1. A 17-year-old boy sustains a head injury and loses consciousness after diving into a freshwater lake from a platform. After being submerged for 3 minutes, he is rescued. He is initially cyanotic but then begins to cough and breathe spontaneously after a 5-minute resuscitation. Over the next 36 hours, which of the following complications is most likely?

- A) Acute respiratory distress syndrome
- B) Bacteremia
- C) Bacterial pneumonia
- D) Hypernatremia
- E) Metabolic alkalosis

2. A 30-year-old woman comes to the physician for a follow-up examination 4 months after starting treatment with lithium carbonate; during this period she has had a 3.2-kg (7-lb) weight gain. Her medication was prescribed soon after the birth of her son to treat racing thoughts, increased spending, and overtalkativeness; she has had difficulty sleeping for more than 2 hours nightly. Her symptoms decreased after 2 weeks of lithium carbonate therapy. She continues to take lithium carbonate (300 mg three times daily). Her temperature is 37°C (98.6°F), blood pressure is 120/80 mm Hg, and pulse is 70/min. Examination shows normal findings. The most appropriate next step is measurement of which of the following?

- A) Fasting serum glucose concentration
- B) Leukocyte count
- C) Serum alkaline phosphatase activity
- D) Serum creatinine concentration
- E) Serum thyroid-stimulating hormone concentration

3. A 62-year-old woman is brought to the physician by her husband because of a 2-day history of fatigue and a 1-hour history of headache and confusion. She has not had fever, nausea, or vomiting. She has a 6-year history of hypertension treated with hydrochlorothiazide and lisinopril. Her temperature is 36.1°C (97°F), pulse is 90/min, respirations are 22/min, and blood pressure is 250/135 mm Hg. Funduscopic examination shows bilateral papilledema. The lungs are clear to auscultation. Cardiac examination shows an S_4 and no murmurs. An ECG shows left ventricular hypertrophy with a strain pattern. Which of the following is the most appropriate initial pharmacotherapy?

- A) Clonidine
- B) Hydralazine
- C) Nifedipine
- D) Nitroglycerin
- E) Nitroprusside

4. A 42-year-old man is brought to the physician by his wife because of a 2-month history of staring spells that last 1 to 2 minutes each. During episodes, he also smacks his lips and picks at his shirt collar. Four years ago, he was comatose for 2 weeks after sustaining a head injury in a motorcycle collision; he required 6 months of rehabilitation. He reports that, over the past year, he has had intermittent episodes of smelling burnt rubber that occur approximately every 2 weeks. He hears an intense hissing sound during these episodes. Examination shows no abnormalities. Which of the following is the most likely diagnosis?

- A) Absence seizures
- B) Complex partial seizures
- C) Transient ischemic attack
- D) Tourette's disorder
- E) Limbic encephalopathy

5. An asymptomatic 21-year-old woman is found to have an adnexal mass on pelvic examination. She uses oral contraceptives. A photograph of the mass is shown. Which of the following is the most likely diagnosis?

- A) Benign cystic teratoma
- B) Corpus luteum cyst
- C) Dysgerminoma
- D) Endometrioma
- E) Mucinous cystoadenoma

6. A previously healthy 47-year-old woman comes to the emergency department because of a 36-hour history of nausea, vomiting, and abdominal pain that radiates to her back. Over the past 3 years, she has had intermittent episodes of cramping abdominal pain 1 to 2 hours after meals; the pain lasts for several hours and resolves spontaneously. She does not smoke and drinks one to two glasses of wine each evening. There is a family history of coronary artery disease and hypertension. Her temperature is 37°C (98.6°F), blood pressure is 100/60 mm Hg, pulse is 120/min, and respirations are 20/min. Abdominal examination shows moderate epigastric and right upper quadrant tenderness with no guarding or rebound; bowel sounds are decreased. Laboratory studies show:

Hematocrit	45%
Leukocyte count	9000/mm^3 with a normal differential
Serum	
Total bilirubin	1.5 mg/dL
Alkaline phosphatase	120 U/L
AST	78 U/L
Amylase	365 U/L
Lipase	1223 U/L (N=1–160)
Triglycerides	300 mg/dL

Which of the following is the most likely diagnosis?

