows: Temperature 97.4°F, HR 50, BP 85/45 mm Hg, RR 22, pulse oximetry 98% on room air. Examination reveals JVP without elevation, normal lung examination, and no peripheral edema. An ECG reveals significant ST elevations in leads II, III, and aVF. What is the next best step in managing this patient?

A. Nitroglycerin
B. Intravenous fluids
C. Furosemide
D. Metoprolol
E. Morphine

8. A 45-year-old female with history of type 2 diabetes, alcohol use disorder, and COPD is evaluated for confusion in the ED. She lives with a roommate who states the patient was acting differently from baseline. The patient is agitated, not oriented, and not responding to questions appropriately. Vitals T 37.5°C, HR 110, RR 30. Physical examination reveals lungs with minimal end-expiratory wheezing. Physical examination is otherwise normal. UA is within normal limits. Labs: Na 140 mEq/L, Cl 105 mEq/L, K 5 mEq/L, HCO_3 15 mEq/L, BUN 20 mg/dL, Cr 1 mg/dL, glucose 100 mg/dL. ABG: pH 7.30, PCO_2

25 mm Hg, PO_2 85 mm Hg. What is the next appropriate medical intervention?

A. Fomepizole
B. Acetylcysteine
C. Albuterol
D. Sodium bicarbonate
E. Insulin

9. A 54-year-old male presents to your office for a physical examination. His PMH is significant for HTN, for which he takes amlodipine. He has never had screening for colorectal cancer previously. On examination, there are no palpable masses in the abdomen, no tenderness, and bowel sounds are normal. He denies any change in bowel habits. The remainder of his physical examination is unremarkable. He is given a fecal immunochemical test (FIT) for screening, which returns positive. What is the appropriate next step in managing this patient?

A. Flexible sigmoidoscopy
B. Digital rectal examination
C. Video capsule endoscopy
D. CT colonography
E. Colonoscopy

10. A 55-year-old male presents to the ED with epigastric abdominal pain. He does not have nausea, vomiting, or diarrhea. His PMH is significant for stroke, HTN, and osteoarthritis of his knees. Medications include a daily baby aspirin, enalapril, and ibuprofen. Vital signs are as follows: RR 20, BP 155/90 mm Hg, HR 70. His physical examination reveals epigastric tenderness, no abdominal distention, and rectal examination notes dark stool in the rectal vault. Laboratory tests reveal hemoglobin of 10.2 g/dL, platelets 190 × 10^3/μL. Hepatic panel is normal. Na 135 mEq/L, K 4.5 mEq/L, Cl 105 mEq/L, HCO_3 22 mEq/L, BUN 45 mg/dL, Cr 1.2 mg/dL. INR is normal. What is the next recommended step in managing this patient?

A. IV omeprazole

B. IV octreotide
C. Platelet transfusion
D. RBC transfusion
E. IV fluids

11. A 45-year-old female is admitted to the hospital with abdominal swelling. She has not previously sought medical care and had been well until 3 months ago when swelling began. Swelling gradually began and has worsened to the point that she is now short of breath and has difficulty mobilizing. She was born in Mexico but has been living in the United States for the past 20 years. She does not take any medications. She does not drink alcohol. Lung examination reveals decreased breath sounds at the bases. Cardiac examination reveals no murmurs and JVP is flat. Her abdomen is moderately distended with a positive fluid wave; her liver is not palpable. Skin examination is normal. She has asymmetric lower extremity edema with a tender right calf. Labs reveal elevated cholesterol levels. A diagnostic and therapeutic paracentesis is performed, which reveals the following: serum albumin 2.5 g/dL, serum total protein 5.0 g/dL, ascites total protein 2.3 g/dL, ascites albumin 1.6 g/dL. What test is the most likely to reveal the cause of her ascites?

A. Echocardiogram
B. Pelvic ultrasound
C. Liver biopsy
D. Ascitic fluid adenosine deaminase
E. 24-hour urine protein

12. A 65-year-old man presents to the ED with lower extremity weakness. His symptoms started 1 week prior when he noticed difficulty walking. He now has difficulty raising his legs off the floor and is using a wheelchair. He does not have any pain in his lower extremities but describes paresthesias in his legs. He does not have weakness elsewhere, dyspnea, or any other associated symptoms. Prior to this he had an episode of nonbloody diarrhea a few weeks ago that self-resolved. His only past medical history is hypertension for which he takes hydrochlorothiazide. Cardiac examination is normal. Pulmonary

examination reveals nonlabored breathing, clear lung fields, and O_2 saturation 98% on room air. Neurologic examination reveals normal speech without dysarthria and no cranial nerve deficits. Strength is 5/5 in bilateral upper extremities in shoulder/elbow/wrist flexion and extension, 1/5 bilateral ankle dorsiflexion/plantar flexion, 1/5 knee flexion/extension, 2/5 hip flexion. Achilles and patellar reflexes are absent bilaterally. Sensory examination is normal. Labs including electrolytes, renal function, and blood counts are normal. CT head is unrevealing for stroke or other acute findings. Lumbar puncture is performed and analysis reveals 3 WBC/mm^3, protein 100 mg/dL (normal range <50 mg/dL), Gram stain negative. What is the most appropriate therapy?

A. Prednisone
B. IVIG
C. Ciprofloxacin
D. Pyridostigmine
E. Botulism antitoxin

13. A 24-year-old female presents to your office for a routine examination. She reports a history of heavy menstrual bleeding since menarche. Her mother had similar symptoms. On further questioning, she states that she has episodes of epistaxis about once every 2 weeks and has a tendency to bruise easily. Her physical examination is unremarkable. CBC results are as follows: Hgb 7.9 g/dL, MCV 69 fL. Platelet count is 230,000/µL. PT 12 seconds (normal), and PTT 30 seconds (normal). A hepatic panel including bilirubin is normal. What is the most appropriate test to order?

A. Fibrinogen
B. Direct antiglobulin test (Coombs test)
C. Factor IX level
D. Mixing study
E. Ristocetin cofactor activity

14. A 43-year-old male presents to the ED with a headache. His headache developed acutely over the past few hours and is severe in nature. His pain is located at the top of his head. He denies any associated weakness. He does not have double vision, dizziness, nausea, vomiting, or phono/photophobia. He has no prior history of headaches. His vitals are as follows: BP 144/90 mm Hg, T 37.2°C. Examination reveals a middle-aged man in moderate distress. Neurologic examination is negative for focal weakness or sensory deficit. No nuchal rigidity is noted. Cranial nerves are intact. CT brain without contrast is obtained and negative for ischemia or hemorrhage. What is the next most appropriate intervention?

A. Sumatriptan
B. MRI brain
C. Cerebral angiogram
D. CT brain with contrast
E. Lumbar puncture

15. A 59-year-old female presents to the office because she is "sick and tired" of this cough she has had for 5 years, and it is getting worse. The cough is often productive of watery mucus. She is also becoming increasingly short of breath and cannot climb a flight of stairs without taking a rest. She does not have chest pain, paroxysmal nocturnal dyspnea, fevers, chills, or weight loss. PMH is significant for HTN and a 35-pack-year history of cigarette smoking. Vital signs are as follows: Temperature = 99.0°F, HR 75, RR 21, BP 158/82 mm Hg. O_2 saturation is 94% at rest and reaches a nadir of 90% with activity. Physical examination reveals an obese woman in no acute distress. On lung auscultation, there are coarse breath sounds bilaterally but no wheezes or crackles. Chest radiograph is significant for prominent lung markings at the bases. PFTs show FEV_1/FVC ratio 0.60 and FEV_1 65%. What is the most effective long-term intervention for this woman?

A. Smoking cessation
B. Tiotropium inhaler
C. Salmeterol inhaler

D. Oxygen therapy
E. Azithromycin

16. A 56-year-old male comes to your clinic requesting advice after recent cardiac surgery. The patient had a long-standing murmur and was diagnosed with mitral stenosis. He eventually underwent repair with a prosthetic valve and his symptoms of dyspnea have resolved. He has resumed physical activity and seeks to maintain his current health. He wants advice on future procedures and possible risk of infection. Which procedure warrants antibiotic prophylaxis to prevent endocarditis?

A. Colonoscopy
B. Wisdom tooth extraction
C. EGD
D. Bronchoscopy without biopsy
E. Dilatation ureteral stricture

17. A 67-year-old male presents to clinic with right hip pain for the last week. He has no history of falls or injury. The pain came on suddenly as he was getting up from a chair. PMH is significant for HTN and hypothyroidism. He started using a cane a few days ago but due to increasing pain is now in a wheelchair. On physical examination, he has severe pain with any attempted motion of the right hip joint. Pulses are palpable bilaterally, and neurologic examination is normal. Radiographs of the right hip are obtained and show normal bone density with a displaced fracture of the right femoral neck. Labs: Na+ 135 mEq/L, Cl 105 mEq/L, HCO_3 25 mEq/L, $Ca2^+$ 11.0 mg/dL, Cr 1.9 mg/dL, Hgb 9.5 g/dL, MCV 90 fL. Labs a year ago were completely normal. He is up-to-date on routine health screening. In addition to referring him for hospital admission for orthopedic repair of the fracture, what other testing is indicated to best explain the patient's findings?

A. SPEP
B. ^{99m}Tc bone scan
C. PTHrP

D. PTH
E. DEXA

18. A 38-year-old female presents to clinic with chief concern of fatigue and weight gain for the past 5 to 6 months. Her fatigue has affected her performance as a surgeon, and she has been having difficulty concentrating during operations. She recently began losing hair. She feels more tired than usual and has difficulty playing with her dogs in the evening. She did not have any of these symptoms until 6 months ago. She denies heat/cold intolerance. She has gained 10 lb in the past 6 months despite attempting to eat well and exercise a few times weekly. She is generally happy and has not had recent mood changes. She does not smoke and drinks alcohol socially. She has an IUD. HR 50, BP 120/80 mm Hg, RR 16, BMI 31. Physical examination reveals a normal pharynx, no neck fullness, and no palpable thyroid nodules. Abdomen is soft, nontender. Skin examination reveals no lesions/rashes and no lower extremity edema. She has an appropriate mood and affect. She donated blood last week and was told that her Hgb was normal. What is the appropriate next step in managing this patient?

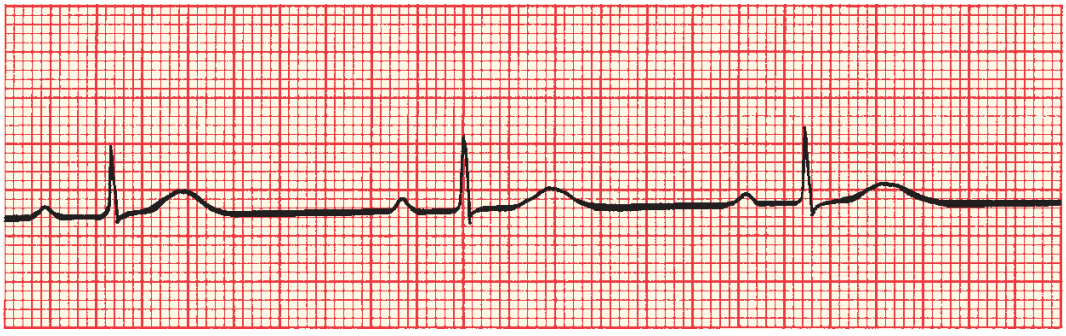
A. US thyroid
B. TPO
C. Thyroid uptake scan
D. FNA
E. TSH

19. A 38-year-old female presents to the ED with a 2-day history of shortness of breath. She states that she has felt tired for the past couple of weeks but is not able to describe any other symptoms. She has never smoked. PMH is unremarkable. On physical examination, she has diffuse wheezing but no calf tenderness or lower extremity edema. Her vitals are as follows: temperature 98.6°F, BP 126/74 mm Hg, pulse 80, RR 20. D-dimer is elevated. CXR reveals no consolidation. She subsequently undergoes a CT scan which reveals a 6-mm round nodule without associated lymphadenopathy or effusions and no evidence of pulmonary embolism. There are no calcifications in the nodule. She is

treated with albuterol and discharged home in stable condition. What is the appropriate recommendation to this patient upon outpatient follow-up with her primary care physician?

A. Follow-up CT chest
B. Bronchoscopy
C. Needle biopsy
D. Follow-up CXR
E. PET-CT scan

20. A 75-year-old female with a history of two prior MIs presents to the ED after a syncopal episode. She reports fatigue and dyspnea for 2 months. She has mild chest pain and dyspnea. A 12-lead ECG reveals a bradycardia with a ventricular rate of 35 bpm. BP 80/55 mm Hg. On physical examination, she is in mild distress. Her heart sounds are regular, bradycardic, with no murmurs. Lungs are clear. Her skin is cold and clammy. Home medications include ASA, atorvastatin, carvedilol, empagliflozin, eplerenone, and sacubitril-valsartan. ECG is as below (Figure 1). Prior echocardiogram from 6 months prior showed EF of 29% with diastolic dysfunction; valves were normal without stenosis or regurgitation. Laboratory testing reveals normal electrolytes including Mg and K. Troponin is elevated. What is the most appropriate immediate management?



A. Echocardiogram
B. Nitroglycerin
C. Metoprolol
D. Atropine

E. ICD

21. A 40-year-old male presents to your office with "chest burning" and cough for the past 5 to 6 months. The pain is intermittent and not related to meals. Triggers for his symptoms include drinking alcohol and lying flat in bed. He does not have dysphagia or odynophagia. He has tried over-the-counter calcium carbonate and famotidine as needed with minimal relief of symptoms. He has not had recent weight loss, dark, or bloody stools. He is a nonsmoker. He does not have history of seasonal allergies, itchy/watery eyes, sneezing, dyspnea, or prior diagnosis of asthma. His PMH is significant for HTN, which is controlled with amlodipine. He does not take any other medications. Physical examination is unremarkable. How would you treat this patient?

A. Helicobacter pylori antigen
B. EGD
C. pH monitoring
D. Gastrin level
E. Trial of omeprazole

22. A 32-year-old female presents to your office with a history of diarrhea and intermittent abdominal cramping/bloating with flatus. She reports having loose, watery diarrhea very frequently on and off for several years, but her symptoms have been worse recently. Prior to initial onset she had normal, formed daily bowel movements. Her weight is 75 kg and on review of her records she has lost 7 kg since her symptoms started. She has not had blood in the stool. There is no family history of IBD or colon cancer. The patient's only past medical history is depression for which she is undergoing cognitive-behavioral therapy. Laboratory evaluation reveals AST 65 U/L, ALT 55 U/L, TSH 3.0 mU/L, and Cr 1.0 mg/dL. Blood counts show Hgb 9.8 g/dL with MCV 70 fL. Vitals: T 37°C, BP 120/85 mm Hg, RR 16. Physical examination reveals a rash on extensor surfaces of both elbows with erythematous vesicles present. She is a college student and is studying for her midterm examination. What test should be the next intervention?

A. EGD with small bowel biopsy

B. Colonoscopy
C. Loperamide
D. Sertraline
E. Skin biopsy

23. A 65-year-old female with a history of type 2 diabetes, HTN, and a large anterior wall MI 5 years ago presents to the clinic with subacute progressive dyspnea. At baseline the patient finds it difficult to do any household chores. She has dyspnea at rest and is homebound because of her symptoms. Vital signs are: Temperature 98.7°F, HR 62, RR 19, BP 160/85 mm Hg, oxygen saturation 90% on room air. There are bibasilar crackles with scattered expiratory wheezes. There is 2+ pitting edema of the lower extremities. JVP is measured just above the clavicle. An ECG reveals left ventricular hypertrophy (LVH), with Q waves and T-wave inversions in V_1 to V_4 and diffuse nonspecific ST segment abnormalities. A CXR shows cardiomegaly and congestion of the pulmonary vasculature. Prior echocardiogram from 1 year ago shows EF 30% with anterior wall motion abnormalities. Labs are normal including CBC, Cr, K. The patient's medications include empagliflozin, losartan, carvedilol, and aspirin. What is the most important long-term intervention for this patient?

A. Isosorbide dinitrate
B. Spironolactone
C. Hydralazine
D. Digoxin
E. Furosemide

24. A 23-year-old female is in your clinic to be evaluated for wheezing and shortness of breath. She has no history of respiratory problems prior to the past few months. She recently joined a gym and began increasing her physical activity. Every time she runs she has similar symptoms of wheezing and shortness of breath. Symptoms seem to last the duration of the activity but will resolve afterward. She has no dyspnea between episodes. She does not have fevers, chills, runny nose, sneezing, sputum production, or congestion. She has no known allergies. She does not

smoke. Physical examination reveals a young woman with no respiratory distress. Cardiac examination reveals normal rate, no murmurs are appreciated, and JVP is not elevated. Lung examination reveals normal expansion, good air movement in all lung fields without rhonchi or wheezing. Peak flow in clinic is normal. PFTs are obtained and show FEV_1/FVC 0.8. FEV_1 is 93% of predicted. TLC is normal. What is the most appropriate management?

A. CXR
B. Inhaled fluticasone
C. Reassurance
D. Inhaled albuterol PRN
E. Inhaled salmeterol

25. A 35-year-old female undergoes routine laboratory workup for an insurance physical. Labs reveal WBC 5.0 $10^3/mm^3$, Hgb 12.7 g/dL, Cr 1.0 mg/dL. Urinalysis shows 2+ bacteria and urine culture grows 10^5 CFU *Escherichia coli*. PMH is otherwise negative. She has had occasional UTIs in the past but none for the past year. Her only medication is an oral contraceptive. Urine hCG is negative. Vital signs are: Temperature 98.6°F, BP 115/60 mm Hg, pulse 80, RR 20. Lungs are clear to auscultation bilaterally. Heart rate and rhythm are regular, without murmurs. The patient appears well and is alert and oriented. She has no tenderness at the costovertebral angles and no suprapubic tenderness. What is the appropriate next step in managing this patient?

A. Nitrofurantoin
B. Cephalexin
C. Trimethoprim-sulfamethoxazole
D. No treatment
E. Repeat urinalysis and culture

26. A 45-year-old female is brought to the ED complaining of fatigue. The patient has been feeling extremely weak over the past few days. Today she stood up and almost fainted, prompting her visit. She has had cough, rhinorrhea, and nasal congestion for the past week. Today she also

began having nausea, vomiting, and severe abdominal pain. Past medical history is significant for hypertension, CKD, and SLE. Home medications are lisinopril, hydroxychloroquine, and prednisone 20 mg daily. Vitals: Temperature 38.5°C, BP 85/55 mm Hg, HR 126. In general, she appears weak and lethargic. Her heart sounds are tachycardic, regular, without murmurs. Her lungs have occasional rhonchi but no wheezing. Her abdomen is diffusely tender throughout without rebound tenderness. Labs: Na 124 mEq/L, K 5.3 mEq/L, Cr 3.0 mg/dL (baseline 1.8). Hgb is 11.1 g/dL. The patient is diagnosed with Influenza A and started on IV fluids. After 2 L of crystalloid fluids her blood pressure is 90/60 mm Hg. What is the most appropriate next step?

A. Cortisol level
B. IV hydrocortisone
C. CT adrenal glands
D. MRI pituitary
E. Cosyntropin stimulation test

27. A 71-year-old female presents to the ED with a 2-day history of severe abdominal pain. Pain developed suddenly with no clear correlation to meals. Her symptoms were mild at first, becoming severe in the next 6 to 10 hours. She has nausea, but no vomiting or dysphagia. Her past medical history is significant for GERD, HFpEF, type 2 DM, and atrial fibrillation. She is afebrile. HR 70, BP 135/85 mm Hg. Cardiac examination reveals a 3/6 systolic murmur in L axilla and irregularly irregular heart rate. Her abdominal examination reveals mild tenderness in the mid-abdomen. Her stool is dark. Laboratory studies show Hgb 10.0 g/dL, WBC 17.5 $10^3/mm^3$, Na 144 mEq/L, Cl 105 mEq/L, K 4.0 mEq/L, HCO_3 20 mEq/L, Cr 1.1 mg/dL, A1c 12.6%, and INR 1.4. Medications are metoprolol, apixaban, insulin, and enalapril, but she has difficulty with medication adherence. What is the appropriate next step in evaluation?

A. CT angiography
B. Gastric emptying study
C. Colonoscopy

D. EGD

E. Andexanet alfa

28. A 43-year-old male presents to your office with a 3-day history of chest pain, which is centrally located and radiates to the right side of his neck. The pain worsens with deep breathing and improves when he sits up. He has no nausea, vomiting, sweating, or SOB. He had an upper respiratory infection about 2 weeks ago, which resolved without treatment. PMH is significant for hyperlipidemia. He takes rosuvastatin. He smokes half a pack of cigarettes a day. Vital signs are: temperature 99.4°F, BP 125/80 mm Hg, pulse 84. Physical examination is significant for a friction rub over the left sternal border heard best when he leans forward. A 12-lead ECG shows diffuse ST elevation in leads I, II, III, aVL, and V_2 through V_6. Echocardiogram shows an EF 50% with no regional wall motion abnormalities and normal valvular function. There is a small pericardial effusion. What is the most appropriate next step?

A. Coronary angiogram

B. Drainage of pericardial effusion

C. Prednisone

D. Azathioprine

E. Ibuprofen

29. A 55-year-old male with past history of COPD presents to the emergency department with chest pain and SOB that started last evening. His chest pain is right-sided and is stabbing in quality, and the pain worsens with inspiration. He is short of breath even at rest. He does not recall any traumatic event or overexertion. He does not have fevers, chills, or sputum production. He has a 35-pack-year smoking history. He takes tiotropium and albuterol PRN. Temperature 98.2°F, BP 130/80 mm Hg, HR 115, RR 24. Pulse oximetry shows 84% oxygen saturation on room air. He is 6 ft 2 in and 175 lb, and he otherwise appears healthy. Physical examination reveals absent breath sounds in the right upper lung field. There is minimal end-expiratory wheezing in both lungs without crackles. No stridor is noted. Heart examination reveals regular tachycardia without murmurs. JVP is flat. There is no

lower extremity edema. What is the appropriate next step in managing this patient?

A. Albuterol–ipratropium nebulizer
B. Prednisone
C. Chest tube insertion
D. Azithromycin
E. Pleurodesis

30. A 78-year-old male with a history of aortic stenosis with a mechanical aortic valve, hypertension, and type 2 diabetes presents to office for evaluation. He is doing well, except for some palpitations over the past few months. He does not have associated shortness of breath, syncope, or a history of falls. On physical examination, you note an irregularly irregular heart rhythm and a mechanical S2. Examination is otherwise normal. You obtain an ECG, which confirms the irregularly irregular arrhythmia. The patient has no history of bleeding and Hgb is normal. What is the recommended medication for prevention of thromboembolic events?

