Common Abbreviations

The following abbreviations are used in this examination:

- **ALT**: Alanine aminotransferase
- **AST**: Aspartate aminotransferase
- **CSF**: Cerebrospinal fluid
- **INR**: International normalized ratio
- **MDMA**: Methyleneoxymethamphetamine
- **PCR**: Polymerase chain reaction
- **S₁**: First heart sound
- **S₂**: Second heart sound
- **S₃**: Third heart sound (ventricular gallop)
- **S₄**: Fourth heart sound (atrial gallop)
- **VDRL**: Venereal Disease Research Laboratory
A 25-year-old woman is brought to the emergency department because she has been acting strangely. Her roommate reports that the patient went to a dance club and when she returned home early the next morning she was speaking very quickly and “acting paranoid.” Nothing more is known about where the patient may have been or whether she drank alcohol or took illicit drugs.

The patient is diaphoretic. She is alert, and her speech is rapid but fluent. She is eager to go home and is picking at her face. Temperature is 38.1°C (100.5°F), pulse rate is 114 per minute and regular, respirations are 20 per minute, and blood pressure is 160/94 mm Hg. Angular cheilitis is noted. The mucous membranes are moist. A small burn is present on the buccal mucosa. The condition of the dentition is poor. The pupils are dilated and minimally reactive to light. Nystagmus is absent. Skin examination shows no rashes or needle marks; a few pustules and scabs are noted on the face. Cardiopulmonary and abdominal examinations are normal except for tachycardia. Examination of the extremities shows no edema, clubbing, or cyanosis. The patient can move all extremities but is tremulous and hyper-reflexic. Laboratory studies show normal liver enzymes and kidney function. Electrocardiogram shows sinus tachycardia at a rate of 110 beats per minute, normal axis and intervals, and no acute ST–T wave changes. Radiograph of the chest is normal.

Intoxication with which of the following best explains this clinical picture?

(A) Hallucinogenic mushrooms
(B) Phencyclidine (PCP)
(C) MDMA (Ecstasy)
(D) Methamphetamine
A 28-year-old man has had moderate pain in the upper back and both knees for 12 hours. He also reports a mild nonproductive cough but no shortness of breath or wheezing. He has sickle cell disease (SS genotype) and has two admissions annually for painful crises. He has not had acute chest syndrome.

Temperature is 39.2 C (102.6 F), pulse rate is 98 per minute, respirations are 22 per minute, and blood pressure is 124/78 mm Hg. Oxygen saturation is 88% by pulse oximetry. He has tachycardia but no murmurs. The lungs are clear. No joint inflammation or edema is noted. Chest radiograph shows a right lower lobe opacity.

Laboratory studies:

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematocrit</td>
<td>24%</td>
<td>42–50%</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>8 g/dL</td>
<td>13–16 g/dL</td>
</tr>
<tr>
<td>Leukocyte count</td>
<td>10,800/µL</td>
<td>4000–11,000/µL</td>
</tr>
<tr>
<td>Platelet count</td>
<td>159,000/µL</td>
<td>150,000–300,000/µL</td>
</tr>
<tr>
<td>Serum bilirubin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.5 mg/dL</td>
<td>0.3–1.0 mg/dL</td>
</tr>
<tr>
<td>Indirect</td>
<td>3.5 mg/dL</td>
<td>0.2–0.7 mg/dL</td>
</tr>
</tbody>
</table>

In addition to intravenous fluids, which of the following is the most appropriate treatment now?

(A) Ceftriaxone and azithromycin
(B) Hydroxyurea
(C) Packed red blood cells
(D) Hydromorphone via patient-controlled analgesia
(E) Exchange transfusion
A 48-year-old woman is scheduled to undergo resection of uterine leiomyomas. Preoperative evaluation reveals a systolic murmur; echocardiogram shows normal left ventricular ejection fraction and structure, atrial septal aneurysm, and mild mitral regurgitation. Telemetry shows sinus rhythm without ectopy or arrhythmia.