- A) Acute cholecystitis
- B) Alcoholic hepatitis
- C) Alcoholic pancreatitis
- D) Ascending cholangitis
- E) Gallstone pancreatitis
- F) Hepatitis A
- G) Pancreatic cancer
- H) Peptic ulcer disease
- I) Triglyceride-induced pancreatitis

7. A 44-year-old woman comes to the emergency department 2 days after being discharged from the hospital for abdominal pain; an exploratory laparoscopy showed no abnormalities. Over the past 5 years, she had been admitted to the hospital numerous times for the evaluation of a variety of symptoms; all work-ups had been negative. Her temperature is 39.2°C (102.6°F). Examination shows a reddened, indurated laparoscopic wound. She is admitted to the hospital and given intravenous antibiotics. On the second hospital day, a nurse witnesses the patient rubbing saliva into her laparoscopy site. Which of the following is the most likely diagnosis?

- A) Adjustment disorder with disturbance of conduct
- B) Conduct disorder
- C) Conversion disorder
- D) Factitious disorder
- E) Hypochondriasis
- F) Major depressive disorder
- G) Oppositional defiant disorder
- H) Somatization disorder

8. A 57-year-old man comes to the physician because of intermittent urinary incontinence over the past 6 months. He has loss of small amounts of urine when he coughs or sneezes. He has not had pain or blood with urination. He has a 15-year history of type 2 diabetes mellitus with peripheral neuropathy, retinopathy, and gastroparesis. Current medications include metoclopramide and glyburide. He appears well. Rectal examination shows a normal-sized prostate. Neurologic examination shows decreased sensation in a stocking-glove distribution. Achilles tendon reflexes are absent bilaterally. Test of the stool for occult blood is negative. Urinalysis shows 2+ protein with no leukocytes or erythrocytes. His postvoid residual volume is 500 mL. Which of the following is the most likely mechanism of this patient's incontinence?

- ○ A) Central nervous system disorder
- ○ B) Functional incontinence
- ○ C) Intrinsic sphincter deficiency
- ◉ D) Overflow incontinence from acontractile bladder
- ○ E) Overflow incontinence from bladder outlet obstruction
- ○ F) Pelvic floor muscle weakness
- ○ G) Retroperitoneal fibrosis
- ○ H) Retroperitoneal lymphadenopathy
- ○ I) Urinary tract infection

9. A 6-year-old boy is brought to the physician by his mother because of progressive visual loss over the past year. Over the past 2 years, he has had deterioration of his hearing, speech, writing, and intellectual performance. His maternal uncle had similar symptoms. Visual acuity is 20/200 bilaterally. Funduscopic examination shows optic atrophy. His hearing is markedly impaired. There is weakness and spasticity of all extremities. Deep tendon reflexes are extremely hyperactive. Babinski's sign is present bilaterally. On mental status examination, he is not oriented to place, year, month, or the names of his siblings. An MRI of the brain shows marked symmetric white matter disease involving all lobes. Diagnostic studies are most likely to show which of the following?

- A) Abnormally decreased serum cholesterol concentration
- B) Acanthocytes on blood smear
- C) An excess of very long chain fatty acids
- D) Normal nerve conduction studies
- E) Vitamin E deficiency

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- ◉ C) An excess of very long chain fatty acids
- ○ D) Normal nerve conduction studies
- ○ E) Vitamin E deficiency

10. A 32-year-old woman comes to the physician because of bright red rectal bleeding and severe stabbing pain with each bowel movement over the past 2 weeks. She has blood-streaked stools, and there is blood on the toilet paper. Over the past 2 months, she has had mild constipation with no change in the caliber of the stool. Examination shows a small anal fissure at the posterior midline. Rectal examination is painful, but no abnormalities are detected except for a small amount of bright red blood from the fissure. Which of the following is the most appropriate next step in management?

- A) Anesthetic ointment and stool softeners
- B) Anal dilatation under anesthesia
- C) Debridement and closure of the fissure under anesthesia
- D) Surgical flaps
- E) Lateral internal sphincterotomy

11. A 45-year-old woman comes to the emergency department because of shortness of breath, chest pain, dizziness, and mild numbness and tingling around the lips for 2 hours. She says that she feels like she is going to die. She had three similar episodes last week when she was vacationing at the Grand Canyon; the first episode occurred while crossing a narrow bridge on a donkey. She takes a hypoglycemic drug for type 2 diabetes mellitus, verapamil for hypertension, and sumatriptan as needed for migraine. She is mildly diaphoretic and appears pale. Her blood pressure is 130/90 mm Hg, pulse is 120/min, and respirations are 28/min. Serum glucose concentration is 120 mg/dL. An ECG shows sinus tachycardia. Sublingual nitroglycerin therapy does not relieve her symptoms and gives her a headache. The most appropriate next step in management is administration of which of the following?