A. Aspirin
B. Clopidogrel
C. Apixaban
D. Warfarin
E. Dabigatran

31. A 73-year-old male with HTN presents to the office with a 3-month history of chest pain and dyspnea induced by lifting weights, shoveling snow, and running on a treadmill. Vital signs are as follows: Temperature 98.3°F, HR 85, RR 17, BP 165/85 mm Hg. Physical examination reveals a 4/6 crescendo–decrescendo murmur heard at the right upper sternal border with radiation to the carotid arteries, weak and delayed carotid pulses, and an S4 gallop. ECG reveals sinus rhythm without arrhythmia. Echocardiogram reveals EF 45% and aortic valve area 0.8 cm^2. Prior coronary angiography 1 year prior showed 20% lesion in the mid left anterior descending artery, 30% right coronary

artery lesion, and no significant stenosis in the left circumflex artery. What is the most effective intervention strategy for this patient?

A. Nitroglycerin
B. Aortic valve replacement
C. Aspirin
D. Carotid Doppler
E. Coronary artery bypass grafting

32. A 38-year-old female presents to clinic with left knee pain for the past 2 to 3 months. She reports no history of injury. PMH is significant for SLE and CKD. She has recently been running more in an attempt to lose weight but her pain is now limiting her activity. She describes her pain as primarily "around and under my knee cap." She points to her patella and the anterior aspect of her knee as the site of her pain. She especially has difficulty climbing and descending stairs. She has full range of motion without pain. She has no tenderness along medial or lateral joint lines. Examination reveals negative anterior and posterior drawer tests, full ROM in flexion and extension without crepitus, no effusion or erythema present. X-rays of the knee reveal normal alignment with preservation of joint space. Labs: Na 135 mEq/L, K 4.0 mEq/L, Cr 2.3 mg/dL. ANA is positive. ESR 10 mm/hr. What is appropriate next step in the management of this patient?

A. Corticosteroid injection
B. Physical therapy
C. Knee arthroscopy
D. MRI knee
E. Ibuprofen

33. A 57-year-old male had a fasting plasma glucose level of 160 mg/dL 1 month ago. Today, his fasting glucose level is 140 mg/dL. His medical history is significant for HFpEF and hyperlipidemia. His current medications include aspirin, lisinopril, and metoprolol. He is 5 ft 11 in and weighs 215 lb. BP 142/79. This patient is asymptomatic, and his physical examination is unremarkable. Labs: Na 142 mEq/L, K 4.0 mEq/L, Cr 1.7 mg/dL. Urine albumin: Cr ratio is 100 mg/g. A1c is

7.1%. In addition to lifestyle changes including increase in physical activity, diet changes, and weight loss, how would you manage this patient?

A. Hydrochlorothiazide
B. Insulin
C. Amlodipine
D. Hydralazine
E. Lisinopril

34. A 36-year-old female presents to your office with a 4-month history of dry cough, SOB, and fatigue. She has a 10-pack-year smoking history. Vital signs: Temperature 98.2°F, BP 132/79 mm Hg, HR 74, RR 16. Pulse oximetry shows 96% O_2 saturation on room air. Examination reveals crackles bilaterally in the lower lung fields. There is no wheezing. She has two tender erythematous nodules on her left leg measuring approximately 3 × 3 cm. CXR shows bilateral hilar adenopathy. What is the next best test in order to confirm the suspected underlying diagnosis that explains the patient's constellation of symptoms?

A. Serum calcium
B. CT chest
C. Serum ACE level
D. Biopsy of leg lesion
E. Bronchoscopy and biopsy of hilar lymph node

35. A 68-year-old male with a history of lung cancer undergoes follow-up labs after recent cycle of chemotherapy. He has mild difficulty with concentration over the past week but is otherwise able to complete all of his daily tasks. He reports no nausea, vomiting, or positional lightheadedness. He has no other significant past medical history. He takes no medications. Vital signs are as follows: Temperature 99.8°F, RR 18, BP 135/88 mm Hg, pulse 76. On examination, he is alert and oriented. Cardiac examination reveals regular rate and rhythm, no murmurs, JVP not elevated. Lung and abdominal examinations are

normal. There is no lower extremity edema. Skin turgor is normal. Neurologic examination reveals 5/5 strength in all extremities, no focal deficits, and normal gait. Laboratory tests reveal the following: serum Na+ 121 mEq/L, K+ 4.3 mEq/L, BUN 7.0 mg/dL, Cr 0.4 mg/dL, glucose 106 mg/dL. TSH 2.0 mU/L. Serum osmolality 250 mOsm/kg, urine Na 45 mEq/L, urine osmolality 450 mOsm/kg. What is the most appropriate management of this patient?

A. Administer IV normal (0.9%) saline
B. Initiate fluid restriction
C. Initiate hemodialysis
D. Administer hypertonic (3%) saline
E. Administer hydrochlorothiazide

36. A 20-year-old male presents for evaluation after an episode of dark urine. He felt well up until 2 weeks ago when he had a sore throat and mild fever for which he did not seek medical care. Urinary symptoms started the day prior to evaluation. He does not have cough, dyspnea, hemoptysis, joint pains, dysuria, or flank pain. He had two recent sexual partners but uses condoms consistently. He has no prior medical history or family history of renal diseases. BP 145/90 mm Hg, HR 65, T 37°C. Physical examination reveals a well-appearing male with normal heart sounds, clear lungs, and mild lower extremity edema. There are no skin lesions. Urinalysis is dark red in color. Microscopic examination is positive for deformed RBCs and RBC casts. Cr is 1.6 mg/dL. What is the most likely test to help aid in the diagnosis of this patient?

A. ANCA
B. Anti-GBM
C. HIV
D. Antistreptolysin titer
E. IgA levels

37. A 31-year-old female with hypertension presents to your office with painful joints for the past 4 months affecting her wrists, ankles, and knees. She also reports several outbreaks of a rash over her face over the past few months. Her only medications are hydrochlorothiazide and

acetaminophen as needed. Vital signs are as follows: Temperature 99.2°F, RR 20, BP 145/83 mm Hg, pulse 78. Physical examination reveals three ulcers in her mouth and mild swelling of the left wrist and ankle. She has 1+ pitting edema in her lower extremities bilaterally. Examination is otherwise unremarkable. Labs reveal a WBC count of 2,300/mm^3, Hgb 12.2 g/dL, and platelets 82,000/mm^3. What is the most likely diagnosis?

A. Osteoarthritis
B. Reactive arthritis
C. Behçet disease
D. Gout
E. SLE

38. A 62-year-old male presents to your office accompanied by his husband. He notes a tremor in his hands that disappears when he writes or handles utensils. His husband thinks he stares often and does not show as much emotion as before. He still participates in his usual activities and enjoys gardening with his husband. His appetite and sleep habits have remained unchanged. Weight is similar to his last clinic visit. His husband notices that he moves slower than before and walks steadily. On examination, you note a mild resting tremor and a fixed expression on his face. There is resistance on passive range of motion with upper extremities. Gait is slow, without imbalance or falling, and his arms do not swing when walking. He scored 26/30 on Mini-Mental Status Examination. What is the best intervention to improve the patient's symptoms?

A. Fluoxetine
B. Carbidopa–levodopa
C. Propranolol
D. Memantine
E. Deep brain stimulation

39. A 24-year-old male presents to clinic with worsening right lower quadrant cramping abdominal pain for 2 months. He reports having diarrhea on and off for the past 1 to 2 years. He had a colonoscopy with

a terminal ileum biopsy showing ulceration, acute inflammation, and noncaseating granulomas. Two months ago, he was placed on mesalamine. He has lost 20 lb since then despite attempting to increase his dietary intake. He has no other medical problems and takes no other medications. His physical examination reveals mild tenderness in the RLQ with normal bowel sounds. There are no anal fissures or fistulae. His stool appears normal on rectal examination. Vital signs are as follows: Temperature 98.7°F, RR 15, BP 122/78 mm Hg, pulse 65. BMI 21. Labs show normal liver and renal function. CBC shows WBC 10.1 × $10^3/mm^3$, Hgb 9.9 g/dL, and MCV 82 fL. CT abdomen reveals thickened mucosa in distal ileum with adjacent mesenteric stranding; there is no obstruction, fistula, abscess, or free air present. What is the next best step in treatment?

A. Loperamide
B. Azathioprine
C. Infliximab
D. Surgical resection
E. Ciprofloxacin and metronidazole

40. A 58-year-old male presents to your office with left wrist pain for the past 3 months. He cannot recall any history of injury or trauma. He works as a car mechanic. He also has a new granddaughter who is 6 months old that he babysits every weekend. He is an amateur golfer when time allows. He does not have neck pain. He has no associated paresthesias or weakness. PMH is significant for mild HTN and chronic kidney disease with a baseline Cr of 2.5 mg/dL. Examination reveals normal sensation throughout bilateral upper extremities. Neck flexion/extension/rotation does not reproduce his symptoms. Strength testing is normal in bilateral upper extremities. There is no evidence of muscle wasting on examination of the hands. With the patient making a fist surrounding the thumb, ulnar deviation of the wrist produces pain over the distal radial styloid. Prolonged wrist flexion does not elicit pain. Palpation over the flexor surface of the wrist base does not reproduce the patient's symptoms. Pain is not elicited with resisted

wrist extension or flexion. What is the most appropriate next step in management?

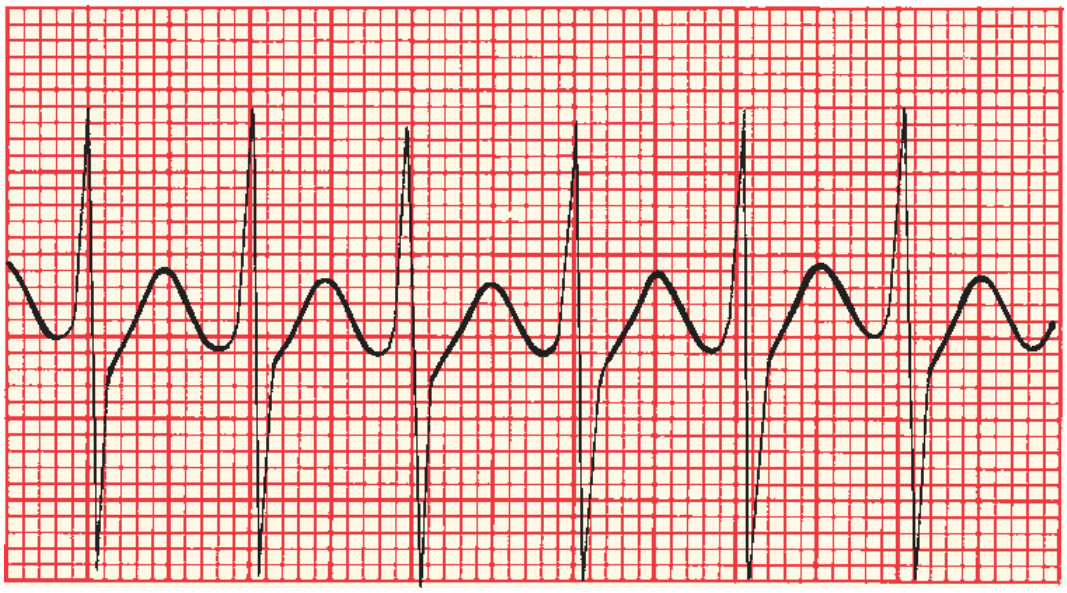
A. Thumb spica splint
B. Wrist splint
C. Counterforce forearm brace
D. Carpal tunnel corticosteroid injection
E. Ibuprofen

41. While on-call in the hospital, you are called to evaluate a 74-year-old female for SOB and increasing oxygen requirements. She does not have a cough. The patient was admitted yesterday with multiple leg fractures after a motor vehicle accident. She has been on strict bed rest since admission while a plan is made for surgical repair. She has mild chest pain and feels short of breath. Past medical history is significant for HFpEF and COPD. She is adherent with her medications, which include tiotropium, furosemide, and carvedilol. Temperature 100.0°F, BP 116/74 mm Hg, pulse 120, RR 24, oxygen saturation 91% on 4 L of oxygen via nasal cannula. General examination reveals a patient who is alert and oriented to name and year but not to place. Mental status on admission was normal and she has no history of neurocognitive disorder. Lung examination reveals good air movement throughout with no wheezing, crackles, or consolidation. JVP is not elevated. There are scattered petechiae on the upper chest. Bilateral lower extremities have symmetric 1+ edema without calf tenderness. CT chest shows scattered ground-glass opacities without consolidation, no segmental or subsegmental emboli, and no effusions. What is the appropriate next step in management?

A. Albuterol
B. Reduction of fracture
C. Furosemide
D. Levofloxacin
E. IV heparin

42. A 38-year-old man is evaluated for palpitations in the ED. He has had these symptoms several times over the past year but this episode is

worse. He does not report any associated chest pain, lightheadedness, or syncope. He has no known history of medical problems and takes no medications. Examination reveals an adult male in no significant distress. He is normotensive. Cardiac examination is significant for regular tachycardia with no JVP elevation. Lungs are clear without crackles or wheezing. There is no lower extremity edema. ECG is shown (Figure 2). What is the best intervention at this point?



A. Valsalva maneuver
B. Adenosine
C. Metoprolol
D. Digoxin
E. Cardioversion

43. A 38-year-old female presents to clinic with pain in her wrists, ankles, and knees bilaterally. She reports noticing numbness and morning stiffness in her hands about 1 year ago, mostly in cold weather. This stiffness gradually spread to her wrists, knees, and ankles, with lesser involvement of her shoulders. The stiffness and pain are worse in the morning but improve as the day wears on. Symptoms have gradually worsened. Some days she cannot go outside her house because of the pain. She has no history of rash or photosensitivity. She often feels tired

and "worn out." Medical history is significant for HTN, for which she takes hydrochlorothiazide. On examination, her metacarpal joints and wrists are swollen and tender, as are her knees and ankles bilaterally. Her examination is otherwise unremarkable. Labs reveal normal liver and renal function. CBC is unremarkable. ESR 65 mm/hr. CCP is positive. ANA is negative. X-rays of hands show erosive changes in MCP joints. What is the most important intervention for this patient to control her disease?

A. Prednisone
B. Corticosteroid injection
C. Indomethacin
D. Methotrexate
E. Physical therapy

44. A 60-year-old female presents to the ED with right upper quadrant abdominal pain that began several hours ago. She has had occasional RUQ pain over the past 3 months but never this severe. Her PMH is significant for HTN and osteoarthritis. On physical examination, she appears ill. Scleral icterus is present. She has RUQ abdominal tenderness without peritoneal signs. There are no surgical scars on the abdomen. Initial vital signs are as follows: Temperature 102.1°F, RR 16, BP 95/70 mm Hg, pulse 120. Laboratory tests reveal ALT 136 U/L and AST 119 U/L, ALP 105 U/L, direct bilirubin 4.5 mg/dL, and WBC count 16.8 × $10^3/mm^3$. Ultrasound of the abdomen shows common bile duct dilatation with obstructing gallstones. Piperacillin-tazobactam is started and the patient is resuscitated with IV fluids. Repeat vitals after antibiotics and 4 L of IV fluids are administered show a BP 110/82 mm Hg, HR 85, and temperature 98.8°F. Repeat hepatic labs show increasingly elevated transaminases and hyperbilirubinemia. What is the next step in managing this patient?

A. Cholecystectomy
B. Liver biopsy
C. ERCP
D. MRCP

E. Percutaneous transhepatic cholangiography

45. A 42-year-old healthy female presents to clinic for pre-employment screening. She is starting a new job as a bus driver and needs to have a physical and TB test before being hired. She reports no fever, chills, sputum, or weight loss. She was born in the United States and has not traveled outside of the country. She has never received a tuberculosis vaccine. She has not had known contact with anyone infected with tuberculosis. She has never used IV drugs. Recent STI screening, including HIV, was negative. Physical examination is normal. PPD testing is performed and on reevaluation after 48 hours, there is 10 mm of induration. What is the best recommendation to the patient?

A. AFB sputum culture
B. Rifampin, isoniazid, pyrazinamide, ethambutol
C. Rifampin
D. Chest x-ray
E. No further intervention

46. A 34-year-old male presents to clinic with left knee pain swelling. He has occasional pain in both knees that is usually dull and resolves with acetaminophen. Over the past few days, he has had swelling which has made it difficult to move the joint. He had a similar episode of swelling a year ago that resolved on its own but this episode is much more severe. He does not recall preceding trauma and does not report morning stiffness. On physical examination, he has a moderate left knee effusion with overlying erythema. He has crepitus in both knees. Strength is normal, and examination does not indicate any ligamentous instability. X-ray shows mild narrowing of the joint space and calcification of the cartilage. Aspiration of the effusion reveals straw-colored fluid, 25,000 WBCs, 85% PMNs, Gram stain and culture are negative. Evaluation for crystals reveals no intracellular negatively birefringent crystals, but does reveal multiple intracellular positively birefringent rhomboid-shaped crystals. What is the most appropriate laboratory test to obtain?

A. Uric acid

B. PTH
C. ANA
D. ESR
E. HLA-B27

47. A 62-year-old female presents to your clinic with questions regarding her new diagnosis of osteoporosis. She had a hip fracture 6 months ago after a fall. Subsequently, she had a prolonged hospital course complicated by a provoked DVT for which she completed therapy with apixaban. She has had no further falls and is back to her baseline level of activity after a 1-month rehabilitation stay. She had a DEXA scan which showed a T-score of −2.6 in the hip and −2.3 in vertebrae. Her past medical history includes achalasia for which she gets dilatations as needed. Currently she only takes omeprazole on a daily basis. Labs including renal function, calcium, and vitamin D are all normal. She is inquiring about further options to prevent her from having fractures. What is the appropriate management of this patient besides recommending continued supplementation with vitamin D and calcium?

A. Zoledronic acid
B. Alendronate
C. Raloxifene
D. Calcitonin
E. Estrogen

48. A 53-year-old female presents to the hospital with abdominal pain. She is diagnosed with cholecystitis and undergoes a cholecystectomy. The following day she complains of palpitations. On questioning she has had an irregular heart beat off/on for the past few months that acutely worsened during this episode. She also notes a 15-lb weight loss over the past month. She denies dizziness, syncope, dyspnea, or chest pain. She has a known history of hyperlipidemia but has otherwise been healthy. Medications include ASA and atorvastatin. Vitals: Temperature 102.4°F, BP 155/88 mm Hg, pulse 134, oxygen saturation at room air 96%. On physical examination, the patient is agitated and confused, answering questions inappropriately. Skin is diaphoretic. Neck is

supple without tenderness and no palpable nodules or enlargement. Cardiac examination reveals an irregular rhythm, tachycardia, and no murmurs. ECG confirms atrial fibrillation with rapid ventricular response. TSH is <0.01 mU/L. What is the most appropriate next step in the management of this patient?

A. Radioactive iodine uptake scan
B. Iodine
C. US thyroid
D. Propranolol
E. Thyroidectomy

49. A 61-year-old male who has been your patient for several years presents to clinic with two episodes of bloody urine over the past 24 hours. He denies any flank pain, dysuria, fevers, or chills. His urine stream is strong, he is able to void completely and does not experience the need to start/stop or strain during urination. PMH is significant for hyperlipidemia, HTN, type 2 diabetes, glaucoma, and osteoarthritis. He has smoked one pack of cigarettes per day for the past 35 to 40 years. Physical examination reveals no costovertebral angle or suprapubic tenderness. Prostate examination reveals a nontender, nonenlarged prostate. Urinalysis shows gross hematuria without proteinuria, pyuria, or RBC casts. Cr 1.1 mg/dL. Urine culture is negative. What is the appropriate next step in managing this patient?

A. CT urography
B. Ultrasound kidneys and bladder
C. Renal biopsy
D. PSA
E. Prostate biopsy

50. A 57-year-old male presents to your office with a 2-week history of cough. The cough is associated with clear sputum, occurs daily and has persisted over the past 2 weeks. He has occasional dyspnea and frequent wheezing. He does not have myalgias, fevers, chills, sore throat, rhinorrhea, congestion, headache, or loss of taste or smell. He has experienced chest discomfort due to excessive coughing. PMH is

unremarkable and he does not take any medications. Temperature is 99.1°F, RR 18, O_2 saturation is 96% on room air. On examination, the patient is in no respiratory distress and is breathing comfortably. Auscultation of lungs reveals diffuse expiratory wheezing but no crackles or rhonchi. CXR shows normal expansion of the lungs without infiltrates or effusions. A rapid SARS-CoV-2 PCR is negative. Peak flow is 530 L/min (expected 556 L/min). What is the most appropriate management?

A. Prednisone
B. Oseltamivir
C. Azithromycin
D. Albuterol
E. Sputum culture

51. A 32-year-old male, who recently moved to the area, presents to clinic for the first time for a routine checkup. PMH is significant for type 2 diabetes. He is 5 ft 9 in and weighs 215 lb. The only medication he takes is metformin. He smokes half a pack of cigarettes a day; does not drink alcohol; and exercises sporadically, approximately once every 2 weeks. His mother died at the age of 62 years due to an MI. His father is 73 years of age and is healthy. Physical examination is normal. Vital signs are: BP 146/95, pulse 73, RR 19, temperature 98.2°F. Which of the following lifestyle modifications has been shown to result in the greatest reduction in blood pressure?

A. Dietary Approaches to Stop Hypertension (DASH) diet
B. Weight loss
C. Decreasing alcohol consumption
D. Increasing exercise
E. Smoking cessation

52. The patient in the previous question returns to clinic in 6 weeks for a repeat evaluation. He has no concerns. He states that he has been walking briskly for 30 minutes four times a week, has lost 10 lb, and has been eating a healthier diet. His laboratory results are within normal

limits. Hemoglobin A1c is 7.2%. CXR, ECG, and urinalysis are normal. His BP today is between 140/90 and 145/95. Physical examination is unchanged from 2 months ago. What is your recommended treatment?

A. Lisinopril
B. Amlodipine
C. Hydrochlorothiazide
D. Atenolol
E. Propranolol

53. A 17-year-old female is referred to the ED by her primary physician; she presents with a 3-day history of fevers, dysuria, and vomiting. She has not had vaginal discharge, abdominal pain, or diarrhea. She is sexually active with her partner. Vital signs are as follows: Temperature 103°F, RR 20, BP 98/65, pulse 100. She appears ill and is unable to tolerate liquids, but she is alert and oriented. Her examination is positive for suprapubic as well as costovertebral angle tenderness bilaterally. Urinalysis reveals numerous WBCs and bacteria, and it is positive for WBC casts and leukocyte esterase. Other laboratory study results are within normal limits, including a negative urine pregnancy test. What is the likely diagnosis?