Which of the following is the most appropriate long-term management of her atrial septal aneurysm?

(A) Aspirin
(B) Warfarin
(C) Resection
(D) No further intervention
A 36-year-old woman who has systemic lupus erythematosus was admitted 24 hours ago with meningococcemia; three of three blood cultures taken in the emergency department prior to starting treatment with intravenous penicillin G are positive for *Neisseria meningitidis*. Now the patient appears to be stabilizing. The nursing staff has asked how long she should be kept in isolation. Physical examination reveals meningismus and a purpuric rash on her ankles.

Which of the following is the most appropriate duration of isolation for this patient?

(A) Discontinuation now  
(B) For 48 hours following admission  
(C) Until follow-up blood cultures are negative  
(D) Until skin lesions have resolved  
(E) Until completion of therapy
A 31-year-old man who uses injection drugs is recovering from fractures of the pelvis, right femur, and left radius after a motor vehicle accident. Temperature spikes to 38.4°C (101.1°F). No source of infection is identified, blood cultures are obtained, and temperature returns to normal. Current medications are intravenous morphine via patient-controlled pump, naproxen, and heparin.

Two days later, blood cultures grow a gram-positive rod. The patient remains afebrile, pain is improving, and leukocyte count is 8400/μL [4000–11,000] with a normal differential.

Which of the following best explains the positive blood culture?

(A) Endocarditis
(B) Wound infection, possibly osteomyelitis
(C) Central venous catheter infection
(D) Skin contamination when culture was drawn
A 65-year-old man comes to the emergency department because he has had shortness of breath and a nonproductive cough for five days. He has chronic obstructive pulmonary disease and heart failure. At baseline he has mild dyspnea on exertion and a nonproductive cough most days of the year. He uses oxygen (2 L/min) with ambulation at home and takes metoprolol, furosemide, lisinopril, and tiotropium.

The patient appears comfortable. Temperature is 37.2 C (99.0 F), pulse rate is 85 per minute, respirations are 16 per minute, and blood pressure is 150/90 mm Hg. Oxygen saturation is 95% by pulse oximetry with the patient breathing oxygen (2 L/min). No jugular venous distention is noted. Bilateral diffuse wheezing is heard.

Which of the following is the most appropriate management?

(A) Noninvasive ventilation
(B) Amoxicillin
(C) Levofloxacin
(D) Low-molecular-weight heparin
(E) Prednisone
A 47-year-old woman has fever and headache. CSF analysis reveals an opening pressure of 150 mm H₂O, cell count 52/µL (96% lymphocytes), protein 46 mg/dL, and glucose 60 mg/dL (simultaneous plasma glucose 108 mg/dL [fasting 70–115]). Specimens are sent for microbiologic analysis, and therapy is initiated with intravenous vancomycin, ampicillin, ceftriaxone, and acyclovir.

Two days later, the patient says she feels well and requests discharge. Cultures, CSF VDRL, cryptococcal antigen, and PCR for herpes simplex virus are negative.

Which of the following is the most appropriate management?

(A) Repeat lumbar puncture
(B) Discontinue current medications and discharge
(C) Discontinue current medications and observe
(D) Discontinue current medications, initiate oral valacyclovir, and discharge
(E) Discontinue current medications, initiate oral cefpodoxime and valacyclovir, and discharge
An 85-year-old man who has Alzheimer’s disease and lives in a nursing home is hospitalized for chest pain. He has an indwelling urinary catheter, which was placed two weeks ago for a stage II pressure ulcer on the sacrum.

Temperature is 37.1 C (98.7 F), pulse rate is 100 per minute, respirations are 20 per minute, and blood pressure is 150/80 mm Hg. Oxygen saturation is 98% by pulse oximetry. Physical examination is normal except for the sacral ulcer. Leukocyte count is 9800/µL [4000–11,000], and erythrocyte sedimentation rate is 50 mm/hr [0–15].