- A) Haloperidol
- B) Lorazepam
- C) Oxygen
- D) Sumatriptan
- E) Verapamil

12. A 57-year-old man comes to the physician because of a 1-day history of severe pain and swelling of his right knee that worsens with movement of the knee. He has no history of serious illness. His temperature is 37.2°C (98.9°F), pulse is 80/min, respirations are 16/min, and blood pressure is 138/78 mm Hg. Examination of the right knee shows warmth, erythema, and diffuse tenderness with a moderate effusion. Aspiration of the knee joint yields cloudy fluid; fluid analysis shows a leukocyte count of 9000/mm^3. Microscopic examination shows negatively birefringent, needle-shaped crystals. Which of the following is the most appropriate initial pharmacotherapy?

- A) Allopurinol
- B) Hydroxychloroquine
- C) Indomethacin
- D) Prednisone
- E) Probenecid

13. A previously healthy 87-year-old woman comes to the physician because of a 4-month history of vulvar itching. Examination shows excoriated areas from scratching and a white, thin vulva. The labia minora are absent, and there are small fissures at the introitus. The remainder of the examination shows no abnormalities. Which of the following is the most likely diagnosis?

- A) *Escherichia coli* infection
- B) Lichen sclerosus
- C) Squamous cell carcinoma
- D) Trichomoniasis
- E) Vulvar melanoma
- F) Vulvar vestibulitis

14. A 20-year-old African American man with sickle cell disease comes to the physician because of a 1-week history of shortness of breath on exertion, fatigue, and generalized weakness. He has had no fever, chills, night sweats, or cough productive of sputum. His only medication is oxycodone for joint pain. He weighs 68 kg (150 lb) and is 168 cm (66 in) tall. His temperature is 36.7°C (98°F), blood pressure is 120/70 mm Hg, pulse is 76/min, and respirations are 18/min. Examination shows no abnormalities. Laboratory studies show:

Hematocrit	20%
Mean corpuscular volume	110 μm^3
Leukocyte count	2300/mm^3
Reticulocyte count	1.8%

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

- A) Adverse drug reaction
- B) Atrophy of gastric mucosa
- C) Bacterial overgrowth in the small intestine
- D) Increased demand for folic acid
- E) Increased demand for vitamin B_{12} (cyanocobalamin)
- F) Malabsorption
- G) Vitamin B_1 (thiamine) deficiency

15. A 16-year-old boy with neurofibromatosis is brought for a follow-up examination. His uncle also has neurofibromatosis. He has a 1-year history of headaches during which his parents say he appears pale. Six months ago, he underwent operative treatment for an optic nerve glioma. His blood pressure is 164/105 mm Hg, pulse is 102/min, and respirations are 14/min. The thyroid glands are not enlarged. No murmurs are heard, and radial pulses are equal. Abdominal examination shows no abnormalities. Which of the following is the most likely cause of this patient's high blood pressure?

- A) Catecholamine-producing tumor
- B) Carcinoma of the thyroid gland
- C) Essential hypertension
- D) Overproduction of aldosterone from an adrenal adenoma
- E) Postsubclavian coarctation of the aorta

16. A 67-year-old woman is brought to the emergency department because of severe chest pain 4 hours after undergoing outpatient endoscopy and dilatation of an esophageal stricture caused by reflux. At discharge, she reported no chest pain. Three hours later, she vomited a small amount of blood and had severe pain. She is pale. Her temperature is 38°C (100.4°F), blood pressure is 140/85 mm Hg, pulse is 125/min, and respirations are 22/min. Examination shows crepitus in the neck and moderate epigastric tenderness. The lungs are clear to auscultation, and breath sounds are equal bilaterally. Rectal examination shows no masses; test of the stool for occult blood is positive. Which of the following is the most likely cause of these symptoms?