A. Pyelonephritis
B. Nephrolithiasis
C. Appendicitis
D. Ectopic pregnancy
E. Acute interstitial nephritis

54. A 32-year-old male presents to the ED with severe low back pain for the last 5 weeks. He reports that the pain is most severe when he first wakes up in the morning and gradually improves with exercise throughout the day. He cannot recall any trauma or insult to his back when the pain started. He does not have any pain or numbness in the lower extremities. Bowel and bladder function is normal. Physical examination reveals a moderately overweight male in some distress. He has very minimal tenderness on palpation of his low back. Neurologic

examination is normal. What is the appropriate next step in managing this patient?

A. Local heat
B. Ice pack
C. Nonsteroidal anti-inflammatory drugs (NSAIDs)
D. Epidural steroid injection
E. Surgical laminectomy

55. A 29-year-old male with a history of asthma presents to the ED with severe SOB for the past 2 days. He also complains of sore throat, generalized malaise, and a nonproductive cough. He denies chest pain, fever, and chills. Temperature 98.9°F, HR 95, RR 33, BP 140/82, and O_2 saturation 90% on room air. Breathing is labored, and he is speaking in short gasps. Lung auscultation reveals bilateral diffuse expiratory wheezing. There is no urticaria or angioedema on skin examination. ABG is drawn: pH 7.42, $PaCO_2$ 43 mm Hg, PaO_2 70 mm Hg, bicarbonate 22 mEq/L. What is the appropriate next step in managing this patient?

A. Intubation
B. IV ceftriaxone and azithromycin
C. Subcutaneous epinephrine for bronchodilation
D. Nebulized ipratropium for bronchodilation
E. Nebulized albuterol for bronchodilation

56. A 22-year-old female presents to the ED with abrupt onset of a rash, high fever, and vomiting. Vital signs are as follows: Temperature 104°F, HR 118, RR 22, BP 76/40, and pulse oximetry 98% on room air. On examination, she appears confused and disoriented. Her skin is warm, and there is a diffuse macular rash over her body. She is admitted to the ICU and subsequently develops multisystem organ dysfunction. Which of the following organisms is most likely implicated in this patient's diagnosis?

A. *Escherichia coli*
B. *Neisseria meningitidis*

C. *Staphylococcus aureus*
D. *Streptococcus pneumoniae*
E. *Rickettsia rickettsii*

57. A 33-year-old male comes to the clinic with a 4-day history of chest pain. The pain radiates to the right side of the neck and is worsened by deep inspiration and improved by leaning forward. Several weeks ago, he had a fever and cough, which have both since improved. He is afebrile, BP is 130/85, and pulse is 88. On examination, there is a scratching sound heard over the left sternal border on expiration. ECG shows ST elevation in leads I, II, III, avL, and V_2 to V_6. The patient is offered treatment but declines all medications. Which of the following is the most common complication if this disease remains untreated?

A. Cardiac tamponade
B. Recurrent pericarditis
C. Constrictive pericarditis
D. Ventricular free wall rupture
E. Valvular insufficiency

58. A 52-year-old woman with a history of type 2 diabetes mellitus and hypertension presents to the emergency department with fevers, chills, and abdominal pain. The symptoms began about 1 week ago and have been getting worse. The abdominal pain is associated with nausea and vomiting, and she has not been able to eat. On examination, her temperature is 102.1, blood pressure is 104/68 mm Hg, heart rate is 94/min, and respiratory rate is 16/min. Her abdominal examination shows right-sided pain to deep palpation, and she has severe right-sided costovertebral angle tenderness. Laboratories demonstrate a leukocytosis (15,400/mm^3) and urinalysis shows WBCs, WBC casts, protein, and bacteria. Despite IV ceftriaxone for 5 days, the patient remains febrile. The patient's urine culture is positive for *Escherichia coli* and is sensitive to ceftriaxone and ciprofloxacin. What is the appropriate next step in management?

A. Renal biopsy

B. CT scan with contrast
C. Continue the current antibiotic
D. Stop ceftriaxone and start ciprofloxacin
E. Stop ceftriaxone and repeat urine culture

59. You are paged to evaluate a 33-year-old female with SOB and tachycardia. She normally takes inhaled fluticasone and albuterol for asthma, however she is not currently responding to the albuterol. On examination, she appears anxious and is moderately short of breath. There are soft bilateral wheezes on examination with quiescent breath sounds, with a prolonged inspiratory and expiratory phase and use of accessory muscles of respiration. Temperature is 99.4°F, pulse 116, BP 116/56, RR 36, oxygen saturation is 91% on room air. Examination shows use of accessory muscles on inspiration. An arterial blood gas is obtained and shows a pH of 7.4, PCO_2 of 40 mm Hg, and a PO_2 of 60 mm Hg. What is the appropriate next step in the management of this patient?

A. Increase supplemental oxygen flow rate
B. IV corticosteroids
C. Azithromycin
D. Intubation
E. Nebulized albuterol

60. A 61-year-old man with a history of chronic alcohol use disorder and parathyroid adenoma presents with pain in his left knee for the last 2 days. He reports no fevers, chills, night sweats, or history of trauma to the knee, but does note abdominal pain and constipation. Physical examination is significant for tenderness and erythematous skin overlying the left knee. There is also marked swelling of the left knee. Laboratory findings reveal an elevated calcium level (12.1 mg/dL). If joint aspiration is performed, which of the following will be seen on synovial fluid analysis?

A. Negatively birefringent needle-shaped crystals
B. Positively birefringent rhomboid-shaped crystals

C. Neutrophil predominance with gram-positive cocci
D. Negatively birefringent needle-shaped crystals AND gram-positive cocci
E. Normal synovial fluid findings

61. A 26-year-old man presents to his primary care physician with fatigue, headache, and a sore throat for the past week. There is also nausea and diarrhea, but no weight loss, productive cough, or difficulty breathing. He has no known past medical history, does not take any medications, and has no recent sick contacts. He is sexually active and uses condoms inconsistently; he drinks alcohol heavily on the weekends and has had previous IV drug use. On examination, his temperature is 39°C and the rest of his vital signs are normal. He has nontender cervical and axillary lymphadenopathy, tonsillar exudates, and mild splenomegaly. There are also several painful, well-demarcated ulcers within his mouth and a mild maculopapular rash over his chest and arms. A rapid Strep test and a monospot (heterophile antibody) test are negative; further screening for chlamydia, gonorrhea, syphilis, and HIV antibody is negative. What is the likely diagnosis?

A. Hodgkin lymphoma
B. Acute retroviral syndrome
C. Infectious mononucleosis
D. Secondary syphilis
E. Upper respiratory infection

62. A 30-year-old medical student is undergoing medical screening in order to start a rotation at a new hospital. She has no current symptoms and reports no previous medical problems. She is originally from South Africa and her vaccinations are up-to-date, including a BCG vaccine she received as a child. A purified protein derivative (PPD) is placed and read 48 hours later, which shows an area of induration that is 11 mm wide. What is the most appropriate next step in management?

A. Start rifampin, isoniazid, pyrazinamide, and ethambutol
B. Obtain a chest x-ray; if normal, reassure the patient

C. Obtain a chest x-ray; if normal, start rifampin, isoniazid, and pyridoxine for 3 months
D. Start rifampin, isoniazid, and pyridoxine for 3 months
E. Reassurance

63. A 35-year-old male presents with a 6-month history of fatigue and lethargy. His medical history is unremarkable. He has not had melena, recent trauma, or surgery. He reports that he does not drink alcohol, smoke, or take any medications. He appears well nourished. Vital signs are as follows: BP 130/80, pulse 70, RR 16. Laboratory test results are as follows: Hb 7.6 g/dL and MCV 68 fL. The remainder of his laboratory test results are normal. Which of the following is the best next step in management of this patient?

A. Serum iron studies
B. Hemoglobin electrophoresis
C. Serum lead levels
D. Coombs test
E. Stool FIT test

64. A 56-year-old female presents to the ED with severe abdominal pain, primarily in the epigastric region. She has had two episodes of vomiting in the past 5 hours. She describes the pain as sharp, with occasional radiation to her back. PMH is significant for type 2 DM, HTN, alcohol use disorder, asthma, and chronic low back pain. Her current medications include metformin, insulin, amlodipine, albuterol inhaler, and oxycodone. She has had abdominal pain several times in the past year, but never this severe and never associated with vomiting. On examination, she has tenderness in the epigastric region. There is mild guarding but no rebound. Physical examination is otherwise unremarkable. Temperature is 101.3°F, BP 136/88, pulse 116. She is alert and oriented and in obvious distress. Which of the following is the most specific finding in this condition?

A. Elevated amylase
B. Elevated ALT

C. Elevated lipase
D. Positive fecal fat test
E. Calcifications on x-ray

65. A 37-year-old female presents to your office with a history of fatigue for the past few months. She does not have any other concerns. After a thorough medical history, she admits to mild constipation that is not troublesome for her. She reports a 5-lb weight gain over the past 6 months, which she attributes to living a more sedentary life of late due to her fatigue and lethargy. Her physical examination is unremarkable; her thyroid does not seem enlarged, although her face is slightly puffy. Which of the following is the best next step in management?

A. Free T4 levels
B. Thyroid-stimulating hormone (TSH) levels
C. Thyroglobulin levels
D. Radioactive iodine uptake (RAIU) scan
E. Biopsy

66. A 21-year-old male college student is brought to the ED by his friends after developing fever, neck stiffness, confusion, and severe sensitivity to light. His friends note that a few hours ago, he lost consciousness and was shaking for a few minutes. Vital signs on admission are as follows: Temperature 105°F, RR 20, BP 120/75, pulse 92, and pulse oximetry 99% on room air. Examination reveals a confused male patient with nuchal rigidity and a left-sided facial droop. His headache acutely worsens when you ask him to rotate his head quickly side to side. Which of the following is the next best step in management?

A. CT scan
B. MRI
C. Lumbar puncture
D. Administer dexamethasone
E. Administer empiric antiviral therapy

67. A 64-year-old male presents with back pain, constipation, and slight confusion for the past 5 to 6 months. Two days ago, he fell while shoveling snow, and he has pain in his right arm as well. Plain films of the spine show several small lytic lesions in the vertebral bodies at the L3 to L4 level. Right humerus films reveal lytic areas in the metaphysis and diaphysis of the right humerus with an associated nondisplaced fracture. Physical examination reveals tenderness on palpation of the low back and right humerus, but is otherwise unremarkable. There is no splenomegaly or lymphadenopathy. CBC results are as follows: Hb 9.1 g/dL, MCV 90, platelet count 150,000/μL. Serum chemistries are as follows: Sodium 137 mEq/L, potassium 4.1 mEq/L, chloride 107 mEq/L, CO_2 24 mEq/L, glucose 89 mg/dL, BUN 46 mg/dL, Cr 3.5 mg/dL. ESR is 105 mm/hr. Which of the following additional findings do you expect with this patient's condition?

A. Mechanical obstruction
B. Electrolyte abnormality
C. Hormone level abnormality
D. Arterial blood gas abnormality
E. Venous blood gas abnormality

68. A 47-year-old male presents to clinic with severe low back pain for the past 2 days. Over the past 2 days he has noted progressive weakness in his bilateral lower extremities. This morning he had an episode of urinary incontinence. His back pain is severe, sharp, and radiates down the right lower extremity. PMH is significant for asthma. He has had intermittent low back pain for the past 2 years but never this severe and never associated with weakness or urinary symptoms. On physical examination, he has very limited motion of his lumbar spine secondary to pain. He has 3/5 strength in gastrocnemius muscles bilaterally and 2/5 strength with great toe dorsiflexion bilaterally. He has diminished sensation throughout his lower extremities, and reflexes are diminished. Rectal tone is absent as is sensation in the perineal area. What is the next best step in management of this patient's condition?

A. Physical therapy
B. Surgery

C. X-ray lumbar spine
D. Bed rest
E. NSAIDs

69. A 67-year-old female presents to the ED after a transient episode of visual loss in her right eye. She reports that she has had right-sided headache for several months, for which she takes ibuprofen, with some relief. On physical examination, she has tenderness over her scalp in the left temporal region and complains that her jaw "gets tired with chewing." Neurologic examination is normal with no focal deficits. Vital signs are as follows: Temperature 101.1°F, HR 72, RR 16, BP 140/82. Which of the following is associated with this condition?

A. Aortic aneurysm
B. Inflammatory bowel disease
C. Hepatitis B
D. Smoking history
E. Alcohol history

70. A 63-year-old female is brought to the ED by paramedics after an episode of syncope at home. Her husband witnessed the event. He states that she fell suddenly to the floor from a standing position. She lost consciousness for 5 seconds, after which she rapidly regained consciousness and was fully oriented. The patient remembers feeling lightheaded, nauseous, and developing "tunnel vision" prior to the event. No bowel or bladder incontinence was noted. PMH is significant for type 2 DM, HTN, and depression. She denies any chest pain or SOB. Vital signs are: Temperature 100.2°F, BP 118/68, pulse 84, RR 18. Oxygen saturation on room air is 96%. Physical examination is significant only for bruising of her left wrist and thigh. Heart and lung examination is normal. Which of the following is the most likely diagnosis?

A. Arrhythmia
B. Orthostatic hypotension
C. Seizure

D. Vasovagal syncope
E. Aortic stenosis

71. A 63-year-old female presents to your office with mid to low back pain for the last year, which has worsened over the past 3 months. She does not report any weakness or radiating pain in her lower extremities. She currently takes oxycodone for her back pain with inadequate relief. She has difficulty sleeping at night because of the back pain. PMH is significant for HTN, for which she takes a calcium channel blocker. Thoracic and lumbar spine radiographs show multiple compression fractures at T8, T11, L3, and L4, as well as diffuse osteopenia. Laboratory studies are as follows: WBC 8 $\times 10^3/mm^3$, hemoglobin 9.7 g/dL, platelets 189 × 103/μL, Na+ 142 mEq/L, K− 4.1 mEq/L, BUN 43 mg/dL, creatinine 2.3 mg/dL, calcium 14.3 mg/dL. Physical examination reveals tenderness on palpation of thoracic and lumbar spine. She has limited lumbar flexion due to pain. Neurologic examination is normal. Which of the following would be most helpful to confirm diagnosis in this patient's condition?

A. CA 15-3
B. Carcinoembryonic antigen (CEA)
C. Alkaline phosphatase
D. Serum protein electrophoresis (SPEP)
E. Bone scan

72. A 62-year-old female is brought to the ED by paramedics for confusion, headache, and vomiting over the past 12 hours. Vital signs are as follows: Temperature 96.9°F, HR 100, RR 22, BP 220/150. She is disoriented and uncooperative. Examination is otherwise unremarkable. What is the most likely diagnosis, and what is the most appropriate management?

A. Hypertensive urgency (asymptomatic severe hypertension); gradual lowering of blood pressure with oral agents
B. Hypertensive urgency (asymptomatic severe hypertension); rapid lowering of blood pressure with IV agents

C. Hypertensive emergency; gradual lowering of blood pressure with oral agents
D. Hypertensive emergency; rapid lowering of blood pressure with IV agents
E. Hypertension; gradual lowering of blood pressure with oral agents

73. A 74-year-old male is brought to your office by his daughter, who is having increasing problems caring for him at home. She reports that he has recently had urinary incontinence and has been "clumsier" than usual. She states that he behaves inappropriately at times, and on two occasions he has wandered outside the home and has gotten lost. He misplaces items frequently, and his personality has become more belligerent and demanding. He seems to lack judgment in social situations, and he never had this problem in the past. She states that these problems have become worse gradually over the past 4 months. On physical examination he has a wide-based gait with small steps. What is the most likely diagnosis?

A. Pseudotumor cerebri (idiopathic intracranial hypertension)
B. Alzheimer disease
C. Normal pressure hydrocephalus
D. Vascular dementia
E. Lewy body dementia

74. A 73-year-old female is brought to the ED by paramedics with SOB and progressive dyspnea. Her medical history is significant for an MI 5 years ago and chronic HFrEF. The patient has also had several episodes of ventricular tachycardia that ultimately required cardioversion. She is currently taking a prophylactic medication and has not had any recurrent arrhythmias. On physical examination, she is in moderate respiratory distress and she has dry rales throughout her lung fields. Temperature 99.1°F, BP 138/75, pulse 96, RR 28. CXR is normal, but CT scan of the chest shows diffuse reticular ground-glass opacities. Which of the following is contributing to this patient's symptoms and clinical findings?

A. Digoxin

B. Lisinopril
C. Amiodarone
D. Bleomycin
E. Losartan

75. A 39-year-old female presents to your office with a 3-year history of headaches. They occur once or twice per week, lasting several hours. The headaches are throbbing and are usually on her left side. During these episodes, the patient is incapacitated and must lie down in a dark room for several hours. She is sensitive to light during the episodes and cannot move because of the pain. She is often nauseated and has vomited on several occasions. Medical history is significant for hypothyroidism, for which she takes levothyroxine. Her physical examination is unremarkable, but the patient endorses another similar headache and begins vomiting near the end of the examination. What is the appropriate next step in managing this patient?

A. Propranolol
B. Amitriptyline
C. Prochlorperazine
D. Verapamil
E. Sumatriptan

76. A 55-year-old female presents to your office for a routine follow-up examination. Medical history is significant for poorly controlled type 2 DM (20-year history), HTN, and osteoarthritis of bilateral knees. She also has had chronic renal insufficiency for the past 5 years. Her current medications include hydrochlorothiazide, lisinopril, metformin, insulin, and metoprolol. She has been taking increasing amounts of NSAIDs for the past several weeks for her painful knees. She is obese with 2+ peripheral pitting edema. She appears weak with dry mucous membranes and is tachycardic. Laboratory tests reveal the following: Na^+ 138 mEq/L, K^+ 4.6 mEq/L, Cl^- 104 mEq/L, HCO_3^- 27 mEq/L, Cr 3.6 mg/dL, WBC 7.9 $10^3/mm^3$, Hgb 8.2 g/dL, MCV 75 fL. On her last visit 3 months ago, her Cr was 2.3 mg/dL. Which of the following tests

would be most helpful to determine the etiology of this patient's renal failure?

A. Urine dipstick
B. Urine sodium
C. Fractional excretion of sodium (FENa)
D. Renal ultrasound
E. Urine eosinophils

77. A 64-year-old female presents to the ED with sudden onset of severe chest pain that occasionally radiates to her back. She has a history of angina and takes nitroglycerin, but this time the pain is much worse and is not relieved with nitroglycerin. PMH is significant for HTN. She is afebrile, HR 105, BP 160/105, RR 17. Cardiac enzymes are negative. CXR shows a widened mediastinum. What is the likely diagnosis?

A. Myocardial infarction
B. Aortic dissection
C. Stroke
D. Acute aortic regurgitation
E. Hypertensive emergency

78. A 17-year-old male presents to the ED with severe pain in his right leg and back that began suddenly a few days ago. The pain is sharp and throbbing. He has a history of sickle cell disease with frequent painful crises requiring hospitalization once or twice per year. He has no other medical problems. Vital signs are as follows: Temperature 101.6°F, HR 94, RR 20, BP 132/84. Oxygen saturation is 97% on room air. His right shin is very tender, as is his low back in the midline. His examination is otherwise unremarkable. CBC results are as follows: Hb 7 g/dL, MCV 94 fL. Osteomyelitis of the right tibia is ultimately diagnosed. What is the most likely cause of this patient's osteomyelitis?

A. Listeria
B. Salmonella
C. Shigella
D. Cryptosporidium

E. Campylobacter

79. A 42-year-old male presents to your office because he noticed a "lump" in his neck 1 month ago. He notes weight loss and palpitations, but has not had pain or dysphagia. On physical examination, you note a nontender, firm nodule about 2 cm in size to the left of the midline in the region of the thyroid gland. Vital signs are as follows: BP 125/82, pulse 75. He does not take any medications and has no significant medical history. He does not have any family history of thyroid disease or cancer. His routine serum laboratory values (CBC and BMP) are normal. The physician decides to do a radioactive iodine uptake (RAIU) scan. Which of the following features is not associated with an increased risk of malignancy?

A. Hard and immobile mass
B. Cold nodule on RAIU
C. Cervical lymphadenopathy
D. Hot nodule on RAIU
E. Microcalcifications

80. A 65-year-old female presents to your office with a 1-month history of intermittent neck and shoulder pain with SOB that normally occurs when she does chores around the house or climbs stairs. She is previously healthy and does not have any medical conditions. She does not smoke or drink alcohol. The patient is up-to-date on vaccinations and had a mammogram done at her previous appointment 1 year ago that was normal. BP 148/86 and pulse 88. She had a colonoscopy performed 6 years ago that was normal. You order an ECG, CXR, CBC, and electrolytes. What should be recommended to the patient at her visit today?

A. Mammogram
B. Colonoscopy
C. Calcium and phosphorus levels
D. Dual-energy x-ray absorptiometry (DEXA)
E. CT scan of the chest

81. A 54-year-old male with a history of parathyroid adenoma presents to the ED with severe pain in his right knee. He says that the pain is extreme and intolerable, and he is in obvious distress. On examination, there is exquisite tenderness, erythema, and swelling of the right knee joint and it feels very warm to the touch. The pain began suddenly a few hours ago. He denies any previous episodes or pain in any other joints. He denies any trauma. Medical history is significant for osteoarthritis of his left knee, for which he takes ibuprofen. He drinks 6 to 7 glasses of wine per day. He does not take any other medications. Vital signs are as follows: Temperature 100.5°F, RR 16, BP 140/85, pulse 78. Which of the following is the best next step in management for this patient?

A. Indomethacin
B. Joint aspiration with synovial fluid analysis
C. Uric acid levels
D. Knee x-ray

82. A 41-year-old male presents to your office with epigastric pain for the past several months. He takes over-the-counter antacids, but symptoms have been worse over the past month. He has not noted any weight loss, vomiting, hematemesis, or melena. The discomfort is worse after eating. Medical history is noncontributory. He takes no other medications. He smokes half a pack of cigarettes a day and drinks alcohol about once per week. Physical examination is unremarkable except for mild epigastric tenderness. A stool antigen *H. pylori* test is negative. What is the appropriate next step in managing this patient?

A. Continue antacids
B. Barium swallow evaluation
C. Empiric 8-week trial with proton pump inhibitor (PPI)
D. Upper GI endoscopy
E. Observation

83. An 81-year-old female was in a motor vehicle accident 3 days ago and suffered a left femur fracture, for which she had surgery on the same day. She has been hospitalized since the day of surgery and has been taking part in daily physical therapy without difficulty. Her family (wife

and daughter) report that she has not been "acting like herself" at times when they come to visit her. She becomes agitated and is belligerent toward them, and she sometimes wonders why she is in the hospital. She reports seeing "creatures." At other times, the patient is doing very well, and they do not notice these inconsistencies. The patient has a history of HTN. Current medications include a laxative and oxycodone for pain control. On examination, the patient is alert and oriented to time/place/person and is appropriately responding to questions. She does not note any hallucinations. Neurologic examination is normal. Which of the following is true of this patient's condition?