Which of the following is the most appropriate management of the ulcer?

(A) Continue the indwelling urinary catheter while the patient remains hospitalized
(B) Remove the indwelling urinary catheter while the patient remains hospitalized but replace before discharge
(C) Remove the indwelling urinary catheter and replace with a condom catheter
(D) Remove the indwelling urinary catheter
A 55-year-old man was discharged from the hospital three weeks ago after a three-day admission for *Clostridium difficile* infection; he was treated with metronidazole and his symptoms improved. During the past five days, he has had cramping abdominal pain and worsening watery diarrhea despite a bland diet. He has ten nonbloody, watery bowel movements daily, his appetite has decreased, and he reports lightheadedness on standing. The patient has hypertension. Current medications are hydrochlorothiazide (25 mg daily) and enteric-coated aspirin (81 mg daily). He does not have allergies and does not smoke cigarettes or drink alcoholic beverages.

The patient is alert and oriented, but appears pale and fatigued. Temperature is 37.9 C (100.2 F), pulse rate is 98 per minute, respirations are 16 per minute, and blood pressure is 100/60 mm Hg. Postural changes in pulse and blood pressure are observed. Bowel sounds are hyperactive but low-pitched. The abdomen is soft, nontender, and mildly distended; no masses or enlarged organs are noted. The remainder of the physical examination is normal. Stool is negative for occult blood.

Laboratory studies:

- **Hemoglobin**: 14.2 g/dL [13–16]
- **Leukocyte count**: 13,200/µL [4000–11,000]
  - Neutrophils: 85% [50–70]
  - Lymphocytes: 12% [30–45]
  - Monocytes: 3% [0–6]
- **Platelet count**: 310,000/µL [150,000–300,000]
- **Plasma glucose**: 98 mg/dL [fasting 70–115]
- **Blood urea nitrogen**: 24 mg/dL [8–20]
- **Serum creatinine**: 1.2 mg/dL [0.7–1.5]
- **Serum electrolytes**
  - Sodium: 140 mEq/L [136–145]
  - Potassium: 3.5 mEq/L [3.5–5.0]
  - Chloride: 110 mEq/L [98–106]
  - Bicarbonate: 20 mEq/L [23–28]
- **Liver biochemical studies**: Normal
- **Stool for *Clostridium difficile* toxin A**: Positive

Supine and upright radiographs of the abdomen show a non-specific bowel gas pattern without evidence of obstruction.

Which of the following is the most appropriate antimicrobial therapy?

(A) Oral metronidazole
(B) Oral vancomycin alone
(C) Intravenous metronidazole alone
(D) Oral vancomycin and intravenous metronidazole
A 28-year-old woman is hospitalized because she has right-sided flank pain, chills, and fever. Leukocyte count is 16,800/µL [4,000–11,000] with 90% neutrophils [50–70]. Urinalysis shows protein 2+, WBCs 4+, RBCs 2+, and many bacteria/hpf. Acute pyelonephritis is diagnosed; blood and urine cultures are obtained, and ticarcillin–clavulanate is begun. The next day, temperature decreases to 38.4°C (101.1°F), and flank pain improves. Leukocyte count now is 12,400/µL, and urine culture grows 4+ gram-negative rods.

On day 3, the patient is asymptomatic and tolerating oral food and fluids. You plan to substitute amoxicillin–clavulanate for ticarcillin–clavulanate and prepare to discharge the patient. The laboratory reports that the bacteria have been identified as *Klebsiella* species; two of three blood cultures now are growing gram-negative rods.

Which of the following should you now do?

(A) Order immediate echocardiography  
(B) Begin amoxicillin–clavulanate and order abdominal computed tomography  
(C) Begin amoxicillin–clavulanate and continue discharge planning  
(D) Continue ticarcillin–clavulanate and postpone discharge
A 76-year-old man was admitted to the hospital ten days ago because of a ruptured gallbladder that required emergent laparotomy. Postoperative complications included sepsis, acute renal failure, and deconditioning, from which he is recovering. Three days ago, the patient began to have progressive high-volume diarrhea. He has been febrile without rigors and has had cramps in the lower abdomen.