A. Anticholinergic medications are first-line treatment
B. Pathologic findings include neurofibrillary tangles and β-amyloid plaques
C. Long-term memory is intact, but short-term memory is affected
D. This is an irreversible condition
E. Etiologies include infection and polypharmacy

84. A 49-year-old female presents to the ED with severe epigastric and RUQ abdominal pain that radiates to the right shoulder. Her symptoms started 3 days ago after she ate a hamburger but have progressively worsened over the past 12 hours. Her symptoms are worse with meals and she has vomited twice over the last day. She notes that over the past several months, a similar pain has intermittently occurred after eating that self-resolved each time. PMH is significant for type 2 diabetes, osteoarthritis, and HTN. Temperature 102.3°F, BP 146/80, pulse 110, RR 16. On physical examination, there is severe right upper quadrant pain on deep palpation, most pronounced on palpation after deep inspiration. Bowel sounds are diminished. The patient is lying on her side holding an emesis basin. Her labs are notable for leukocytosis and mildly elevated transaminases. Which of the following is causing this patient's disorder?

A. Alcoholic hepatitis
B. Gallstone obstruction in the cystic duct
C. Obstruction from carcinoma of the head of the pancreas
D. Gallstone obstruction in the common bile duct

E. Pancreatic inflammation

85. A 31-year-old female presents to your office with multiple musculoskeletal aches and pains including, but not limited to, her shoulders, elbows, knees, neck, and buttocks. She has had these symptoms for the past year. She does not sleep very well when the pain is severe and has no relief with NSAIDs. She has tried exercising more, but the pain is persistent. On palpation, she has marked tenderness over both lateral epicondyles, the anterior aspect of her left shoulder, the medial aspect of her right knee, her posterior neck, and her left greater trochanter. There are no effusions at any of the above sites. Routine laboratory test results are normal. What is the appropriate next step in managing this patient?

A. Prednisone
B. Naproxen
C. Amitriptyline
D. Colchicine
E. Steroid injections

86. A 52-year-old male with a long-standing history of alcohol use disorder is brought to the ED by his wife for vomiting blood. He vomited bright red blood at least twice this morning. PMH is significant for cirrhosis, HTN, and arthritis. He has never vomited blood before. On examination, the patient is awake but appears nervous and is in moderate distress. Delayed capillary refill is present. You are able to determine that he has vomited approximately 2 L of blood over the past 6 hours. Vital signs are: Temperature 99.2°F, BP 90/58, HR 134, RR 20. Pulse oximetry shows 98% oxygenation on room air. What is the appropriate immediate next step in managing this patient?

A. Immediate upper GI endoscopy
B. Administration of fluids
C. Intravenous octreotide
D. Intravenous (IV) proton pump inhibitor
E. Reassurance

87. A 57-year-old female presents to the ED with acute on chronic abdominal pain and vomiting. The pain is diffuse and poorly localized. She has had these symptoms for the past month and has been constipated during this time. Over the last 3 days, her pain has worsened significantly. She has not had a bowel movement or passed gas in 3 days. She has a history of prior appendectomy. Vital signs are: Temperature 99.2°F, BP 128/78, HR 78, RR 16. On physical examination, there is abdominal distention and no guarding or rebound tenderness. The remainder of the examination is normal. What is the next appropriate diagnostic step for this patient?

A. Abdominal ultrasound
B. Colonoscopy
C. Barium enema
D. Sigmoidoscopy
E. CT scan of abdomen and pelvis

88. A 43-year-old female with a history of Crohn disease presents to the ED with a 4-hour history of left flank pain radiating to her left groin. The pain was sudden in onset but was mild at first. However, it has been increasing in severity over the past 2 to 3 hours. The pain is now constant and excruciating. It was associated with nausea and vomiting, but the patient has not had fevers/chills. She has not seen any gross blood in her urine. Vital signs are as follows: Temperature 98.1°F, BP 148/88, pulse 93, RR 24. On physical examination, the patient is in obvious distress, writhing in pain. She has marked tenderness along the left flank, but the examination is otherwise unremarkable. Urinalysis reveals 2+ blood. Urine sediment reveals no casts but many RBCs and few WBCs per HPF. Laboratory tests reveal the following: WBC 8.2 $10^3/mm^3$, Hgb 11.9 g/dL, BUN 14 mg/dL, Cr 0.9 mg/dL. A urine pregnancy test is negative. What is the most likely diagnosis?

A. Pyelonephritis
B. Nephrolithiasis
C. Appendicitis
D. Ectopic pregnancy

E. Pancreatitis

89. A 39-year-old male is brought to the ED by his partner with the chief concern of acute SOB and anxiety that started suddenly 2 hours ago while he was working around the house. Last night he drank seven glasses of wine with his partner. He has not had chest pain. His PMH is unremarkable, however he uses diuretics to help "prevent bloating." Vital signs are: Temperature 99.1°F, BP 148/90, pulse 100, RR 34. Oxygen saturation is 94% on room air. On examination, the patient appears healthy although in moderate respiratory distress. Examination is otherwise unremarkable. Laboratory tests reveal: WBC 7.1 $10^3/mm^3$, Hgb 12.2 g/dL, Na^+ 138 mEq/L, K^+ 4.7 mEq/L, Cl^- 109 mEq/L, HCO_3^- 25 mEq/L, BUN 14 mg/dL, Cr 0.9 mg/dL, glucose 106 mg/dL. ABGs are obtained and reveal: pH 7.52, HCO_3^- 20 mEq/L, $PaCO_2$ 26 mmHg, PaO_2 70 mmHg. CXR and ECG are normal. Which of the following is the etiology of his acid–base disturbance?

A. Accumulation of unmeasured anions due to hepatic metabolism of alcohol
B. Vomiting due to alcohol toxicity
C. Hyperventilation secondary to anxiety
D. Electrolyte imbalance due to diuretic use
E. Hypoventilation from respiratory depression due to alcohol intoxication

90. A 63-year-old male is brought to the ED by his wife for altered mental status. The patient regularly drinks alcohol and has a long-standing history of alcohol use disorder. Over the past 24 hours, he has become more confused and is not "acting like himself" according to his wife. She states that he has never acted like this before. On further questioning, the patient had an episode of massive hematemesis last year that required admission to the hospital, necessitating blood transfusion and other treatment that the wife does not recall. On physical examination, the patient is arousable and is alert to person but not to place or time. He is cachectic, with prominent veins over his abdomen. He has a significant ascites. There are several dilated superficial

arterioles scattered throughout his body. When the patient extends his arms out in front of him, a jerking movement of the limbs is observed. Which of the following is the most appropriate next step in management?

A. Furosemide
B. Thiamine
C. Lactulose
D. Morphine
E. Hydromorphone

91. A 65-year-old female presents to your office with a chief concern of low back pain and bilateral knee pain that is worse with activity and relieved by rest. She has had this pain for 6 or 7 months. She cannot recall any recent trauma or event precipitating the pain. One year ago, she suffered a distal radius fracture when she tripped in her bedroom and landed on her outstretched left arm. Medical history is significant for HTN, for which she takes hydrochlorothiazide. She smokes approximately 12 cigarettes per day and has a 25-pack-year history of smoking. She does not use alcohol. She does not exercise. On physical examination, she is obese, has no radicular symptoms, and the straight-leg test is negative. What is the appropriate next step in managing this patient?

A. Intra-articular corticosteroid injection
B. Acetaminophen
C. Naproxen
D. Allopurinol
E. Observation

92. A 46-year-old male presents to your office with fatigue for the past 2 months. He does not drink alcohol. His medical history is significant for HTN, for which he takes amlodipine. He has not had melena, hematochezia, or any other blood loss. His family history is noncontributory. He has no symptoms other than fatigue. He admits he does not have a good diet. Vital signs are: BP 135/85, pulse 70. Physical examination is unremarkable except for mild pallor. Digital

rectal examination is unremarkable. Laboratory test results are: Hb 9.2 g/dL, MCV 117 fL. ECG is normal. The patient is started on folic acid and 4 weeks later presents with a hemoglobin level of 10.1 g/dL. However, he reports a new "pins and needles" sensation in his distal toes and fingers. Which of the following is the underlying cause of the patient's current symptoms?

A. Inadequate treatment with folic acid
B. Iron deficiency
C. Glucose intolerance
D. Vitamin B_{12} deficiency
E. Peripheral neuropathy from diabetes mellitus

93. A 41-year-old female with history of hypertension presents to your office for a routine checkup. She is new to your office as she recently moved and presents to establish care. She takes blood pressure medications but cannot recall the names. On today's visit, her BP is 142/96. She is asymptomatic except for leg swelling. Physical examination reveals bilateral edema of the lower extremities. She smokes one pack of cigarettes per day and has a 20-pack-year history. Family history is negative. Her total serum cholesterol concentration is 175 mg/dL and HDL is 40 mg/dL. Routine laboratory test results are within normal limits. Which medication is most likely responsible for the patient's issue?

A. Amlodipine
B. Metoprolol
C. Hydrochlorothiazide
D. Metformin
E. Glipizide

94. A 73-year-old male is brought to the ED in a coma. He was delivered to the ED from a nursing home and was reported by the nursing home staff to have had a seizure that lasted less than 1 minute. He was subsequently confused and soon thereafter entered a comatose state. His medical history is significant for type 2 DM requiring insulin, HTN, and

HFpEF. In the ED, the patient is very lethargic and responds only to pain stimuli. His vital signs are stable, and CBC and electrolyte levels are normal. Serum glucose is 16 mg/dL and serum insulin is elevated. C-peptide is 0.2 ng/mL (normal range, 0.5 to 3 ng/mL). Urine sulfonylurea level is undetectable. What is the likely cause of this patient's condition?

A. Factitious hypoglycemia from surreptitious injection of insulin
B. Insulinoma
C. Somatization disorder
D. Glucagonoma
E. Dehydration

95. A 78-year-old female presents to your office for a routine checkup. Her only concern is burning when she urinates that she has had for several weeks. Her medical history is significant for HTN and type 2 DM. She has four children, all delivered vaginally. Medications include lisinopril, insulin, metformin, and empagliflozin. She wears adult pads because she loses large volumes of urine throughout the day and usually cannot reach the bathroom in time. Physical examination is unremarkable. Vital signs are unremarkable. Routine laboratory test results are within normal limits except for a random blood glucose level of 210 mg/dL. Urinalysis shows positive nitrites and bacteria. She receives oral antibiotics for a urinary tract infection. After completing the course of antibiotics, she goes on a run, and feels a "pop" above her heel that is associated with severe pain. She has pain and difficulty with plantar flexion of the affected foot. Which of the following antibiotics is most likely responsible?

A. Trimethoprim-sulfamethoxazole
B. Metronidazole
C. Tobramycin
D. Ciprofloxacin
E. Azithromycin

96. A 33-year-old female presents to your office with insomnia and difficulty concentrating at work for several weeks. She reports a 20-lb

weight loss over the past 2 to 3 months, despite eating more. When questioned, she reports that she frequently feels "hot and sweaty" at work and at home. She denies chest pain or palpitations but does have diarrhea frequently. Vital signs are: Temperature 98.9°F, BP 130/80, pulse 98, RR 15. She appears worried. On physical examination, she has warm and moist skin. She has a slight hand tremor. On palpation of her thyroid, you note a diffusely enlarged thyroid gland that is nontender. Which of the following is the best next step in management?

A. Free T4 levels
B. Thyroid-stimulating hormone (TSH) levels
C. Thyroglobulin levels
D. Radioactive iodine uptake (RAIU) scan
E. A fine-needle aspiration (FNA) biopsy

97. A 26-year-old medical student is injured via needle stick while drawing blood from a patient with chronic hepatitis B. The patient received her final hepatitis B vaccination of the series 7 years ago. The patient had her titers checked before clinical rotations 6 months ago and was found to be positive for anti-hepatitis B surface antibodies (HBsAbs). Which of the following is the best next step in the management of this patient?

A. Hepatitis B immunoglobulin (HBIG) now
B. Serologic testing for HBsAg
C. Hepatitis B vaccination
D. Reassurance

98. A 71-year-old female is brought to the ED by her husband for increased confusion over the past 3 days. The husband reports that the patient fell 4 days ago and immediately after the fall she was asymptomatic but over the ensuing days has become lethargic and more confused. PMH is significant for hyperlipidemia. She underwent a right total hip replacement 5 weeks ago and was diagnosed with a DVT 2 weeks after the operation. Medications include apixaban and atorvastatin. On examination, patient has slurred speech and appears confused. She is oriented to person but not to place or time. Neurologic examination is

normal. The remainder of physical examination is normal. A head CT is ordered which confirms the diagnosis. Which of the following is the etiology of this patient's condition?

A. Tearing of the middle meningeal artery
B. Tearing of the bridging veins
C. Ruptured aneurysm
D. Hypertensive hemorrhage
E. Alzheimer disease

99. A 66-year-old male is brought to your office by his wife with productive cough, fever, and chills for the past 2 days. The patient lives with his wife and is retired. PMH is significant for type 2 DM, for which he takes metformin and insulin; HFrEF, with an ejection fraction of 40%; and a history of chronic kidney disease. He is alert and oriented. There is no history of smoking or alcohol use. On physical examination, the patient is lethargic. He has crackles over the left lower lung. Cardiovascular examination is normal. His JVP is flat and his extremities are warm. Vital signs are: Temperature 103.3°F, BP 82/54, HR 128, RR 24. Oxygen saturation on room air is 97%. CXR shows a consolidation in the left lower lobe of the lung. Laboratory test results show WBC 15 $10^3/mm^3$, hemoglobin 12 g/dL, Na 142 mEq/L, glucose 167 mg/dL, BUN 36 mg/dL, creatinine 1.5 mg/dL. Lactate is elevated. What is the likely diagnosis in this patient?

A. Cardiogenic shock
B. Pulmonary embolism
C. Sepsis
D. Severe sepsis
E. Septic shock

100. You are on-call in the hospital and called to see a 69-year-old male with acute dyspnea. Vital signs are: Temperature 100.1°F, BP 166/88, pulse 130, RR 33. On your arrival, the patient's oxygen saturation is 79% on a 100% nonrebreather face mask. The nurse informs you that his oxygen saturation was 68% on room air. He currently has heavily labored breathing and appears cyanotic. The nurse informs you that the

patient was admitted 2 days ago for a severe COPD exacerbation. You decide to emergently intubate the patient. Which of the following will reduce the risk of developing pneumonia in this patient?

A. Place the patient in a semi-recumbent position
B. Avoid daily attempts to wean the patient from the ventilator
C. Measure daily gastric residual volumes
D. Administer daily omeprazole
E. Avoid any instrumentation of the airway, including endotracheal suctioning

Answers

1. **Answer: E. Small cell carcinoma.** The patient most likely has small cell carcinoma given the main risk factor of a strong smoking history, a mass located in the central/proximal airways and the muscle weakness suggestive of paraneoplastic Lambert–Eaton syndrome (also known as Eastern–Lambert syndrome, or Lambert–Eaton myasthenic syndrome). Other associated paraneoplastic syndromes with small cell include Cushing's and SIADH.

   Bronchial carcinoid is not clearly associated with smoking or Lambert–Eaton, although usually presents as a central/proximal lesion. Large cell carcinoma is not associated with Lambert–Eaton. Squamous cell carcinoma is not associated with Lambert–Eaton but is typically a central lesion; this lung malignancy is also the most likely lung cancer associated with paraneoplastic hypercalcemia.

2. **Answer: D. Obtain contrast-enhanced CT of the abdomen.** The patient is presenting with typical signs/symptoms of acute diverticulitis —fever, leukocytosis, LLQ location of pain. Further suggestion is made by the fact that the patient had a prior episode of rectal bleeding, likely from underlying diverticulosis. CT scan will help not only confirm the diagnosis but also to rule out other processes and assess for any complications of diverticulitis.

   Checking the serum lactate will help assess for ischemia but will not help you confirm the diagnosis of diverticulitis. Retroperitoneal ultrasound will assess for hydronephrosis and pyelonephritis but urinalysis/chemistry are normal and there is no suggestion of obstruction/infection regardless of his history of nephrolithiasis. Colonoscopy should be avoided in a patient with acute diverticulitis because of the risk of perforation. Proceeding to the operating room would be premature unless the patient had surgical indications such as

signs of peritonitis, fistula, stricture, large abscess, or perforation related to the diverticulitis.

3. **Answer: B. Heparin.** IV UFH (unfractionated heparin) and subcutaneous LMWH (low–molecular-weight heparin) are shown to decrease mortality in acute coronary syndrome. In addition, statins, ASA, and β-blockers (provided the patient is not in acute decompensated heart failure), and $P2Y_{12}$ inhibitors are also mainstays of therapy. ACE inhibitors are recommended prior to discharge.

   Alteplase is NOT indicated for UA/NSTEMI but ONLY for STEMI when PCI is *not* available. Hydralazine, furosemide, and digoxin offer no mortality benefit in this setting either.

4. **Answer: C. Aspirin.** Aspirin is shown to reduce recurrent stroke and to decrease mortality and should be administered within 48 hours.

   Insulin is not necessary as the level of glucose elevation is not contributing to the current presentation; in fact, aggressive glycemic control is associated with worse outcomes. Heparin has not been shown to improve outcomes and is not recommended as an acute treatment for ischemic stroke. Alteplase can be considered but only for significant deficits when the patient presents within 4.5 hours of clearly defined symptom onset and has no contraindications; this patient presented too late for this to be a treatment option. Labetalol would not be used despite the elevated BP as permissive hypertension is allowed in the setting of an acute ischemic stroke; BP up to 220/120 mm Hg is generally tolerated initially, unless the patient is a candidate for alteplase, in which case the blood pressure goal is systolic BP ≤185 and diastolic BP <110.

5. **Answer: E. Methylmalonic acid level.** The other answers will help narrow down your differential but will not definitely confirm the diagnosis. The patient has a total gastrectomy and thus loss of intrinsic factor leading to impaired absorption of B_{12}. The neurologic symptoms are a result of this deficiency and the fatigue/pallor are related to macrocytic anemia. Laboratory assessment of B_{12}, methylmalonic acid,

or homocysteine would all be useful to confirm deficiency; however, homocysteine is also elevated in folate deficiency and thus not as specific. An elevated methylmalonic acid is specific to B_{12} deficiency.

Folate level could help confirm a deficiency in this vitamin which does cause a macrocytic anemia but this deficiency is not associated with neurologic deficits; in addition, folic acid is absorbed in the small intestine, not the stomach. CBC with mean corpuscular volume may help confirm macrocytic anemia but this is not always present with B_{12} deficiency; in addition, there are multiple causes of macrocytosis and anemia and this will not confirm his diagnosis. Intrinsic factor Ab is present in pernicious anemia; it is not a sensitive test but regardless, a positive test would not confirm the cause of his symptoms. MRI lumbar spine has nonspecific findings in B_{12} deficiency; it may help assess for central/foraminal stenosis but without back pain this is unlikely and would this test would not assess his pallor/anemia.

6. **Answer: D. 24-hour urine-free cortisol.** The patient likely has Cushing syndrome given the constellation of weight gain, striae (without prior history of pregnancy), new-onset diabetes, hypertension, and vertebral compression fracture indicative of osteoporosis. The diagnosis of Cushing syndrome requires that at least two of the three first-line tests are positive. These include a 24-hour urine-free cortisol level, a low-dose dexamethasone suppression test, or a late night salivary cortisol level.

Serum ACTH is not used for screening and is only helpful in determining the etiology once the diagnosis of Cushing syndrome has been made. It helps establish ACTH-dependent from ACTH-independent etiologies, narrowing the differential diagnosis and subsequent evaluation. MRI brain and CT abdomen may help identify pituitary adenoma and adrenal adenoma, respectively, but this test is premature at this point as the diagnosis of Cushing syndrome has not yet been confirmed. CRH stimulation test is only used once hypercortisolism has been established and ACTH is elevated as it helps distinguish Cushing disease versus ectopic ACTH production.

7. **Answer: B. Intravenous fluids.** The patient is presenting with an inferior MI as evidenced by the location of the ST elevations on ECG. Because the patient also has bradycardia and hypotension, he also has evidence of an associated right ventricular MI, which is strongly associated with inferior wall MIs and importantly is treated differently than a left-sided MI. The diagnosis can be confirmed with a right-sided ECG, which would show ST elevations in V3R-V6R. It is important to remember that hemodynamic instability can result from increased vagal tone and sinus node dysfunction. Patients with right ventricular MI are often preload dependent and IV fluids are indicated to increase the systemic blood pressure. Treatment with antiplatelet agents (ASA and $P2Y_{12}$ inhibitors), fibrinolysis versus PCI, and anticoagulation (heparin or LMWH) are all indicated as well.

   Nitroglycerin will decrease preload and worsen the patient's hemodynamics. Furosemide is not indicated as the patient has no signs of fluid overload and diuresis will further decrease preload. The patient is already showing signs of hemodynamic instability and metoprolol will cause further bradycardia and hypotension. At this time, morphine may cause vasodilation and further hypotension. Morphine would be a reasonable choice once the patient is fluid resuscitated, as achieving pain control is very important in acute MI management.

8. **Answer: D. Sodium bicarbonate.** The patient has evidence of an anion gap metabolic acidosis (HCO_3 is decreased and AG is 15) as well as a respiratory alkalosis (CO_2 is decreased) consistent with salicylate toxicity. This involves using Winter's formula and the expected PCO_2 in this example is 31 ± 2; however, the actual PCO_2 is 25 confirming there is a respiratory alkalosis as well. Treatment options include alkalinization of urine with intravenous sodium carbonate, and hemodialysis for severe cases.

   Fomepizole is indicated for methanol or ethylene glycol toxicity; however, neither of these would also cause respiratory alkalosis. Albuterol will treat a COPD exacerbation, although CO_2 retention and primary respiratory acidosis would be the dominant finding in that

scenario. Insulin would be the treatment for diabetic ketoacidosis (DKA). However, DKA would present with a primary anion gap metabolic acidosis, hyperglycemia, and hyperosmolarity, and this clinical picture is more consistent with salicylate toxicity.

9. **Answer: E. Colonoscopy.** The patient has not had colorectal cancer screening and this would certainly be indicated at this time given his age (>45). Initial choices for screening include FIT, flexible sigmoidoscopy, or colonoscopy. In this example, the patient had a positive screening test and requires a colonoscopy as it will allow full visualization of the entire colon for diagnostic and therapeutic (biopsy if needed) purposes.

   Flexible sigmoidoscopy will miss more than half of the colon and therefore is not the best answer. Digital rectal examination will not be sensitive enough to check anything but the rectum. Video capsule endoscopy is not the best next step; it will allow visualization of the entire GI tract but will not allow for biopsy if needed. CT colonography will not be sensitive enough to detect small lesions and again will not allow for intervention if necessary.

10. **Answer: A. IV omeprazole.** The patient likely has an upper GI bleed as evidenced by epigastric abdominal pain, melena, and labs showing an elevated BUN:Cr ratio of >30 in the setting of NSAID use. Acid suppression and upper endoscopy (EGD) are the indicated interventions.

    IV octreotide is not indicated as the patient has no signs of cirrhosis (e.g., thrombocytopenia, coagulopathy) to suggest esophageal varices as the cause of bleeding. Platelet transfusion will not reverse the effect aspirin has had on platelets and the patient does not have thrombocytopenia that would necessitate platelet transfusion during bleeding. RBC transfusion is not necessary as the patient is hemodynamically stable and the Hgb is not below the recommended transfusion threshold (usually Hgb < 7 g/dL, or higher in those with active cardiac disease, symptomatic anemia, or ongoing bleeding). IV fluids are not necessary at this point as the patient does not appear hypovolemic or hemodynamically unstable.

11. Answer: E. 24-hour urine protein. The patient has ascites in the setting of a low SAAG (<1.1 g/dL) indicating the etiology is not portal hypertension, and low ascitic protein (<2.5 g/dL) indicating low protein overall. The expected diagnoses would be severe malnutrition or protein-losing disorder such as nephrotic syndrome; thus, 24-hour urine protein is the most appropriate test. Moreover, she has hypercholesterolemia and physical examination evidence of a deep vein thrombosis, both of which can result from nephrotic syndrome.

Echocardiogram would be helpful if the patient had elevated SAAG and elevated ascitic protein, which is consistent with cardiac ascites. Pelvic ultrasound to assess for potential ovarian malignancy would be indicated if patient had low SAAG and elevated ascitic protein. Liver biopsy might be indicated to assess for causes of cirrhosis if patient had elevated SAAG and low ascitic protein. Adenosine deaminase of the ascites fluid is one of several tests that can be used in the diagnosis of peritoneal tuberculosis, which would be more likely if patient had low SAAG and elevated ascitic protein.

12. Answer: B. IVIG. The patient is presenting with an ascending paralysis, absent reflexes, and albuminocytologic dissociation (elevated CSF protein, but normal cell count) consistent with a diagnosis of Guillain–Barré syndrome in the setting of a preceding diarrheal illness. IVIG and plasma exchange are the recommended treatments.

Prednisone is not recommended as steroids have not shown benefit. Ciprofloxacin is not indicated as there are no signs of ongoing infection; there are many precipitating illnesses that can trigger this disorder. Pyridostigmine would be indicated in myasthenia gravis. Botulism antitoxin would be beneficial if the patient has symptoms suggestive of botulism, a descending paralysis.

13. Answer: E. Ristocetin cofactor activity. The patient is presenting with mucocutaneous bleeding suggestive of von Willebrand disease. vWD is an autosomal dominant disorder and can be associated with factor VIII deficiency, sometimes manifested by an increased PTT

level. Ristocetin testing is the only test mentioned that assesses platelet aggregation.

Fibrinogen levels can be low in DIC but these patients are usually acutely ill and PT/PTT would also be elevated. Direct antiglobulin test (DAT) will assess for causes of hemolytic anemia but not for bleeding; in addition, bilirubin is normal suggesting against hemolysis. Factor IX level is helpful in diagnosis of hemophilia B, but this diseases is X linked recessive and unlikely to be seen in successive generations of females; in addition, hemarthrosis or hematomas would be more prominent. A mixing study is not indicated as the PT/PTT times are normal, so the patient is unlikely to have a factor deficiency or inhibitor.

14. **Answer: E. Lumbar puncture.** The patient has acute headache in "thunderclap" fashion and subarachnoid hemorrhage is a must-not-miss diagnosis. CT brain showed no signs of hemorrhage, but LP is the next best step to evaluate for RBCs, xanthochromia, or an elevated opening pressure (all signs of SAH).

Sumatriptan can be used for migraines but his symptoms are not suggestive of migraines, and it is necessary to rule out SAH with this patient's concerning history. MRI brain may have comparable sensitivity to CT scan, but a negative scan should still be followed by a lumbar puncture for definitive evaluation. Cerebral angiogram will be useful once SAH is confirmed, but is invasive and will not be the next step. CT brain with contrast is unlikely to visualize a small aneurysm and is not the next step.

15. **Answer: A. Smoking cessation.** She has evidence of obstructive pulmonary disease as indicated by her FEV_1/FVC ratio <0.70. Smoking cessation will decrease the rate of decline in lung function and is one intervention for COPD that has also been shown to decrease mortality.

Tiotropium and salmeterol are likely to improve her symptoms but will have no effect on mortality. Oxygen therapy has been shown to decrease mortality but is only indicated if O_2 saturation is 88% or below at rest, or if 89% or below combined with evidence of cor

pulmonale, right heart failure, or erythrocytosis. Azithromycin is indicated in the treatment of COPD exacerbation, and is considered for severe COPD when other therapies have not been effective. The best long-term intervention for this patient is smoking cessation.

16. **Answer: B. Wisdom tooth extraction.** Endocarditis prophylaxis requires a high-risk situation PLUS a qualifying procedure that is high risk for bacteremia and resultant endocarditis. Antibiotic prophylaxis is currently recommended for the following cardiac conditions: certain congenital heart diseases, history of infective endocarditis, valve disease in a heart transplant patient, and presence of a prosthetic valve. Thus, this patient should receive prophylaxis since he has a prosthetic valve and is undergoing a dental procedure.

    Colonoscopy, EGD, as well as GI procedures in general do not require prophylaxis. Bronchoscopy only requires prophylaxis if mucosa will be broken, such as with biopsy. Dilatation ureteral strictures as well as GU procedures in general do not require antibiotics to prevent endocarditis (although antibiotics may be indicated for asymptomatic bacteriuria prior to GU procedure).

17. **Answer: A. SPEP (serum protein electrophoresis).** The patient is presenting with a pathologic fracture, indicating weakening of the underlying bone prior to a low impact injury. The laboratory findings (hypercalcemia, normocytic anemia, renal failure, and low anion gap) are suggestive of multiple myeloma; thus, SPEP would be the best next step in diagnosis.

    Bone scans detect osteoblastic activity and can be falsely negative in myeloma. PTHrP can assess for hypercalcemia of malignancy, but this clinical scenario is more concerning for multiple myeloma than malignancy. In addition, an elevated PTHrP would explain only the hypercalcemia. PTH elevation in hyperparathyroidism would explain the hypercalcemia, but not the other lab findings. A DEXA scan is useful to evaluate for underlying osteoporosis, but the x-ray shows normal bone density, and it is more likely that his pathologic fracture is related to a lytic lesion from multiple myeloma.

18. **Answer: E. TSH.** The patient has symptoms suggestive of hypothyroidism (bradycardia, fatigue, weight gain, hair loss) and TSH is the best initial screening test.

US thyroid is not necessary when the physical examination is normal. TPO would help confirm Hashimoto's as a potential cause of hypothyroidism but would not help confirm hypothyroidism itself, as patients may have elevated antibodies but normal thyroid function. Thyroid uptake scan would be more helpful in evaluating hyperthyroidism, such as thyroiditis or Graves disease. FNA is only indicated if a patient has a nodule with size or features worrisome for malignancy and in need of tissue diagnosis.

19. **Answer: A. Follow-up CT chest.** The patient has an indeterminate pulmonary nodule discovered incidentally that requires further follow-up. The patient is low risk (<5%) as evidenced by her lack of smoking history and young age. Interval CT scan is the most appropriate follow-up (Fleischner guidelines and ACCP guidelines). Of note, if the nodule clearly has benign properties such as popcorn calcifications suggesting hamartoma, no further follow-up is required.

Bronchoscopy and needle biopsy are indicated if the patient had an intermediate/high malignancy risk, if the nodule is enlarging, or the patient desires a definitive tissue diagnosis. CXR is not sensitive enough to follow changes in size. PET-CT scan may also be indicated if there is intermediate/high risk of malignancy.

20. **Answer: D. Atropine.** The patient has symptomatic bradycardia with hypoperfusion leading to her symptoms; atropine is the first step in resuscitation for symptomatic bradycardia. If atropine is ineffective, then epinephrine, dopamine, or transcutaneous or transvenous pacing would all be alternative treatments.

Echocardiogram will not help treat the patient in the acute setting as this situation demands urgent intervention; obtaining this test will only delay treatment. Nitroglycerin can be used to alleviate chest pain, but will cause decreased preload and thus worsen this patient's hypotension. ICD is a consideration for this patient for long-term

primary prevention of ventricular arrhythmias with her reduced EF despite maximal goal-directed medical therapy; however, it is not an acute treatment for the patient's life-threatening condition.

21. Answer: E. Trial of omeprazole. His symptoms are suggestive of gastroesophageal reflux with a component of laryngeal reflux. He is currently only using an H_2 blocker as needed. PPIs are more effective than H_2 blockers; if his symptoms persist despite a PPI for 8 weeks, then workup should be done for other causes of his symptoms.

Helicobacter pylori antigen would be useful if evaluating for abdominal pain if gastritis/ulcers were the suspected diagnoses. EGD would be indicated if patient was following lifestyle changes and taking scheduled PPI but having no relief in symptoms, or if he had alarm symptoms (melena, anemia, weight loss, or dysphagia). pH monitoring can also be used for refractory symptoms after appropriate empiric therapy. Gastrin level would only be indicated if evaluating for suspected gastrinoma or with multiple gastroduodenal ulcers.

22. Answer: A. EGD with small bowel biopsy. The patient has chronic symptoms suggestive of celiac sprue (iron deficiency, mildly elevated transaminases, anemia, and dermatitis herpetiformis). There is also an association with psychiatric issues with celiac sprue. TTG serology would be reasonable and duodenal biopsy is necessary for confirmation.

Colonoscopy would not be able to evaluate for a diagnosis of celiac sprue. Loperamide may help diarrhea but will not address the underlying cause of her symptoms and is therefore not the best answer. Sertraline would be helpful in pharmacologic treatment of depression; there is a link of IBS with mood disorders but IBS is a diagnosis of exclusion and only considered when labs/examination is normal. Skin biopsy may confirm dermatitis herpetiformis but small bowel biopsy is still be needed for the diagnosis of celiac sprue, as one may have this skin condition without having celiac disease.

23. **Answer: B. Spironolactone.** The patient has NYHA class IV heart failure with reduced ejection fraction (HFrEF) and MRAs such as spironolactone are shown to decrease mortality in these patients. β-Blockers, ACEi/ARB, ARNI (angiotensin receptor/neprilysin inhibitor), SGLT2 inhibitors, and ICDs are also shown to decrease mortality in patients with heart failure with reduced ejection fraction.

Isosorbide dinitrate and hydralazine are alternatives to ACEi/ARBs for afterload reduction if the patient cannot tolerate one of those agents, but do not have mortality benefit. Digoxin and furosemide may be helpful for symptoms but do not decrease mortality in heart failure.

24. **Answer: D. Inhaled albuterol PRN.** The patient has classic symptoms of exercise-induced bronchoconstriction and would benefit from pre-exercise inhaler usage to prevent symptoms. It is important to remember that PFTs may be normal between episodes when the patient is asymptomatic; a challenge may be needed to objectively evaluate the bronchoconstriction.

CXR is not necessary as the lung examination is clear and she has no symptoms at baseline. Inhaled fluticasone is not the best answer as the patient only has intermittent symptoms related to activity, not constant symptoms to suggest chronic asthma. Reassurance is not appropriate as the patient clearly has symptoms that limit her lifestyle and are causing airway constriction. Inhaled salmeterol is not appropriate as the patient has no baseline symptoms between episodes; in addition, treatment of asthma with LABA monotherapy, without cotreatment with inhaled corticosteroids, has been found to be associated with increased serious adverse events.

25. **Answer: D. No treatment.** It is not recommended to screen for asymptomatic bacteriuria as treatment does not offer benefit but does include potential harm from inappropriate use of antibiotics. The only populations in which to screen and treat asymptomatic bacteriuria are pregnancy and patients undergoing urologic procedures in which mucosal bleeding is expected (some experts recommend treatment in patients with history of renal transplantation, but this is controversial).

Nitrofurantoin would be the drug of choice for a patient with uncomplicated cystitis. Cephalexin and TMP-SMX would be considerations for cystitis or for pyelonephritis. Repeat urinalysis and culture is not indicated as screening and treating asymptomatic bacteriuria in this patient would not offer clinical benefit.

26. **Answer: B. IV hydrocortisone.** The patient is presenting with acute adrenal crisis, which is an endocrine emergency. The patient must be adequately resuscitated with IV fluids in addition to replacement of corticosteroids. The most likely cause for the patient's adrenal insufficiency is her long-term use of corticosteroids and inadequate response in the setting of acute illness.

A cortisol level can be checked but medical treatment is the most important intervention, and it is not necessary to confirm a low cortisol in a patient with this constellation of signs and symptoms of adrenal crisis. CT adrenal glands and MRI pituitary are unlikely to yield further information regarding the diagnosis in the patient; in addition, they would be inappropriate as they would delay the treatment of the patient and lead to higher morbidity/mortality. Cosyntropin stimulation test can be used to confirm the diagnosis of adrenal insufficiency but should NOT delay treatment; dexamethasone could be used if the diagnosis is in question as it will not interfere with interpretation of this test.

27. **Answer: A. CT angiography.** The patient has pain out of proportion to examination in the setting of atherosclerotic risk factors for thrombosis as well as atrial fibrillation with intermittent adherence to anticoagulation, which are risk factors for embolism. The most likely diagnosis is acute mesenteric ischemia and CT angiography is the best diagnostic study to confirm diagnosis.

Gastric emptying study would be helpful to evaluate for gastroparesis, which the patient is at risk for with poorly controlled diabetes; however, this patient is presenting with acute abdominal pain, which is not consistent with the presentation of gastroparesis. EGD and colonoscopy would help evaluate for many causes of abdominal pain but would delay the diagnosis of acute mesenteric ischemia, which is needed urgently to prevent bowel infarction. Andexanet alfa can

rapidly reverse apixaban in the setting of major bleeding, but given the scenario suggestive of acute mesenteric ischemia and stable hemodynamics, rapid reversal is not indicated at this time. Rapid reversal of anticoagulation may be needed if the patient develops bowel infarction/necrosis and needs emergent surgery.

28. **Answer: E. Ibuprofen.** NSAIDs are the mainstay of treatment for acute pericarditis. Colchicine can be added to this regimen for added benefit.

Coronary angiogram is not indicated as there are no focal ST elevations or wall motion abnormalities suggestive of an acute MI. Drainage of pericardial effusion is only indicated in large or rapidly accumulating effusions causing hemodynamic compromise or for diagnostic purposes. Prednisone is not indicated unless NSAIDs are not effective or the patient has contraindications to receiving them. Azathioprine would only be used if the patient had recurrent pericarditis and was unable to wean off of steroids.

29. **Answer: C. Chest tube insertion.** It is important to recognize that the patient is presenting with a symptomatic spontaneous pneumothorax, in this setting related to his underlying COPD and likely bleb rupture. CXR can confirm the diagnosis, but this can also be made clinically. Supplemental oxygen would be appropriate followed by needle aspiration or chest tube insertion to remove air from the pleural space.

Albuterol–ipratropium nebulizer and prednisone would help treat COPD exacerbation but this is not the diagnosis presented. Azithromycin is not the best answer as there is no suggestion of infection in this patient. Pleurodesis is only indicated if there are recurrent pneumothoraces.

30. **Answer: D. Warfarin.** The patient has atrial fibrillation and a CHADS2-VASc score of 4 without a history of major bleeding, thus warranting systemic anticoagulation. In addition, the patient has a mechanical aortic valve. For most patients with atrial fibrillation, a direct oral anticoagulant (DOAC) is an appropriate choice for systemic

anticoagulation. However, patients with mechanical valves should be on warfarin.

Aspirin and clopidogrel are antiplatelet agents that are not adequate as for this patient with an elevated CHADS2-VASc score. Apixaban and dabigatran are DOACs that would be appropriate if the patient did not have a mechanical valve.

31. Answer: B. Aortic valve replacement. The patient has symptomatic aortic stenosis which is an indication for valve replacement. Options include a surgical aortic valve replacement (SAVR) or transcatheter aortic valve replacement (TAVR).

Nitroglycerin would be indicated if his symptoms were related solely to atherosclerotic disease; however, vasodilation may worsen his systemic blood pressure. Aspirin will prevent further atherosclerotic disease but will not fix his valvular disease. Carotid Doppler will assess for carotid stenosis; however, the murmur heard in the neck is referred from the aortic valve. Coronary artery bypass grafting is sometimes done at the same time as a surgical valve replacement if significant atherosclerotic disease is present; however, he has very mild disease on prior angiogram and this is not indicated.

32. Answer: B. Physical therapy. The diagnosis here is patellofemoral pain syndrome and PT is the most appropriate intervention.

Corticosteroid injection would be unlikely to be helpful as the cause of pain is not intra-articular; she does have an underlying autoimmune disease but there is no effusion and inflammatory markers do not show significant inflammation to heighten suspicion of SLE as the cause. Knee arthroscopy and MRI knee are also unwarranted at this time given the normal examination and lack of trauma to suggest meniscal or ligamentous injury. Ibuprofen is contraindicated given CKD.

33. Answer: E. Lisinopril. The patient has a new diagnosis of type 2 diabetes with elevated blood pressure and requires not only control of his glucose but also treatment for complications related to his disease. An ACE inhibitor or ARB are indicated for hypertension, CKD, or

moderately increased albuminuria, and thus lisinopril is the best answer.

Hydrochlorothiazide, amlodipine, and hydralazine are not the best choices for antihypertensives as they do not have renal protective features that ACE inhibitors do. Insulin is not necessary given the patient's relatively controlled A1c and is premature at this point without trialing lifestyle modifications first.

34. Answer: E. Bronchoscopy and biopsy of hilar lymph node. The patient's clinical picture is consistent with possible sarcoidosis. Tissue biopsy showing noncaseating granulomas along with ruling out other diseases is essential for the diagnosis.

Serum calcium will be elevated in a subset of sarcoid patients but this is not sensitive enough to make the diagnosis. CT chest will yield more information in regard to lung imaging but will not confirm a diagnosis. A serum ACE level is not sensitive enough to confirm a diagnosis (it may be normal in sarcoidosis). Biopsy of a leg lesion which is easily accessible will reveal inflammation as the patient has findings consistent with erythema nodosum; however, this will not show noncaseating granulomas so this will not confirm a diagnosis of sarcoid.

35. Answer: B. Initiate fluid restriction. The patient is euvolemic and has low serum osmolality, and high urine osmolality which are all suggestive of SIADH due to underlying lung cancer as the cause. He has very mild symptoms and can be managed with fluid restriction. Oral salt tabs or oral urea packets (both of which provide a high solute load, which promote free water excretion) may be useful for management as well.

Administering IV normal (0.9%) saline is not the appropriate answer as sodium will be excreted but water will be retained; thus, worsening hyponatremia. Initiating hemodialysis is not appropriate as the patient has minimal symptoms, has not failed other therapies, and is overly invasive. Administering hypertonic (3%) saline is not necessary as the patient has minimal symptoms; if the patient had severe symptoms such as confusion, lethargy, nausea, or vomiting this would

be appropriate. Administering hydrochlorothiazide is not correct as this medication itself can worsen hyponatremia.

36. **Answer: D. Antistreptolysin titer.** The patient is presenting with hematuria in the setting of a recent infection and the most likely diagnosis is poststreptococcal glomerulonephritis. Antistreptolysin titer can help confirm recent strep infection.

ANCA is unlikely to be helpful as the patient does not have other symptoms suggestive of a systemic vasculitis. Anti-GBM is also unlikely to assist in the diagnosis as the patient has no other symptoms to suggest this and the time course fits best with PSGN. HIV is associated with renal disease, most specifically collapsing variant of FSGS but this is nephrotic in presentation. IgA levels are unnecessary as serum IgA levels are not useful in the diagnosis of IgA nephropathy; in addition, the glomerulonephritis associated with IgA deposits happens much quicker after the infection, usually within several days.

37. **Answer: E. SLE.** This patient has multiple symptoms and examination findings consistent with a likely diagnosis of SLE—oral ulcers, malar rash, arthritis, edema suggestive of renal impairment, as well as hematologic abnormalities.

Osteoarthritis is unlikely given the patient's young age and would not explain the patient's multiple other symptoms. Reactive arthritis usually follows a GI/GU infection and includes arthritis, urethritis, and uveitis. Behçet disease can include many symptoms, most notably oral/genital ulcerations but would be unlikely to include the classic malar rash and is very rare in the United States. Gout is possible given her use of HCTZ and potential for hyperuricemia but this would not explain the other findings.

38. **Answer: B. Carbidopa–levodopa.** The patient is presenting with symptoms consistent with Parkinson disease and medical treatment is recommended with dopamine agonist.

Fluoxetine is not appropriate as the patient does not have a clinical diagnosis of depression; his psychomotor slowing alone should not be misinterpreted as depressive symptoms unless there are other

symptoms such as sadness, appetite changes, sleep disturbance, or disinterest in activities. Propranolol can be beneficial in patients with essential tremor. Memantine is indicated only if patient has moderate-to-severe dementia. Deep brain stimulation is invasive and would not be considered unless severe symptoms develop or medical therapy is no longer effective.

39. Answer: C. Infliximab. The patient has moderate-to-severe Crohn disease (anemia, abdominal tenderness, and weight loss) and demands appropriate therapy to prevent complications. Infliximab is an anti-TNF antibody that is indicated for moderate-to-severe Crohn disease.

Loperamide should not be used in active inflammatory bowel disease. Azathioprine is less likely to offer control of the patient's symptoms than infliximab (although it may be used in combination with infliximab); in addition, this medication takes up to 6 weeks to reach a therapeutic effect and needs to be given alongside steroids. Surgical resection is not indicated as the patient has no evidence of abscess, perforation, or fistula. Ciprofloxacin and metronidazole are not indicated for treatment of active Crohn disease without signs of infection.

40. Answer: A. Thumb spica splint. The patient has risk factors for several causes of pain related to overuse in the upper extremity but examination reveals a positive Finkelstein test which confirms a diagnosis of de Quervain tenosynovitis. This is related to a combination of repetitive motions in this patient's occupation as mechanic and in caring for his grandchild. Immobilization of the thumb is the most appropriate intervention.