The patient is uncomfortable because of abdominal pain. Temperature is 39.1 C (102.4 F), pulse rate is 95 per minute, respirations are 12 per minute, and blood pressure is 105/64 mm Hg. Cardiopulmonary examination is normal. Bowel sounds are hyperactive. Mild abdominal distention is noted without signs of ascites. The lower abdomen is tender bilaterally, without rebound tenderness.

Laboratory studies:

- Hematocrit: 24.8% [42–50]
- Leukocyte count: 28,000/μL [4000–11,000]
- Platelet count: 480,000/μL [150,000–300,000]
- Serum creatinine: 1.8 mg/dL [0.7–1.5]
- Serum albumin: 1.9 mg/dL [3.5–5.5]
- Blood cultures: Negative
- Stool *Clostridium difficile* toxin A: Positive

Which of the following is the most appropriate treatment for the diarrhea?

(A) Metronidazole orally
(B) Metronidazole intravenously
(C) Vancomycin orally
(D) Vancomycin intravenously
Which of the following is the most appropriate treatment for a patient with Parkinson’s disease who has delirium and refractory agitation?

(A) Haloperidol
(B) Lorazepam
(C) Olanzapine
(D) Risperidone
A 38-year-old man is found to have hepatitis C.

When discussing therapy with the patient, you tell him which of the following is the most important determinant of response to therapy?

(A) Hepatitis C viral load
(B) Hepatitis C genotype
(C) Serum albumin level
(D) Serum ALT and AST levels
(E) Prothrombin time
A 58-year-old man who has cirrhosis secondary to hepatitis C and alcohol ingestion has increasing edema and ascites. Large volume paracentesis with albumin replacement is performed; ascites improves and urine output increases. Spironolactone is added to the current furosemide regimen.

One month later, the patient returns with massive ascites. He tells you that he discontinued taking spironolactone because his breasts became enlarged and painful. He has no health insurance and is concerned about his ability to pay for expensive medications.

In addition to dietary sodium restriction and continuation of furosemide, which of the following is the best option to control ascites formation?

(A) Amiloride
(B) Bumetanide
(C) Eplerenone
(D) Indapamide
(E) Midodrine
A 54-year-old man is brought to the emergency department because he has been confused and incoherent for 12 hours. He has hypertension, which is treated with hydrochlorothiazide and amlodipine; he adheres to treatment intermittently.

The patient is confused and uncooperative. Pulse rate is 108 per minute, and blood pressure is 240/130 mm Hg. Agitation prevents funduscopic examination. He has tachycardia and an S4. He has 1+ edema of the legs. He has no focal neurologic deficits.

Laboratory studies:

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Reference Range</th>
</tr>
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<td>Complete blood count</td>
<td>Normal</td>
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<tr>
<td>Blood urea nitrogen</td>
<td>28 mg/dL</td>
<td>8–20</td>
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<tr>
<td>Serum creatinine</td>
<td>2.2 mg/dL</td>
<td>0.7–1.5</td>
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<tr>
<td>Sodium</td>
<td>136 mEq/L</td>
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<tr>
<td>Potassium</td>
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<td>3.5–5.0</td>
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<tr>
<td>Chloride</td>
<td>104 mEq/L</td>
<td>98–106</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>26 mEq/L</td>
<td>23–28</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>2+ protein, 10–20 RBCs, no casts/hpf</td>
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</tr>
</tbody>
</table>

Electrocardiogram shows left ventricular hypertrophy and no ischemic changes. Computed tomogram of the head reveals no evidence of hemorrhage.

Which of the following is the most appropriate blood pressure (mm Hg) goal during the first hour of treatment?

(A) 180/100
(B) 160/95
(C) 140/90
(D) 130/80
Which of the following is the most common presentation of invasive methicillin-resistant *Staphylococcus aureus* in the United States?