Wrist splint would be helpful if the patient had carpal tunnel syndrome. Counterforce forearm brace would be helpful if patient had lateral/medial epicondylitis. Carpal tunnel corticosteroid injection is not helpful as this is not the source of his pain. Ibuprofen is contraindicated given his known chronic kidney disease.

41. Answer: B. Reduction of fracture. The patient has the classic triad diagnostic for fat embolism: hypoxia, petechial rash, and neurologic

abnormalities. Treatment is supportive and as the source of emboli is her multiple long bone fractures; these should be repaired when the patient is stabilized.

Albuterol is not indicated as the patient has no evidence of obstructive lung disease (e.g., wheezing) as a cause for her acute decline. Furosemide is not indicated as the patient has no evidence of volume overload. Levofloxacin is not indicated as there is no evidence of infection. IV heparin will be ineffective in improving the patient's symptoms as it cannot dissolve fat, only thrombi.

42. **Answer: A. Valsalva maneuver.** The patient has SVT likely related to AVNRT and he is hemodynamically stable with no concerning symptoms. Initial attempt at termination should use vagal maneuvers such as Valsalva maneuver.

Adenosine is very short acting and can be used if vagal maneuvers fail to terminate the arrhythmia. Metoprolol would also be considered if the above measures failed. Digoxin would also inhibit the AV node but has more potential side effects than the other medications and is rarely used for this purpose. Cardioversion is reserved for signs of hemodynamic instability including hypotension, heart failure, or angina.

43. **Answer: D. Methotrexate.** The patient is presenting with signs/symptoms fulfilling criteria for a diagnosis of rheumatoid arthritis. The most important intervention is DMARD therapy (disease-modifying antirheumatoid drugs), especially as the patient already has evidence of joint damage.

Prednisone, corticosteroid injections, and indomethacin will all help control symptoms but not control joint damage. Physical therapy will help improve function for the patient but without DMARD therapy her joint damage will continue to worsen.

44. **Answer: C. ERCP.** The patient has cholangitis secondary to obstructing common bile duct stone and is presenting with severe sepsis. The patient needs hemodynamic support, antibiotics, and control of the source of infection. ERCP is the next step in order to relieve the obstruction and allow drainage of the biliary system.

Cholecystectomy is recommended eventually to prevent recurrence but not in the acute setting due to higher morbidity and mortality. Liver biopsy will not aid in diagnosis or treatment; the cause of elevated tranaminases is evident. MRCP may be helpful to clarify if the stone is still obstructing the common bile duct in equivocal cases, but in this case, her worsening transaminases and hyperbilirubinemia indicate ongoing obstruction. Percutaneous transhepatic cholangiography is second line to ERCP as it carries higher morbidity in regard to bleeding or peritonitis.

45. **Answer: E. No further intervention.** There is no further workup or treatment that is required at this point. The patient is in a low-risk category with no identifiable risk factors and a PPD is considered positive if 15 mm or greater in the absence of risk factors.

AFB sputum culture is not necessary to rule out active pulmonary TB because the patient is asymptomatic and has a negative PPD test. Rifampin, isoniazid, pyrazinamide, ethambutol would be indicated only if the patient had active pulmonary TB. Rifampin alone would be indicated for treatment of latent infection if the patient had a positive TB test without any pulmonary symptoms and a negative CXR. Chest x-ray would be indicated to evaluate for evidence of pulmonary TB if the PPD was positive.

46. **Answer: B. PTH.** The patient has calcium pyrophosphate dehydrate deposition disease (CPPD, pseudogout). This is confirmed by the inflammatory arthrocentesis with CPPD crystals and imaging findings showing deposition. Associated disorders include hemochromatosis, hyperparathyroidism, and hypothyroidism, so labs including calcium, phosphorus, magnesium, PTH, TSH, and an iron panel are all reasonable to screen for as treatment of underlying disorder can improve symptoms. This is especially important in patients who are diagnosed with CPPD at a young age.

Uric acid would be helpful in determining initial treatment for gout, but this is not the underlying diagnosis. ANA and ESR are nonspecific and would not be helpful in guiding therapy. HLA-B27 is not indicated

as the diagnosis of CPPD is confirmed and this will not screen for any associated disease.

47. **Answer: A. Zoledronic acid.** The patient has osteoporosis and a history of a fracture; thus, every attempt would be made to start the patient on a medication to reduce her risk of fractures. Zoledronic acid is a bisphosphonate which will reduce both vertebral/nonvertebral fractures; in addition, it is given intravenously and is most appropriate in this patient with achalasia.

Alendronate is a PO bisphosphonate and should be avoided in achalasia due to the risk of pill esophagitis. Raloxifene is a selective estrogen receptor modulator (SERM) and has evidence only for reduction of vertebral fractures and would thus not be an ideal choice; in addition, it should be avoided in this patient as it increases risk of venous thromboembolism (VTE). Calcitonin can be used for treatment of osteoporosis but is less effective than bisphosphonates so should not be first-line therapy. Estrogen is no longer used for management of osteoporosis in light of its many adverse effects, including increased rate of VTE.

48. **Answer: D. Propranolol.** The patient is presenting with thyroid storm, an endocrine emergency, and requires treatment without delay. She now also has atrial fibrillation with rapid ventricular response, likely triggered by increased adrenergic tone from thyroid storm. This was likely triggered by her recent surgery. β-Blockers like propranolol will control the tachycardia induced by increased adrenergic tone.

RAIU at this point will delay treatment which is not appropriate given the morbidity/mortality associated with thyroid storm. Iodine is a treatment option used in thyroid storm; however, it should be given AFTER methimazole or PTU to avoid its use as a substrate for more thyroid hormone synthesis. US thyroid is also unnecessary and will delay treatment. Thyroidectomy should only be performed once the hyperthyroidism is treated given the mortality rate associated with surgery in thyroid storm.

49. **Answer: A. CT urography.** The patient has hematuria and whether gross or microscopic hematuria, this demands further workup. A negative urine culture and absence of pyuria make infection unlikely. The urinalysis is also not consistent with a glomerular cause. All patients with hematuria without evidence of infection or glomerular disease should undergo cystoscopy and CT urography to evaluate for malignancy or other causes of bleeding.

Ultrasound of kidneys and bladder will evaluate the kidneys and bladder but can miss small tumors and will be less sensitive in evaluating the ureters. Renal biopsy is not indicated in this scenario as a glomerular source of bleeding is unlikely; RBC casts or dysmorphic RBCs on microscopy would be suggestive of a glomerular cause. PSA and prostate biopsy are unlikely to yield a cause of the patient's bleeding and would not evaluate the remainder of the GU tract.

50. **Answer: D. Albuterol.** The patient has a diagnosis of acute bronchitis and this is most likely viral in nature. Symptoms are related to hyperreactive airways and should self-resolve in a few weeks; treatment is symptomatic. Because of the wheezing associated with his symptoms, albuterol would be the appropriate choice. Inhaled β-agonists such as albuterol are often limited for use in acute bronchitis to patients with wheezing or underlying pulmonary disease.

Prednisone is not indicated as the patient has no underlying reactive lung disease, is not in distress, and his peak flow is normal. Oseltamivir is not indicated because the patient does not have symptoms suggestive of influenza; in addition, he is well outside the appropriate window of treatment given his risk factors. Antibiotics are NOT indicated as the etiology of most acute bronchitis is viral; antibiotics would be indicated if pneumonia was confirmed. Sputum culture is not necessary as a viral cause is much more likely.

51. **Answer: B. Weight loss.** Most groups recommend the following lifestyle modifications for patients with hypertension: *Reducing dietary sodium* to less than 2.4 g per day; *increasing exercise* to at least 30 minutes per day (4 days per week); *limiting alcohol consumption* to 2 drinks or less per day for men and 1 drink or less per

day for women; following the *Dietary Approaches to Stop Hypertension (DASH) diet* (high in fruits, vegetables, potassium, calcium, and magnesium; low in fat and salt); and achieving a *weight loss* goal of 10 lb (4.5 kg) or more. Of these, weight loss has shown to have the highest reduction in systolic blood pressure (reduction from 5 to 20 mm Hg) in overweight patients. **(A, C, D)** These three lifestyle modifications are also recommended and do have a substantial effect on reduction of systolic pressure, just not as much as weight loss does. **(E)** Smoking cessation should always be encouraged as part of any comprehensive lifestyle modification plan.

52. **Answer: A. Lisinopril.** This patient has type 2 diabetes and hypertension, so he should be on an ACE inhibitor or ARB. ACEi/ARB are shown to be renal protective in diabetes, so these should be first-line antihypertensives in all patients with concomitant diabetes. Thiazide diuretics such as hydrochlorothiazide or calcium-channel blockers such as amlodipine are first-line treatment in patients without diabetes **(B, C)**. β-Blockers such as atenolol or propranolol are not first-line therapy for hypertension **(D, E).**

53. **Answer: A. Pyelonephritis.** Pyelonephritis produces flank pain, but is also suggested by fever, leukocytosis, and a urinalysis showing infection (e.g., positive nitrites, positive leukocyte esterase). The presence of WBC casts is also seen in pyelonephritis, as is the physical examination finding of costovertebral angle tenderness (CVA) tenderness. **(B)** Nephrolithiasis (kidney stones) produces a colicky pain but uncomplicated nephrolithiasis typically does not produce fever, leukocytosis, or urinalysis findings suggestive of infection (however it does often cause hematuria). **(C)** Appendicitis is a very important diagnosis to consider in young patients with abdominal pain, however does not explain the positive urinalysis findings. **(D)** Ectopic pregnancy can often mimic the pain produced in nephrolithiasis, however this diagnosis is unlikely given the negative pregnancy test. **(E)** Acute interstitial nephritis (AIN) can indeed cause fever and produce WBC casts in the urine, but her constellation of urinalysis findings is more supportive of an ascending urinary tract infection such

as pyelonephritis. The most common cause of AIN is an allergic reaction to medications.

54. **Answer: C. Nonsteroidal anti-inflammatory drugs (NSAIDs).** Back pain that improves with exercise, but worsens with rest in an otherwise healthy young patient lends credence to the diagnosis of ankylosing spondylitis (AS). AS is a seronegative spondyloarthropathy (rheumatoid factor is negative) that is a systemic rheumatic disease. Ninety percent of people express the HLA-B27 genotype. It is also three times more common in males than females. In addition to back pain, patients can also experience anterior uveitis causing eye redness and pain, and cardiovascular and lung involvement. The first-line treatment for all seronegative spondyloarthropathies is NSAIDs, but biologics and disease-modifying antirheumatic drugs (DMARDs) are effective in treating the progression of the disease. **(A, B)** Local heat and ice therapy may be effective in back pain caused by musculoskeletal strain. This is a consideration in this patient, but the severity of his back pain that improves with exercise and worsens with rest, and lack of a known trigger make this less likely than AS. **(D, E)** Epidural steroid injections and surgical laminectomy are typically reserved for refractory back pain that does not respond to more conservative measures initially.

55. **Answer: E. Nebulized albuterol for bronchodilation.** This patient is likely suffering from an asthma exacerbation caused in part by his recent exposure to a viral illness. There were wheezes on examination with no urticaria or angioedema, making an anaphylactic reaction unlikely. **(C)** Management of an acute asthma exacerbation involves oxygen administration as well as intermittent or continuous nebulized albuterol, which is the first-line treatment. If albuterol is not effective, then ipratropium and magnesium are additional options to promote bronchodilation. Oral corticosteroids should also be given to reduce airway inflammation during and after the exacerbation. Response to therapy can be monitored by following the SaO_2 as well as either the FEV_1 or the peak expiratory flow (PEF). Arterial blood gases may also

be useful; be concerned about the finding of a normal $PaCO_2$, which is often indicative of respiratory fatigue leading to the need for intubation (hypoxemia should cause hyperventilation and hypocapnia). **(A)** Although the patient has signs of increased work of breathing, it would be premature to intubate the patient before trialing first-line therapies for an asthma exacerbation. **(B)** This patient is unlikely to have pneumonia as he is afebrile and has no suggestive findings of pneumonia on lung examination. **(C)** Subcutaneous epinephrine is useful in anaphylaxis, but has no benefit over inhaled β_2-agonists in asthma for bronchodilation. (**D**) Ipratropium is an anticholinergic and is the first-line treatment for COPD exacerbation (although albuterol is often used too); it may be used as an adjunctive therapy in asthma exacerbation, but albuterol is the first-line therapy.

56. **Answer: C. *Staphylococcus aureus*.** This patient's clinical presentation and subsequent deterioration are consistent with a diagnosis of toxic shock syndrome (TSS), which is caused by preformed *S. aureus* exotoxin, TSST-1. TSS was historically most often associated with prolonged tampon use, but is also associated with surgical wound infections, sinusitis, and many other common sites of infection. The toxin acts as a superantigen, which activates T cells leading to massive cytokine release. TSS typically presents with fever, vomiting, diarrhea, and the development of a diffuse macular erythematous rash. Complications of TSS include acute respiratory distress syndrome (ARDS), hypotension, disseminated intravascular coagulation (DIC), and hemorrhage. **(A)** *Escherichia coli* is not associated with TSS. **(B)** *Neisseria meningitidis* can certainly present with fever and diffuse rash, however it is not associated with such a high fever or tampon use. **(D)** *Streptococcus pneumoniae* is a type of group B Strep species, and accordingly, does not cause TSS. Only Group A Strep species such as *Streptococcus pyogenes* can cause TSS. **(E)** Rocky Mountain spotted fever presents with fever and a rash that is first apparent in the extremities and moves centrally.

57. **Answer: B. Recurrent pericarditis.** The chest pain and ECG are typical of acute pericarditis, which commonly presents with fever, pleuritic chest pain, new-onset pericardial effusion, and diffuse concave ST elevations on ECG. Most cases have an infectious etiology, including Coxsackie viruses, HIV, influenza, *Staphylococcus aureus, Streptococcus pneumoniae,* tuberculosis, and various fungi. Other important causes include cancer, autoimmune diseases, post-MI or cardiac surgery, radiation therapy, and uremia. Acute pericarditis should be treated with NSAIDs and colchicine to improve symptoms and prevent complications. Patients who are not treated are much more likely to develop recurrent pericarditis, which is defined as a recurrence of symptoms after the inciting event (e.g., virus) has passed. **(A)** Pericardial effusions commonly accompany acute pericarditis, but cardiac tamponade is a rare complication. **(C)** Constrictive pericarditis is a possible outcome of any cause of acute pericarditis, but is not the most common complication. **(D)** Free wall rupture is a complication of acute myocardial infarction. (**E**) Pericarditis affects the pericardium, although the myocardium is sometimes affected as well in perimyocarditis or myopericarditis. However, the rate of valve involvement and complications is low.

58. **Answer: B. CT scan with contrast.** This patient has pyelonephritis that likely progressed to a renal or perinephric abscess, which is indicated by the persistent fever. Patients with this complication will present with symptoms typical of pyelonephritis (fevers, chills, flank pain, abdominal pain, anorexia, nausea/vomiting), but will continue to be febrile despite treatment with appropriate antibiotics. Most cases of renal/perinephric abscesses are caused by urologic pathogens (e.g., *E. coli* and other enteric gram-negative bacilli), but *Staphylococcus aureus* is also common and arrives at the kidneys by hematogenous spread. The best diagnostic test is a CT scan of the abdomen with contrast, although a renal ultrasound can also identify many renal/perinephric abscesses. If the abscess is small (<5 cm), it can be observed with antibiotics alone; if the patient does not respond to antibiotics, or if the abscess is large (≥5 cm), both antibiotics and drainage are necessary. Antibiotic therapy should always be based on

culture and sensitivity data when available. Empiric therapy for renal/perinephric abscesses is the same as for pyelonephritis and depends on susceptibility data. Options include a carbapenem, piperacillin-tazobactam, fluoroquinolone, ceftriaxone, and antistaphylococcal therapy if *S. aureus* is suspected. **(A)** The presence of WBC casts does not necessarily indicate acute interstitial nephritis or glomerulonephritis; it may also indicate an upper urinary tract infection such as pyelonephritis. Therefore, a renal biopsy is not the next step. **(C)** Failure to defervesce after treatment with antibiotics raises the concern for a complication of pyelonephritis, such as a renal or perinephric abscess, and therefore further diagnostic workup should be pursued. **(D, E)** The organism is sensitive to both antibiotics, so there is no benefit of changing antibiotics or stopping antibiotics.

59. **Answer: D. Intubation.** The patient in this vignette is experiencing an acute asthma exacerbation with worrisome symptoms/signs: wheezes with quiet respirations indicating poor air movement, use of respiratory accessory muscles, tachycardia, tachypnea, and poor oxygen saturation. In addition, the arterial blood gas shows a normal $PaCO_2$ which is worrisome; hypoxic patients should hyperventilate to maintain oxygenation, so you would expect to find hypocapnia and a respiratory alkalosis. When a patient with tachypnea to this degree has a normal $PaCO_2$, this is a sign that the patient is tiring and decompensating. Even though intubation should be avoided if possible, there is a low threshold for intubating patients that are showing signs of respiratory fatigue. **(A)** Increasing the oxygen flow rate might improve oxygenation, but the patient is likely starting to develop hypercapnic respiratory failure, which is due to inadequate ventilation. Once the patient is on a ventilator, ventilation is controlled primarily by adjusting the respiratory rate or tidal volume. Oxygenation can be maintained by adjusting the FiO_2 and positive end-expiratory pressure (PEEP). **(B)** IV corticosteroids are used in acute exacerbations but will not take effect immediately to prevent this patient from further decompensation. **(C)** Azithromycin and other antibiotics are used in acute COPD exacerbations, not acute asthma exacerbations. **(E)** This

arterial blood gas shows a normal $PaCO_2$ which is worrisome. Although nebulized albuterol is typically first-line treatment for acute asthma exacerbation, this patient is decompensating as evidenced by the arterial blood gas and intubation must be pursued next.

60. **Answer: B. Positively birefringent rhomboid-shaped crystals.** This patient has a history of parathyroid adenoma which is likely causing hypercalcemia secondary to hyperparathyroidism. Patients with hypercalcemia are at risk for developing pseudogout or CPPD, a rheumatologic disease with diverse symptoms and signs arising from the accumulation of calcium pyrophosphate dihydrate crystals in the connective tissues. It commonly presents with acute onset, painful monoarthropathy of the knee. Joint aspiration with synovial fluid analysis confirms the diagnosis, showing rhomboid-shaped crystals that are positively birefringent. **(A)** Negatively birefringent needle-shaped crystals describe *gout,* which also presents with acute onset monoarthropathy, but usually affects the first metatarsophalangeal joint of the foot. Furthermore, gout is not triggered by hypercalcemia. **(C, D)** Neutrophil predominant synovial fluid with gram-positive cocci is diagnostic of septic arthritis. This patient has no fever, making septic arthritis highly unlikely from the clinical picture alone. **(E)** Normal synovial fluid findings are not the norm in the setting of pseudogout.

61. **Answer: B. Acute retroviral syndrome.** Acute HIV infection can present in a variety of ways, but typical symptoms of the "acute retroviral syndrome" include a mononucleosis-like syndrome with fever, lymphadenopathy, headache, myalgias/arthralgias, sore throat, and a maculopapular rash. Another less sensitive but more specific finding is painful, well-demarcated mucocutaneous ulcerations. Additional clues to the diagnosis in this case are the patient's social history (inconsistent barrier contraceptive use, IV drug use) and negative test results for other conditions on the differential diagnosis (mononucleosis due to EBV, syphilis, and other STIs, etc.). During the acute phase of HIV infection, there may be a negative screening antibody test (ELISA may take weeks to become positive) with elevated RNA viral load. A p24 antigen assay with the ELISA test has

better ability to detect early infection (approximately 5 to 7 days after viral RNA is detectable), but there is still a window of time for acute HIV infection in which both ELISA and p24 antigen will be negative. **(A)** The finding of diffuse nontender lymphadenopathy is more consistent with a systemic process such as a viral infection rather than Hodgkin lymphoma, which often presents with focal or asymmetric lymphadenopathy. **(C)** Though heterophile-negative mononucleosis due to CMV is a possibility, the findings of both a maculopapular rash and mucocutaneous ulcerations make HIV more likely (both may occur in CMV infection but are less common manifestations, and GI ulcerations usually occur in the setting of immunosuppression). **(D)** Secondary syphilis is less likely to have mucocutaneous ulcerations and the screening test was negative. Although false negatives are possible with RPR and VDRL tests, the constellation of findings makes HIV infection much more likely than a false-negative syphilis test. **(E)** These clinical findings are much more severe than typical upper respiratory infection symptoms.

62. **Answer: C. Obtain a chest x-ray; if normal, start rifampin, isoniazid, and pyridoxine for 3 months.** There are a couple of important teaching points in this vignette. First, screening for TB is often performed with a PPD or an interferon gamma release assay (IGRA). In patients with close contact to a patient with active TB, a concerning chest x-ray, or who are immunosuppressed, a positive test is ≥5 mm. For those patients at high risk (healthcare workers, prison/jail residents or employees, persons experiencing homelessness, IV drug users, persons with conditions that increase risk of reactivation such as diabetes or CKD requiring dialysis, etc.), a positive test is ≥10 mm. And for all others without risk factors, a positive test is ≥15 mm. This patient has an induration of 11 mm and is a healthcare worker, therefore she warrants further workup to differentiate active from latent TB. (Note: prior BCG vaccination rarely produces an induration >10 mm as an adult, and the CDC recommends that BCG vaccination status should not influence the workup and treatment of TB.) If the chest x-ray is negative, then the patient has latent TB and should be treated with 3 months of rifampin, isoniazid, and pyridoxine (vitamin B6, which helps

to prevent isoniazid-induced neuropathy). Alternatively, other treatment options include isoniazid for 6 or 9 months, isoniazide and rifapentine for 3 months, or rifampin for 4 months. **(A)** Treatment of active TB is becoming complicated with MDR TB, however active TB is generally treated with a 4-drug regimen (rifampin, isoniazid, pyrazinamide, ethambutol) for 2 months followed up a 2-drug regimen (rifampin, isoniazid) for 4 months. **(B)** Because this patient is a healthcare worker, she should be treated for latent TB given the risk of reactivation and exposure to other patients. **(D)** A chest x-ray should be performed before starting treatment to differentiate latent from active TB. **(E)** Reassurance would only be appropriate if the PPD result was negative.