(A) Bacteremia
(B) Endocarditis
(C) Osteomyelitis
(D) Pneumonia
A 74-year-old woman falls at her nursing home and sustains a hip fracture. She has hypertension, diabetes mellitus, and hyperlipidemia. The hip is surgically repaired, and dual-energy x-ray absorptiometry (DEXA) is pending.

In preparation for transition to the outpatient clinic, which of the following should be added to calcium and vitamin D to reduce her risk of subsequent hip fractures?

(A) Calcitonin
(B) Hip protectors
(C) Alendronate
(D) Teriparatide
A patient under your care who has a documented history of anaphylaxis to penicillin is given a dose of intravenous ticarcillin–clavulanate to treat an intra-abdominal infection. The patient develops stridor and hypotension, requiring intubation and transfer to the intensive care unit. After he is stabilized, you meet with his family.

In addition to reporting on the patient’s progress and apologizing, which of the following should you say to the family?

(A) The cause of the error is not yet known but will be fully investigated
(B) Occasional errors are unavoidable because of human factors
(C) The administering nurse failed to check the patient’s allergies and will be disciplined
(D) An error most likely occurred due to an oversight on the part of the administering nurse and dispensing pharmacist, and system changes will be implemented to ensure the error does not happen again
A 70-year-old man who has diabetes mellitus and hypertension has had intermittent nonradiating pain below the xyphoid process for two days. The patient notes no increase in pain with respiration or eating, but antacids provide some relief. He has not had nausea, vomiting, or shortness of breath.

Temperature is 37.0°C (98.6°F), pulse rate is 70 per minute, respirations are 14 per minute, and blood pressure is 152/82 mm Hg. Cardiopulmonary and abdominal examinations are normal.

Which of the following is the best indication for the use of multi-slice computed tomography in evaluating this chest pain?

(A) Confirm the diagnosis of coronary artery disease in low-risk patients
(B) Confirm the diagnosis of coronary artery disease in high-risk patients
(C) Exclude the diagnosis of coronary artery disease in low-risk patients
(D) Exclude the diagnosis of coronary artery disease in high-risk patients
A 77-year-old woman is brought to the emergency department one day after the onset of right hemiplegia and slurred speech. She has hypertension, atrial fibrillation, and anxiety. Three years ago she had gastrointestinal bleeding resulting from a duodenal ulcer.

The patient has expressive aphasia. Motor strength is 2/5 in the right arm and 3/5 in the right leg.

Laboratory studies:

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Normal Range</th>
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</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
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<tr>
<td>Leukocyte count</td>
<td>8700/μL [4000–11,000]</td>
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<tr>
<td>Platelet count</td>
<td>317,000/μL [150,000–300,000]</td>
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<tr>
<td>Prothrombin time</td>
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<td></td>
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<tr>
<td>Activated partial thromboplastin time</td>
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<tr>
<td>INR</td>
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Electrocardiogram reveals atrial fibrillation at 84 beats per minute. Computed tomogram of the head shows no acute bleeding.

Which of the following is the most appropriate treatment?

(A) Aspirin, 325 mg daily
(B) Clopidogrel, 75 mg daily
(C) Warfarin adjusted to achieve an INR of 2-3
(D) Unfractionated heparin bolus followed by infusion
(E) Enoxaparin, 1 mg/kg subcutaneously every 12 hours
A 68-year-old woman is admitted because of volume overload, edema, and heart failure. She has known chronic kidney disease, with an estimated glomerular filtration rate of 30 mL/min, and heart failure, with a left ventricular ejection fraction of 20%. Prior to admission she had been taking furosemide (80 mg twice daily).

The patient receives intravenous furosemide for three days and has symptom improvement and a 3-kg (6.6-lb) weight loss. Blood urea nitrogen has increased from 25 mg/dL [8–20] on admission to 60 mg/dL, and serum creatinine has increased from 1.6 mg/dL [0.7–1.5] on admission to 2.0 mg/dL. Furosemide is discontinued; the following day, the laboratory results are unchanged. She is about to be discharged, and outpatient follow-up in two weeks is planned.

Which of the following is the most appropriate treatment at discharge?

(A) Decrease home furosemide dosage
(B) Continue home furosemide dosage
(C) Switch to metolazone
(D) Withhold diuretics until follow-up with primary care physician
A 26-year-old woman who has type 1 diabetes mellitus is admitted because of nausea and vomiting. Symptoms improve after 24 hours of intravenous fluids and antiemetics. Her current medications are 70/30 insulin (40 units in the morning and 25 units in the evening), lisinopril, gabapentin, and prochlorperazine as needed. She has been admitted on two other occasions this year because of nausea and vomiting. On each admission she was treated with intravenous fluids and metoclopramide with good results.

Laboratory studies:

<table>
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<tr>
<th>Test</th>
<th>Result</th>
<th>Reference Range</th>
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<td>Hemoglobin</td>
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<td>[12–15]</td>
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<tr>
<td>Hemoglobin A1C</td>
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<td>[4.0–6.1]</td>
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<tr>
<td>Leukocyte count</td>
<td>4000/µL</td>
<td>[4000–11,000]</td>
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<td>Platelet count</td>
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<td>[150,000–300,000]</td>
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<td>Blood urea nitrogen</td>
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<td>Serum creatinine</td>
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<td>[0.7–1.5]</td>
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<td>Sodium</td>
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<td>Potassium</td>
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<td>[3.5–5.0]</td>
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<td>Chloride</td>
<td>110 mEq/L</td>
<td>[98–106]</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>20 mEq/L</td>
<td>[23–28]</td>
</tr>
</tbody>
</table>

Which of the following is the most appropriate management?

(A) Discharge with prescription for metoclopramide, 10 mg before every meal
(B) Obtain barium swallow
(C) Obtain esophagogastroduodenoscopy
(D) Obtain gastric emptying study
(E) Change insulin therapy to insulin glargine at bedtime and insulin aspart with meals; discharge
A 31-year-old man who is recovering from fractures of the pelvis, right femur, and left radius following a motor vehicle accident has a temperature spike to 38.4 °C (101.1 °F). No source of infection is identified, blood cultures are obtained, and temperature returns to normal. Current medications are intravenous morphine via patient-controlled pump, naproxen, and heparin.

Four days later, blood cultures grow yeast. The patient remains afebrile, pain is improving, and leukocyte count is 9400/µL [4000–11,000] with a normal differential.

In addition to repeating blood cultures and changing the patient’s central line (non-tunneled internal jugular vein), which of the following should you do next?

(A) Continue observation
(B) Order computed tomography of the chest and abdomen and echocardiography
(C) Start fluconazole
(D) Start liposomal amphotericin B
A 69-year-old man who underwent suprapubic prostatectomy for prostate cancer five days ago now has a urinary tract infection. One day later, he begins to have left calf tenderness without swelling or edema. He has never had a venous thromboembolism.

Temperature is 36.8 C (98.2 F), pulse rate is 82 per minute, and blood pressure is 138/90 mm Hg. Oxygen saturation by pulse oximetry is 96%.

Which of the following is the most appropriate next step?

(A) Measurement of plasma D-dimer
(B) Computed tomographic angiography of the pulmonary vasculature
(C) Venous duplex compression ultrasonography of the lower extremities
(D) Ventilation–perfusion lung scan
An 82-year-old woman who is a nursing home resident is admitted because of a hip fracture following a fall. During her hospitalization she is found to have a serum 25-hydroxyvitamin D level of 12 ng/mL [15–40].

Which of the following is the most appropriate dosage of vitamin D supplementation on discharge?

(A) 400 IU daily
(B) 1000 IU daily
(C) 2000 IU daily
(D) 50,000 IU weekly