63. Answer: A. Serum iron studies. The patient in this question is presenting with a microcytic anemia (MCV <80 fL). The differential diagnosis of microcytic anemia can be remembered by the mnemonic "*TAILS*" (*T*halassemia, *A*nemia of chronic disease, *I*ron-deficiency anemia, *L*ead poisoning, *S*ideroblastic anemia). The most common cause of microcytic anemia is iron deficiency and the best next step is ordering iron studies: serum iron, total iron-binding capacity (TIBC), and serum ferritin. In iron-deficiency anemia, serum iron is typically low, TIBC is increased, and serum ferritin is low. After iron-deficiency anemia is confirmed, the underlying cause should be determined. **(B)** Hemoglobin electrophoresis would be useful for diagnosing thalassemia. β-Thalassemia trait usually has reduced or absent HbA, elevated levels of HbA2, and increased HbF. Clinical manifestations generally arise very early in life. **(C)** Although lead poisoning is a cause of microcytic anemia, it is uncommon and should only be sought after iron-deficiency anemia has been ruled out. **(D)** A Coombs test would be helpful to evaluate for autoimmune hemolytic anemia, but this is not suggested by his presentation and is less common than iron deficiency anemia. **(E)** If iron deficiency is confirmed, a stool FIT test or colonoscopy should be considered later, although this patient's young age makes malignancy less likely.

64. **Answer: C. Elevated lipase.** The patient in this question is presenting with signs and symptoms of acute pancreatitis (epigastric abdominal pain radiating to the back, nausea, and vomiting). The vast majority of cases (80%) result from gallstones and alcohol. However, other causes of acute pancreatitis can be remembered with the mnemonic *I GET SMASHED* (Idiopathic, Gallstones, Ethanol, Trauma, Steroids, Mumps/Malignancy, Autoimmune, Scorpion/spider bite, Hypertriglyceridemia/hypercalcemia, ERCP, Drugs [specifically diuretics, gliptins, HIV medications, sulfonamides]). Acute pancreatitis can be diagnosed through several modalities: physical examination demonstrating epigastric pain radiating to the back, elevated amylase and lipase levels (typically 3× higher than the normal limit), and abdominal imaging (CT) showing pancreatic enlargement with heterogeneous enhancement with IV contrast. Ultrasound is also helpful in diagnosing gallstone pancreatitis by visualizing gallstones in the gallbladder. Lipase has the greatest *specificity* of all possible tests and is usually more elevated than amylase in acute pancreatitis. **(A)** Amylase can sometimes be normal in acute pancreatitis (particularly if the etiology is hypetriglyceridemia). Furthermore, amylase is not specific to the pancreas as there is not only pancreatic amylase, but also salivary amylase. **(B)** Although elevated ALT is useful in suggesting *gallstone* pancreatitis, it does not encompass all the causes of acute pancreatitis and therefore is not a specific test. **(D)** Positive fecal fat test is typically positive (>7 g/day) in *chronic* pancreatitis, however chronic pancreatitis presents with symptoms of malabsorption and is typically after multiple recurrent bouts of acute pancreatitis due to alcohol use. **(E)** Pancreatic calcifications are seen in chronic pancreatitis, not acute pancreatitis.

65. **Answer: B. Thyroid-stimulating hormone (TSH) levels.** The patient in this question is demonstrating clinical manifestations of hypothyroidism. In approaching the diagnosis of thyroid disorders, the first step is to order a TSH level. TSH is the *most sensitive* test to detect primary hypothyroidism and hyperthyroidism. Based on the TSH level, additional tests can be performed. **(A)** Free T4 is important in the diagnostic workup of thyroid disorders and should be the next test

ordered if TSH comes back abnormal. If free T4 is increased with a decreased TSH level, this is diagnostic of primary hyperthyroidism. If free T4 is low with a high TSH level, this is primary hypothyroidism. If free T4 is decreased with a decreased TSH level, then central hypothyroidism is the diagnosis and the etiology involves the pituitary gland or the hypothalamus. Finally, if free T4 is normal with a decreased TSH, then this is subclinical hypothyroidism. **(C)** Thyroglobulin is often increased in goiter and hyperthyroidism and is also a tumor marker for thyroid cancer. It is not the best first test in working up thyroid disorders. **(D)** Radioactive iodine uptake (RAIU) scan is the next best step once primary hyperthyroidism is diagnosed (increased free T4 with decreased TSH) as it can help differentiate causes of hyperthyroidism (Graves vs. multinodular goiter vs. silent thyroiditis). **(E)** Thyroid biopsy is far too invasive of a test without a baseline TSH level.

66. **Answer: A. CT scan.** The suspected diagnosis here is meningitis, and a CT scan should be performed first to rule out mass effect before a lumbar puncture is performed. He has a high fever, as well as other symptoms/signs of meningitis (including the most sensitive test for meningitis: the jolt accentuation sign, in which a patient's headache intensifies after a quick head jolt). Kernig and Brudzinski signs are not sensitive, but they are fairly specific. Once a diagnosis of meningitis is suspected and a lumbar puncture needs to be performed, a CT scan should be performed in patients at high risk for cerebral herniation. Risk factors include papilledema, previous CNS disease, a seizure in that past week, immunosuppression, altered consciousness, and focal neurologic signs. **(C)** This patient has both a recent seizure and a focal neurologic sign (facial droop), and therefore a CT scan should be performed before a lumbar puncture to assess the risk for cerebral herniation during lumbar puncture. **(B)** An MRI provides better visualization of the brain, but is costly and time-consuming. Because the purpose here is to rule out mass effect, a CT scan is the test of choice as it is much quicker. **(D)** Dexamethasone is coadministered with antibiotics if bacterial meningitis is suspected. In cases in which there is high clinical suspicion for bacterial meningitis, and a CT scan

before LP will cause a delay in treatment, it is recommended to draw blood cultures and then administer empiric antibiotics and dexamethasone before LP (this is one situation where empiric antibiotics should be administered first, as mortality from untreated bacterial meningitis is high). However, dexamethasone alone is not sufficient treatment. **(E)** Empiric antiviral therapy is appropriate if HSV encephalitis is suspected. However, at this point, bacterial meningitis is more likely and the patient should undergo CT scan and LP.

67. **Answer: B. Electrolyte abnormality.** The patient in this question is presenting with anemia, low back pain, lytic lesions, increased erythrocyte sedimentation rate (ESR), and renal dysfunction, suggesting the diagnosis of multiple myeloma. A peripheral smear often shows the rouleaux formation (stacked appearance of RBCs). This patient additionally is presenting with constipation and confusion, both symptoms of hypercalcemia (>10.2 mg/dL), which is seen in about one-third of patients with multiple myeloma. The etiology of hypercalcemia in multiple myeloma is bone lysis from humoral factors released by the plasma cells. **(A)** Mechanical obstruction secondary to malignancy also can cause constipation, but the patient's signs and symptoms do not support a diagnosis of colon cancer. **(C, D, E)** Hormone level and blood gas abnormalities are typically not seen in multiple myeloma and are not associated with constipation.

68. **Answer: B. Surgery.** This patient is presenting with signs and symptoms consistent with a diagnosis of cauda equina syndrome, a serious neurologic condition in which damage to the cauda equina (a bundle of spinal nerves originating in the conus medullaris) causes acute loss of function of the lumbar plexus. The management of this condition is urgent surgical decompression. Steroids are sometimes administered concurrently, especially if the cause of spinal cord compression is due to malignancy. **(A)** Physical therapy would not be the ideal treatment for cauda equina syndrome, which requires urgent surgical evaluation. **(C)** An x-ray of the lumbar spine would be insufficient to make the diagnosis of cauda equina syndrome (a clinical

diagnosis based on history and exam) and would only delay treatment. An MRI of the lumbar spine is reasonable, but surgical consultation should be prioritized. **(D, E)** Given the finding of absent rectal tone and saddle anesthesia, conservative management with NSAIDs and bed rest should be avoided as cauda equina syndrome is a neurologic emergency.

69. **Answer: A. Aortic aneurysm.** The patient in this question is presenting with signs, symptoms, and laboratory values consistent with a diagnosis of giant-cell arteritis (GCA), also known as temporal arteritis. Symptoms can include headache, visual problems, jaw claudication, fever, and temporal scalp tenderness. GCA is a vasculitis most commonly involving large and medium arteries of the head, predominantly the branches of the external carotid artery. A decreased temporal artery pulse can be noted as well. ESR and C-reactive protein are commonly elevated. High-dose corticosteroids should be started as soon as the diagnosis is suspected (even before confirmation by temporal artery biopsy) to prevent irreversible blindness secondary to ophthalmic artery occlusion. GCA can involve branches of the aorta leading to aortic aneurysm, thus patients should have advanced imaging of the aorta (CT or MR angiography) performed. **(B)** Inflammatory bowel disease includes ulcerative colitis and Crohn disease and is not associated with GCA. **(C)** Hepatitis B is associated with polyarteritis nodosa (30% of the time), a vasculitis of medium- and small-sized arteries. **(D)** A smoking history is seen in thromboangiitis obliterans (Buerger disease), which presents with progressive inflammation and thrombosis of small and medium arteries of the hands and feet. Ulceration and gangrene are common complications. **(E)** Alcohol has not been shown to be associated with the development of temporal arteritis.

70. **Answer: D. Vasovagal syncope.** Syncope is defined as loss of consciousness that results from cerebral hypoperfusion. The most common cause of syncope is neurocardiogenic (vasovagal) syncope, which is caused by a sudden surge of sympathetic activity that transiently increases the contractility of the left ventricle.

Mechanoreceptors in the left ventricle sense this increased contractility and cause an excessive vagal response, which lowers heart rate and contractility. This transiently drops the blood pressure and causes syncope. These patients typically have symptoms of lightheadedness, nausea, and narrowing vision before losing consciousness and can usually partially brace their fall. Diagnosis is usually made based on history but can be confirmed with the tilt table test. **(A, E)** Cardiovascular causes of syncope include arrhythmias, mechanical heart disease (e.g., aortic stenosis and hypertrophic cardiomyopathy), pulmonary embolism, aortic dissection, and cardiac tamponade. Patients with sudden-onset syncope and trauma to the face (indicating an inability to brace the fall) should increase suspicion for a cardiac etiology. **(B)** Orthostatic hypotension usually occurs in the presence of hypovolemia, dysautonomia, and/or certain medications (e.g., diuretics and β-blockers). Diagnosis can be made if systolic blood pressure decreases by ≥20 mm Hg, often with associated reflex tachycardia of more than 20 beats/min when going from a sitting to a standing position, which was not seen in this patient. **(C)** Seizures technically do not meet the definition of syncope, since they are not caused by a disruption in cerebral blood flow. History that would support a seizure includes a preceding aura, tonic–clonic movements during the episode, and a postictal state (confusion with gradual improvement in neurologic function).

71. Answer: D. Serum protein electrophoresis (SPEP). The patient in this question is presenting with signs and symptoms consistent with a diagnosis of multiple myeloma. *CRAB* can be a useful mnemonic in diagnosing multiple myeloma: Hyper*C*alcemia, *R*enal failure, *A*nemia, *B*one lesions (often punched out lesions in the skull). Serum and urine electrophoresis with immunofixation may reveal a monoclonal spike and is useful for confirmation of the diagnosis. **(A)** CA 15-3 is a tumor marker for breast cancer. **(B)** CEA is a tumor marker for adenocarcinomas, particularly colon (but also lung, breast, and stomach). **(C)** Alkaline phosphatase may be abnormal in multiple myeloma but is nonspecific. It would be significantly elevated in Paget disease, but Paget disease is not characterized by hypercalcemia.

Furthermore, Paget disease is characterized by a *mixed* osteolytic and osteoblastic phage (where multiple myeloma is purely osteolytic). As a result, rather than showing punched out skull lesions as seen in multiple myeloma, Paget disease will show a "cotton wool" appearance due to irregular areas of sclerosis. **(E)** An abnormal bone scan may show lytic lesions in multiple myeloma, but is not diagnostic of multiple myeloma; rather it is useful in diagnosing cancer of the bone or cancers that have metastasized to the bone.

72. Answer: D. Hypertensive emergency; rapid lowering of blood pressure with IV agents. Hypertensive urgency, also known as asymptomatic severe hypertension, is defined as a systolic blood pressure ≥180 mm Hg and/or a diastolic blood pressure ≥120 mm Hg with no end-organ damage. Hypertensive emergency is the same definition but with the presence of end-organ damage. Many organs are acutely affected by high blood pressure, including the brain (stroke or encephalopathy), eyes (papilledema), heart (MI, aortic dissection), lungs (pulmonary edema), and kidneys (renal failure or oliguria). Within the umbrella term of hypertensive emergency, there are additional terms for specific end-organ involvement: malignant hypertension refers to hypertensive emergency in the presence of papilledema (other ophthalmologic findings include retinal exudates and hemorrhage), and malignant nephrosclerosis refers to renal damage. This patient has a hypertensive emergency with end-organ involvement including the brain (encephalopathy) and the eyes (papilledema). (**A, B, C, E**) The management of hypertensive urgency and emergency is different. In hypertensive urgency, the goal is to gradually lower the blood pressure to achieve a normal value within a couple of days. Oral antihypertensive agents are given. This typically does not require hospital admission. Some options for oral medications include labetalol, captopril, clonidine, furosemide, and hydralazine. In hypertensive emergency, there is ongoing end-organ damage and therefore blood pressure needs to be lowered quickly. The goal in this setting is to immediately lower blood pressure using IV agents, targeting a decrease in mean arterial pressure by 10% to 20% within the first hour, and gradually by another 10% over the next 23 hours.

Some options for IV medications include nitroprusside, nitroglycerin, calcium channel blockers (e.g., nicardipine), labetalol, hydralazine, fenoldopam, and phentolamine. Because adaptive mechanisms occur with chronically elevated blood pressure, rapid lowering of blood pressure is not always tolerated and can cause cerebral hypoperfusion. If this happens, the blood pressure must be lowered more gradually.

73. **Answer: C. Normal pressure hydrocephalus.** The patient in this question is presenting with dementia, urinary incontinence, and gait disturbance. This triad, often remembered by "wet, wacky, wobbly," is characteristic of normal pressure hydrocephalus (NPH). NPH is diagnosed by MRI, which will show dilated ventricles. As one would expect from the name, the opening pressure measured during lumbar puncture is normal. Treatment generally consists of repeated spinal taps to improve the symptoms (by decreasing the pressure exerted on the adjacent cortical tissue by the enlarged ventricles). **(B)** Alzheimer disease is not associated with gait problems or urinary incontinence (incontinence can develop but usually late in the clinical course). **(A)** Pseudotumor cerebri, also known as idiopathic intracranial hypertension, is associated with headaches, not memory impairment or dementia. Furthermore, it is typically seen in young women of childbearing age who are overweight. **(D)** Although this patient has a history of hypertension, it is well controlled and thus her symptoms are unlikely to be a result of vascular dementia. This type of dementia tends to be very abrupt in onset and show multiple areas of increased T2-weighted density on MRI in the periventricular regions. **(E)** Lewy body dementia is the second most common form of dementia (after Alzheimer's) closely associated with Parkinson disease.

74. **Answer: C. Amiodarone.** Amiodarone is an antiarrhythmic medication that may be used for prophylaxis or treatment of serious arrhythmias, especially ventricular arrhythmias. This patient has a history of ventricular tachycardia, and therefore has an indication for amiodarone. This drug has many toxicities, and therefore when started the patient must have baseline pulmonary function tests, thyroid function tests, and liver function tests due to the toxicity involving each

of these organs. Other notable side effects include blue-gray discoloration of the skin, corneal deposits, and peripheral neuropathy. This patient developed pulmonary fibrosis as a result of chronic amiodarone use. **(A, B, E)** Digoxin, lisinopril, and losartan are not associated with pulmonary fibrosis. **(D)** Bleomycin can cause pulmonary fibrosis, but it is an antineoplastic drug and the patient has no reason to be taking this medication.

75. **Answer: C. Prochlorperazine.** The patient in this question is likely having an acute episode of a migraine headache. Migraines are characterized by unilateral, pulsating pain that is often associated with photophobia and an aura of neurologic symptoms prior to the onset of the headache. Acute attacks can range in duration from 4 to 72 hours. Acute treatment and primary preventive treatment vary in migraine headaches. Acute attacks are best treated with intravenous antiemetic medications (prochlorperazine and metoclopramide) and/or triptans (sumatriptan). **(E)** As that this patient presents with vomiting, prochlorperazine is the best choice since it can be given in IV form, unlike sumatriptan. Sumatriptan can be given in subcutaneous form but is associated with more adverse effects. **(A, B)** Propranolol and amitriptyline are both excellent medications used for migraine *prophylaxis,* not for acute episodes. These would be appropriate to give to the patient after her acute migraine episode resolves to prevent further attacks. **(D)** Verapamil is a calcium channel blocker that is the first-line medication for cluster headache prophylaxis. However, this patient is having a migraine, not a cluster headache. Cluster headaches typically involve pain around the eye with eye watering, nasal congestion, and swelling.

76. **Answer: C. Fractional excretion of sodium (FENa).** Acute kidney injury (AKI) is defined as an abrupt rise (within 48 hours) in serum creatinine by ≥0.3 mg/dL from baseline, a ≥50% increase in serum creatinine from baseline, or oliguria of <0.5 cc/kg/hr for >6 hours. Once AKI is recognized, the next step in diagnosis is determining whether the etiology is prerenal, intrinsic renal, or postrenal. These terms reflect the perceived sight of pathology; prerenal AKI is caused

by decreased blood flow to the kidneys, intrinsic renal AKI is caused by direct damage to the kidney parenchyma (i.e., to the renal vasculature, tubules/interstitium, or glomeruli), and postrenal AKI is caused by an obstruction in the urinary tract leading away from the kidneys. The patient in this question is hypovolemic (tachycardia and dry mucus membranes). In response to hypovolemia, the renal arterioles vasoconstrict, decreasing blood flow to the kidneys and decreasing the glomerular filtration rate (GFR). Prerenal AKI is a result of ischemia from poor perfusion, however it can progress to acute tubular necrosis (ATN), which is a form of intrinsic renal AKI. Besides hypovolemia, her daily NSAID may also be contributing to the AKI since NSAIDs cause renal vasoconstriction. One of the best tests for differentiating between prerenal AKI and ATN is the FENa. In prerenal AKI, sodium is reabsorbed in an attempt to maintain circulating blood volume, and therefore there will be little sodium in the urine. **(B)** Although this is often reflected by the urine sodium, this value is affected by renal water handling and urine output. FENa is a better test, since it only measures the fraction of sodium excretion and is not affected by urine output. In general, low FENa values indicate prerenal AKI and high values indicate intrinsic renal AKI (tubular damage leads to salt wasting). The FENa will be <1% in prerenal AKI and >2% in ATN. (Note: FENa should not be used if the patient is taking diuretics, but the fractional excretion of urea may be used instead.) **(A)** A urine dipstick is a helpful screening tool for things such as proteinuria or infection, but it will not help to differentiate between prerenal and intrinsic renal AKI. **(D)** A renal ultrasound would be helpful in excluding postrenal AKI, which is not suspected in this case. **(E)** Urine eosinophils are of limited diagnostic utility. They were thought to be associated with acute interstitial nephritis (AIN), but are neither sensitive nor specific for this diagnosis.

77. **Answer: B. Aortic dissection.** The most important risk factor for aortic dissection in the general population is hypertension, however there is a high incidence in patients with connective tissue disease (e.g., Marfan and Ehlers–Danlos syndromes). Sharp chest pain radiating to the back is the first clue to this diagnosis. Other symptoms

may occur based on which arteries are occluded by the dissected flap. Finally, a widened mediastinum is seen on chest x-ray. Other potential manifestations not seen in this patient are cardiac tamponade and Horner syndrome (from compression of the superior cervical ganglion). Dissections involving the proximal aorta require immediate surgical intervention. **(A, C, D)** All of these diagnoses are a potential result of the patient's aortic dissection, but are not the underlying (primary) diagnosis. Acute coronary syndromes (ACS) may occur during an aortic dissection as a result of involvement of one or more coronary arteries, and stroke can occur with involvement of the carotid arteries. Aortic regurgitation is common in patients with Marfan syndrome, and this can also occur as a result of a dissection in the ascending aorta. In either situation, it is not the primary diagnosis. **(E)** Hypertensive emergency requires a systolic blood pressure ≥180 mm Hg and/or a diastolic blood pressure ≥120 mm Hg in the presence of end-organ damage.

78. **Answer: B. *Salmonella*.** Patients with sickle cell disease often have functional asplenism from infarction. This often results in impaired immunologic response to encapsulated organisms, such as *Streptococcus pneumoniae, Haemophilus influenzae,* and *Neisseria meningitidis*. Furthermore, they are more prone to invasive *Salmonella* infections which, when localized, can result in osteomyelitis. In addition to treatment with antibiotics here, this patient should immediately be treated with oxygen, aggressive hydration, and analgesics. **(A, C, D, E)** These organisms do not cause osteomyelitis in sickle cell patients.

79. **Answer: D. Hot nodule on RAIU.** Thyroid nodules are fairly common with a 5% to 10% prevalence. Approximately 5% of thyroid nodules are malignant. **(A, B, C, E)** Factors associated with malignancy include history of radiation to the neck, male sex, hard and immobile mass, age greater than 70 years, worrisome ultrasound findings such as irregular borders and microcalcifications, cervical lymphadenopathy, and cold nodule on RAIU. Cold nodules are nonfunctional and do not absorb the radioiodine. Hot nodules, on the

other hand, are autonomous (toxic) and readily absorb the radioiodine. However, hot nodules are benign and not associated with malignancy.

80. **Answer: D. Dual-energy x-ray absorptiometry (DEXA).** Risk factors for osteoporosis include smoking, family history, low body weight, excessive alcohol use, and secondary organic causes such as premature menopause, among others. Regardless of symptoms, the USPSTF recommends a one-time screening for osteoporosis in *all* women aged 65 years or older with DEXA scan of the spine and hips. A bone density with T-score <2.5 standard deviations below the mean is associated with osteoporosis and a T-score between 1 and 2.5 standard deviations below the mean is associated with osteopenia. **(A)** The patient had a normal mammogram the year before. Mammograms should be performed every 2 years in her age group. **(B)** The patient had a colonoscopy 6 years ago that was normal. She is due for another colonoscopy in 4 years (reaching the 10-year mark after her previous one). **(C)** Calcium and phosphorus levels are normal in patients with osteoporosis and have no value in screening for the condition. **(E)** There is no significant smoking history or clinical suspicion here for lung cancer, so a CT scan of the chest is not warranted.

81. **Answer: B. Joint aspiration with synovial fluid analysis.** This patient is presenting with signs and symptoms consistent with an acute gout attack. The patient's alcohol use lends credence to the history of gouty arthritis. Furthermore, the patient is presenting with acute right knee pain, swelling, and low-grade fever, all confirming the likely diagnosis of gout. As septic arthritis and pseudogout can present similarly to gout, it is imperative to first perform joint aspiration and synovial fluid analysis. Synovial fluid analysis of gout will demonstrate a leukocyte count of 2,000 to 50,000/mm^3 and negatively birefringent needle-shaped crystals with a negative Gram stain and negative culture. **(A)** Indomethacin (an NSAID) is very helpful in treating acute gout. Nonetheless, the diagnosis of gout must first be confirmed before administering indomethacin especially with its side-effect profile. **(C)** Uric acid levels can be elevated in gout, but may also be low or normal during an acute flare (elevated uric acid is the

underlying cause of the clinical manifestations). **(D)** An x-ray of the knee is not as specific as synovial fluid analysis for diagnosing gout.

82. Answer: C. Empiric 8-week trial with proton pump inhibitor (PPI). The patient in this question is presenting with dyspepsia (characterized by epigastric pain and early satiety). Dyspepsia is a common presentation, and only a minority of patients are diagnosed with an underlying etiology contributing to the dyspepsia. The most common etiologies of dyspepsia are GERD, NSAIDs, peptic ulcer disease (PUD), and malignancy. **(D)** Importantly, if a patient presents with any "alarm symptoms" such as unexplained weight loss, persistent vomiting, blood loss or unexplained iron deficiency anemia, dysphagia, odynophagia, lymphadenopathy, or family history of gastrointestinal cancer, then they should undergo an upper GI endoscopy to evaluate for malignancy. In patients without the "alarm symptoms," current recommendations are to test for *Helicobacter pylori* in regions where there is a high prevalence of the bacteria and begin treatment with a PPI. In regions where there is a low prevalence of *H. pylori,* some physicians will treat empirically with a PPI. The most important thing to note here is that patients who have persistent symptoms with either of these treatment options after 4 to 8 weeks should undergo endoscopy. **(A)** Antacids have not alleviated this patient's symptoms and therefore are not the correct answer here. **(B)** Barium swallow evaluation is not helpful in diagnosing the etiology of dyspepsia. **(E)** This patient is symptomatic and clearly not responding to over-the-counter antacids. Observation is inappropriate.

83. Answer: E. Etiologies include infection and polypharmacy. This patient is presenting with signs and symptoms consistent with a diagnosis of delirium, which has several etiologies including infection, surgery, trauma, or polypharmacy side effects. Acute onset of symptoms, fluctuating level of consciousness, and presence of visual hallucinations favor a diagnosis of delirium over dementia. In addition, sleep–wake cycle disturbance is a prominent feature of delirium. **(D)** Delirium is reversible, while dementia, by contrast, is often irreversible. Clinically, patients with dementia show gradual decline in

cognition with preserved level of consciousness. Reversible causes of delirium should be considered, including metabolic disorders, infections, medications, normal pressure hydrocephalus, nutritional deficiencies, or thyroid dysfunction, which may be potentially reversible causes of dementia-like symptoms. Delirium occurs in up to 20% of acute hospital inpatients and up to 60% of surgical patients in the perioperative period. Identifying and treating the cause of delirium is critical. **(A)** Anticholinergic medications will *worsen* delirium. **(B)** Neurofibrillary tangles and β-amyloid plaques seen on pathology are consistent with Alzheimer dementia, not delirium. **(C)** If long-term memory is intact, but short-term memory is affected, then this is more consistent with dementia.

84. **Answer: B. Gallstone obstruction in the cystic duct.** The patient in this question is presenting with acute cholecystitis. She is presenting with fever, right upper quadrant pain after a fatty meal that radiates to the right scapula, and positive Murphy sign (pain on palpation in the right upper quadrant with cessation of inspiration). Her history of biliary colic further supports this diagnosis. Additional nonspecific findings include vomiting, leukocytosis, and mild elevation in transaminases. Acute cholecystitis usually arises from gallstone formation that obstructs the cystic duct. The symptoms occur after eating a fatty meal because the fat stimulates gallbladder contraction, and in the presence of cystic duct obstruction, this leads to colicky pain. Infection results from stasis that contributes to bacterial growth in the gallbladder. **(D)** Importantly, alkaline phosphatase is *not* elevated in this patient with acute cholecystitis. Assume if laboratories are not shown, they are normal. If it were elevated (in addition to total bilirubin and direct bilirubin), this might indicate common bile duct obstruction in the setting of jaundice (choledocolithiasis). **(A)** Alcoholic hepatitis does not present with this constellation of symptoms. **(C)** Similar to common bile duct obstruction, obstruction from a carcinoma of the head of the pancreas would cause severely elevated alkaline phosphatase levels and would usually present with weight loss and painless jaundice. **(E)** Pancreatitis should definitely be

ruled out with a serum lipase, but pain typically is only epigastric in nature and radiates to the back.

85. Answer: C. Amitriptyline. The patient in this question is presenting with signs and symptoms consistent with a diagnosis of fibromyalgia (FM). FM is more common in adult women and is characterized by chronic widespread pain and allodynia (a heightened and painful response to pressure). Physical examination is typically normal except for point muscle tenderness in several areas including the mid trapezius, lateral epicondyle, and greater trochanter, among others. Of note, FM has no laboratory findings that are diagnostic of the condition. The first-line treatment for FM is patient education, aerobic exercise, and good sleep hygiene. This patient has clearly attempted those recommendations based on the history she provides, so the first-line *medication* is a tricyclic antidepressant (TCA) such as amitriptyline. Several other drugs (pregabalin and duloxetine) can be attempted if TCAs fail to alleviate the patient's symptoms. **(A, B, E)** Corticosteroids and NSAIDs are useful in treating *inflammatory* conditions, but FM is not an inflammatory condition (not associated with elevated inflammatory markers such as ESR). **(D)** Colchicine is useful in treating gout, not FM.

86. Answer: B. Administration of fluids. This is a common question on the USMLE that emphasizes the importance of airway, breathing, and circulation (ABCs) in the management of patients (regardless of the underlying disorder). This patient presents with hypotension and delayed capillary refill, indicating that there is compromise of his circulation. The best next step in management of circulatory compromise (in this case from an upper GI bleed) is fluid resuscitation. Blood transfusion should also be done, but crystalloid fluids can be obtained much faster than blood products so they should be prioritized first. After the patient is hemodynamically stable, treatment for the actual underlying condition can be initiated. **(A, C, D)** All these answer choices address the underlying cause of the upper GI bleeding (likely variceal bleeding); however, the patient must be stabilized before these

modalities are pursued. **(E)** This is a life-threatening condition and reassurance is inappropriate.

87. **Answer: E. CT scan of abdomen and pelvis.** The patient in this question is presenting with signs and symptoms concerning for a small bowel obstruction (SBO). The typical constellation of symptoms includes abdominal pain, vomiting, obstipation, abdominal distention, and diffuse tenderness. A mild leukocytosis is often found in an SBO. The best diagnostic test is a CT scan of the abdomen and pelvis because it can evaluate the severity of obstruction, location of a transition point, and look for any potential complications. Treatment involves supportive care, bowel rest, and decompression with a nasogastric tube. Surgery is reserved for those patients who fail to improve with the aforementioned treatments and/or develop findings consistent with strangulation. **(A, B, C, D)** These options are not the best initial test in diagnosing an SBO. Ultrasound is a poor imaging modality for bowel obstruction as any bowel gas will obscure the view.

88. **Answer: B. Nephrolithiasis.** This patient is presenting with the typical symptoms of a kidney stone. Patients with Crohn disease are at risk of developing calcium oxalate stones due to increased absorption of oxalate in the GI tract (and therefore increased oxaluria), which has two causes. First, malabsorption of bile salts and GI tract inflammation increase mucosal permeability. Second, fatty acids (also a result of malabsorption) bind intestinal calcium, and so less calcium is available to bind and trap intestinal oxalate. This causes an increase in free oxalate that can be absorbed, eventually making it back to the kidneys to be excreted. Calcium stones are the most common type of kidney stones, and patients with these stones are encouraged to increase their dietary intake of calcium (in order to decrease oxalate absorption in the GI tract). Ammonium magnesium phosphate (struvite) stones are caused by urinary tract infections with urease-positive organisms (e.g., *Proteus, Klebsiella*) and can form staghorn calculi. Uric acid stones are associated with hyperuricemia (e.g., leukemia, gout). Cystine stones are seen in the genetic disease cystinuria and are

treated by alkalinizing the urine with acetazolamide. **(A)** Pyelonephritis would also produce flank pain, but unlike nephrolithiasis it would also produce fever, leukocytosis, and a urine dipstick showing inflammation (e.g., positive nitrites, positive leukocyte esterase). **(C)** Appendicitis is important to consider in any young patient with abdominal pain, however it would be unusual for appendicitis to cause hematuria. **(D)** Ectopic pregnancies can mimic the pain of a kidney stone, but this diagnosis is unlikely given the negative pregnancy test. **(E)** This would be an unusual presentation of abdominal pain seen in pancreatitis, which is usually epigastric and radiating to the back.

89. **Answer: C. Hyperventilation secondary to anxiety.** According to the ABG, this patient has an acute respiratory alkalosis (caused by loss of CO_2 which is balanced by increased excretion of HCO_3). Respiratory alkalosis can only be caused by an increase in ventilation (commonly caused by high altitudes or sympathetic stimulation like anxiety or pain). **(A)** Accumulation of unmeasured anions due to hepatic metabolism of alcohol would cause an anion gap metabolic acidosis (*low* pH with *low* HCO_3 and *low* CO_2 and an increased gap, calculated by subtracting $[Cl^- + HCO_3^-]$ from Na^+). **(B)** Vomiting causes a *metabolic* alkalosis from loss of acid and chloride. Metabolic alkalosis is characterized by *high* pH, *high* HCO_3, and *high* CO_2 (respiratory compensation by hypoventilating). **(D)** Diuretics are associated with a *metabolic* alkalosis from volume contraction. **(E)** Hypoventilation causes a *low* pH from CO_2 retention. This will cause a *respiratory* acidosis, not alkalosis as seen with this patient.

90. **Answer: C. Lactulose.** This patient is presenting with signs and symptoms of cirrhosis (ascites, spider angiomata) and hepatic encephalopathy (altered mental status and asterixis). In hepatic encephalopathy, the liver is unable to convert ammonia into urea and it therefore accumulates, in addition to other toxins the liver is unable to clear. It is often precipitated by illness, infection, or gastrointestinal bleed. Serum ammonia levels have no utility in the diagnosis of hepatic encephalopathy, as ammonia levels may be low, normal, or elevated

and HE is a clinical diagnosis. Treatment involves treating the precipitant and administering therapies to increase gut excretion of ammonia. Lactulose, a nonabsorbable disaccharide, is used because bacteria in the gut metabolize it into acidic compounds (lactic acid, acetic acid) that permit the *absorbable* ammonia to be converted into the *nonabsorbable* ammonium, thereby enabling excretion from the body. **(A)** Furosemide would improve the ascites and volume status in a cirrhotic patient, but is not helpful in the management of hepatic encephalopathy. **(B)** Thiamine is useful in the treatment of *Wernicke encephalopathy,* another form of encephalopathy characterized by altered mental status, ataxia, and nystagmus and is associated with thiamine deficiency. Of note, asterixis is not a common feature in Wernicke encephalopathy. **(D, E)** Morphine and hydromorphone are opioids that are not the treatment for hepatic encephalopathy. Moreover, many opioids have altered metabolism in cirrhosis so should be used with caution.

91. Answer: B. Acetaminophen. This patient is obese, greater than 40 years of age, and is presenting with bilateral knee and back pain. The fact that the pain is worsened with activity and relieved by rest suggests that it is most likely secondary to osteoarthritis (OA). If she reported morning stiffness lasting greater than 30 minutes and had systemic symptoms, rheumatoid arthritis would have been the likely diagnosis. OA is a *noninflammatory* arthritis that results in eroding cartilage in the intra-articular joints. This causes joint crepitus (a "grating" or popping sound) that occurs when the surfaces of the joint grind against each other. Although the diagnosis is usually made clinically, the typical changes seen on x-ray include joint space narrowing, subchondral sclerosis (increased bone formation around the joint), subchondral cyst formation, and osteophytes. Acetaminophen is the first-line treatment for mild-to-moderate OA. It is just as efficacious as NSAIDs in alleviating the pain in OA with considerably fewer side effects. **(A)** Intra-articular corticosteroid injections lead to short-term pain relief that lasts up to a few months. This should not be the initial treatment in OA. **(C)** Naproxen is an NSAID and although NSAIDs have been shown to be efficacious in the treatment of OA,

their side-effect profile consists of gastrointestinal and renal consequences that make them second-line treatments. **(D)** Allopurinol is used in the prophylactic treatment of gout. It acts via inhibition of xanthine oxidase which decreases production of uric acid. It is not used in the treatment of OA. **(E)** This patient is clearly in pain and would benefit from medication, so observation is inappropriate.

92. **Answer: D. Vitamin B_{12} deficiency.** The patient in this question likely has cobalamin (vitamin B_{12}) deficiency. This results in a megaloblastic anemia. Long-term consequences of vitamin B_{12} deficiency include peripheral neuropathy and posterior column defects from abnormal myelin synthesis. Importantly, folic acid deficiency is another cause of macrocytic anemia and treatment with folic acid can improve the actual *anemia* of vitamin B_{12} deficiency since both folate and vitamin B_{12} are involved in the conversion of homocysteine to methionine. However, neurologic symptoms can be worsened in vitamin B_{12} deficiency with the treatment of folic acid since vitamin B_{12} is used in other biologic processes as well. As a result, it is critical to rule out vitamin B_{12} deficiency before initiating folic acid. Vitamin B_{12} deficiency results from inadequate vitamin B_{12} intake (diet lacking in animal products) and autoimmune gastritis. The loss of gastric parietal cells secondary to autoimmune gastritis causes intrinsic factor deficiency (which is necessary for vitamin B_{12} absorption in the terminal ileum). **(A)** The patient's underlying disorder is vitamin B_{12} deficiency and no amount of folic acid supplementation will improve his neurologic symptoms. **(B)** Iron deficiency is a microcytic anemia (MCV <80 fL) and is not associated with peripheral neuropathy. **(C, E)** Although glucose intolerance commonly causes peripheral neuropathy, this patient does not have a history that suggests diabetes.

93. **Answer: A. Amlodipine.** Amlodipine is a calcium channel blocker that is often used as an antihypertensive agent. It has a high incidence of peripheral edema as a side effect. **(B)** Metoprolol is a selective β_1-blocker used in hypertension, heart failure, and rate control for

tachyarrhythmias such as atrial fibrillation. It can cause bradycardia and hypotension, but avoids some of the adverse effects of nonselective β-blockers (e.g., bronchospasm). It rarely causes peripheral edema. **(C)** Hydrochlorothiazide blocks the Na-Cl channel in the distal convoluted tubule, leading to sodium and water excretion. It is used as an antihypertensive agent, and can cause orthostatic hypotension, hypercalcemia, hypokalemia, hyperlipidemia, and hyperglycemia. **(D)** Metformin is a biguanide drug used in diabetes and acts by decreasing hepatic glucose secretion and increasing insulin sensitivity. It causes GI symptoms, vitamin B_{12} deficiency, and, rarely, lactic acidosis in patients with significant renal failure. **(E)** Glipizide is a sulfonylurea antidiabetic drug. It blocks potassium channels in islet cells of the pancreas, leading to increased insulin release that can result in hypoglycemia.

94. **Answer: A. Factitious hypoglycemia from surreptitious injection of insulin.** The patient in this question is presenting with clinical symptoms and laboratory findings consistent with surreptitious injection of insulin (elevated insulin, decreased glucose, and decreased C-peptide). **(B)** Since this patient presents with a decreased C-peptide level, this is not consistent with an *endogenous* source of insulin since pancreatic β-cells produce proinsulin (which breaks down into insulin and C-peptide). Therefore, insulinoma is not the diagnosis since there are decreased levels of C-peptide in this patient. Note that surreptitious sulfonylurea use will also produce elevated insulin and C-peptide levels (similar to insulinoma) since this drug essentially stimulates proinsulin secretion. That is why it is critical to order a urine sulfonylurea level, which is undetectable in this patient. **(C, D)** Somatization disorder and glucagonoma do not produce hypoglycemia. **(E)** Dehydration cannot explain the severe hypoglycemia seen in this patient.

95. **Answer: D. Ciprofloxacin.** One reported adverse reaction of fluoroquinolone antibiotics is tendinopathy, and the Achilles tendon is most often affected. Fluoroquinolones can also cause GI upset, *Clostridium difficile* colitis, dizziness, rash, and a prolonged QT

interval, among many other issues. **(A)** Trimethoprim-sulfamethoxazole may cause Stevens–Johnson syndrome, leukopenia, hyperkalemia, hypoglycemia, and hepatitis. **(B)** Metronidazole can cause GI upset and peripheral neuropathy. **(C)** Tobramycin and other aminoglycosides may cause renal failure and ototoxicity. **(E)** Azithromycin and other macrolides can cause a prolonged QT interval and hepatitis.

96. **Answer: B. Thyroid-stimulating hormone (TSH) levels.** The patient in this question is demonstrating clinical manifestations of hyperthyroidism. In approaching the diagnosis of thyroid disorders, the first step is to order a TSH level. TSH is the *most sensitive* test to detect primary hypothyroidism and hyperthyroidism. Based on the TSH level, additional tests can be performed. **(A)** Free T4 is important in the diagnostic workup of thyroid disorders and should be the next test ordered if TSH comes back abnormal. If free T4 is increased with a decreased TSH level, this is diagnostic of primary hyperthyroidism. If free T4 is decreased with a decreased TSH level, then central hypothyroidism is the diagnosis and the etiology involves the pituitary gland or the hypothalamus. Finally, if free T4 is normal with a decreased TSH, then this is subclinical hypothyroidism. **(C)** Thyroglobulin is often increased in goiter and hyperthyroidism and is also a tumor marker for thyroid cancer. It is not the best first test in working up thyroid disorders. **(D)** Radioactive iodine uptake (RAIU) scan is the next best step once primary hyperthyroidism is diagnosed (increased free T4 with decreased TSH) as it can help differentiate causes of hyperthyroidism (Graves vs. multinodular goiter vs. silent thyroiditis). **(E)** A fine-needle aspiration (FNA) biopsy is far too invasive of a test without having basic laboratory values.

97. **Answer: D. Reassurance.** This patient demonstrates immunity to hepatitis B (positive for HBsAb) and therefore reassurance should be offered. Immunity to hepatitis B occurs when anti–hepatitis B surface antibodies (HBsAbs) develop against the recombinant hepatitis B surface antigen. Given the patient's documented hepatitis B vaccination and positive titers for HBsAb, reassurance is appropriate. **(A, C)** If the patient had unknown vaccination history, she should receive *both*

HBIG (passive immunity) and hepatitis B vaccine (active immunity). **(B)** The patient has documentation already revealing positivity for HBsAb. Therefore, a hepatitis B panel is unnecessary.

98. **Answer: B. Tearing of the bridging veins.** This patient is suffering from a subdural hematoma, which is caused by blunt trauma that tears the bridging veins, which connect the cortical superficial veins to the sagittal sinus in the dura. This blood will *slowly* extravasate into the subdural space, which is why this patient's fall was recorded 4 days prior to admission. Epidural hematomas, on the other hand, become immediately symptomatic (although the classic description of epidural hematomas is that of a "lucid" phase followed by rapid decline). Subdural hematomas manifest symptomatically with headache and gradual confusion and loss of consciousness. Of note, subdural hematomas are much more common in elderly patients and alcoholic patients (brain atrophy and fragility of vasculature). Radiologic findings of a subdural hematoma include a white crescent on noncontrast CT of the head. Also, a midline shift is commonly appreciated. Treatment is neurosurgical hematoma evacuation. **(A)** Tearing of the middle meningeal artery is the underlying cause of most epidural hematomas. **(C)** Ruptured aneurysm is the underlying cause of a subarachnoid hemorrhage. **(D)** In addition to the radiologic evidence, this particular patient does not have a history of hypertension and therefore hypertensive hemorrhage is not the right answer. **(E)** Alzheimer disease would not present with this acute presentation. This patient clearly endorses trauma making a hematoma much more likely than underlying dementia.

99. **Answer: D. Severe sepsis.** This patient has severe sepsis secondary to pneumonia. It is important to know the definitions related to the topic of sepsis. Systemic inflammatory response syndrome (SIRS) is defined by 2 or more of the following: (1) temperature >38°C or <36°C; (2) a heart rate >90/min; (3) a respiratory rate >20/min or a $PaCO_2$ <32 mm Hg; and (4) a serum leukocyte count >12,000/mm^3 or <4,000/mm^3 or >10% bands. The 2016 Third International Consensus updated the definition of sepsis to be a qSOFA score of 2 or more (qSOFA

includes respiratory rate of 22 or higher, altered mental status, or systolic blood pressure 100 mm Hg or less). Despite these guidelines, many providers still use the SIRS definition of sepsis and it is thus still important to know the previous definition. **(C)** When there is a suspected source of infection, the definition becomes sepsis. Severe sepsis is the definition for sepsis with end-organ dysfunction, signified by hypotension or hypoperfusion (oliguria, elevated serum lactate, etc.). Septic shock is severe sepsis that does not respond to adequate fluid resuscitation. This patient meets SIRS criteria with a suspected source of infection (pneumonia) and hypotension; **(E)** IV fluids have not been administered yet, so the definition of septic shock is not met. Septic shock is one type of distributive shock, which is characterized by hypotension with flat neck veins and warm extremities (low systemic vascular resistance). **(A, B)** Both cardiogenic shock and pulmonary embolism (a type of obstructive shock) are less likely by the clinical findings and patient's volume status on examination (flat JVP). Lastly, hypovolemic shock would present with flat neck veins and *cool* extremities, since systemic vascular resistance increases in an attempt to maintain blood pressure.

100. Answer: A. Place the patient in a semi-recumbent position.
Mechanical ventilation is the biggest risk factor for developing HAP, and the risk can be decreased with certain measures. Patient should be placed in a semi-recumbent position (head of the bed elevated 30 to 45 degrees) to prevent aspiration events. **(B)** Daily attempts to wean a patient from the ventilator should be performed to minimize the duration of mechanical ventilation. **(C)** Measuring daily gastric residual volumes for patients on enteral feeds has been a standard practice, but studies show that measurement of gastric volumes does not correlate well with the risk of aspiration. **(D)** Omeprazole and other agents that increase the pH of gastric contents have been shown to increase the rate of HAP. They should be avoided if possible. **(E)** Endotracheal suctioning of subglottic secretions reduces the risk of VAP. Other important preventive measures include following proper hand hygiene protocols, avoiding gastric overdistention, and using orotracheal intubation rather than nasotracheal intubation.

B