- A) Bleeding from erosive esophagitis
- B) Esophageal perforation
- C) Mallory-Weiss syndrome
- D) Myocardial infarction
- E) Perforated gastric ulcer

17. Over the past 3 months, a 30-year-old woman has had intermittent episodes of headache, palpitations, sweating, and irritability. Her blood pressure is 150/100 mm Hg while supine and 149/100 mm Hg while standing, and pulse is 90/min while supine and 110/min while standing. Examination shows no abnormalities except for pallor. Which of the following is the most likely location of this patient's lesion?

- A) Adrenal gland
- B) Brain
- C) Heart
- D) Kidney
- E) Thyroid gland

18. A 42-year-old man comes to the physician because of a 3-month history of progressive shortness of breath with exertion that began after he had an upper respiratory tract infection. He says he has had progressive respiratory difficulty during the past 5 years. He has no other history of serious illness and takes no medications. His father and paternal grandfather had "lung and liver problems." The patient has smoked one pack of cigarettes daily for 25 years. He drinks one beer daily. He works as an automobile mechanic. Respirations are 16/min. Pulse oximetry on room air shows an oxygen saturation of 90%. On pulmonary examination, expiratory wheezes are heard bilaterally. The remainder of the examination shows no abnormalities. Serum studies show an alkaline phosphatase activity of 100 U/L, AST activity of 60 U/L, and ALT activity of 76 U/L. Which of the following is the most likely diagnosis?

- A) Asbestosis
- B) Asthma
- C) Emphysema
- D) Hypersensitivity pneumonitis
- E) Lung cancer

LABORATORY VALUES

*Included in the Biochemical Profile (SMA-12)

BLOOD, PLASMA, SERUM	REFERENCE RANGE	SI REFERENCE INTERVALS
*Alanine aminotransferase (ALT, GPT at 30 C)	8-20 U/L	8-20 U/L
Amylase, serum	25-125 U/L	25-125 U/L
*Aspartate aminotransferase (AST, GOT at 30 C)	8-20 U/L	8-20 U/L
Bilirubin, serum (adult) Total // Direct	0.1-1.0 mg/dL // 0.0-0.3 mg/dL	2-17 µmol/L // 0-5 µmol/L
*Calcium, serum (Ca^{2+})	8.4-10.2 mg/dL	2.1-2.8 mmol/L
*Cholesterol, serum	Rec:<200 mg/dL	≤5.2 mmol/L
Cortisol, serum	0800 h: 5-23 µg/dL 1600 h: 3-15 µg/dL 2000 h: ≤ 50% of 0800 h	138-635 nmol/ L 82-413 nmol/L Fraction of 0800 h: ≤ 0.50
Creatine kinase, serum	Male: 25-90 U/L Female: 10-70 U/L	25-90 U/L 10-70 U/L
*Creatinine, serum	0.6-1.2 mg/dL	53-106 µmol/L
Electrolytes, serum		
Sodium (Na^+)	136-145 mEq/L	136-145 mmol/L
Chloride (Cl^-)	95-105 mEq/L	95-105 mmol/L
*Potassium (K^+)	3.5-5.0 mEq/L	3.5-5.0 mmol/L
Bicarbonate (HCO_3^-)	22-28 mEq/L	22-28 mmol/L
Magnesium (Mg^{2+})	1.5-2.0 mEq/L	1.5-2.0 mmol/L
Estriol, total, serum (in pregnancy)		
24-28 wks // 32-36 wks	30-170 ng/mL // 60-280 ng/mL	104-590 // 208-970 nmol/L
28-32 wks // 36-40 wks	40-220 ng/mL // 80-350 ng/mL	140-760 // 280-1210 nmol/L
Ferritin, serum	Male: 15-200 ng/mL Female: 12-150 ng/mL	15-200 µg/L 12-150 µg/L
Follicle-stimulating hormone, serum/plasma	Male: 4-25 mIU/mL Female: premenopause 4-30 mIU/mL midcycle peak 10-90 mIU/mL postmenopause 40-250 mIU/mL	4-25 U/L 4-30 U/L 10-90 U/L 40-250 U/L
Gases, arterial blood (room air)		
pH	7.35-7.45	[H^+] 36-44 nmol/L
PCO_2	33-46 mm Hg	4.4-6.9 kPa
PO_2	75-105 mm Hg	10.0-14.0 kPa
*Glucose, serum	Fasting: 70-110 mg/dL 2-h postprandial: ≤ 120 mg/dL	3.8-6.1 mmol/L ≤ 6.6 mmol/L
Growth hormone - arginine stimulation	Fasting: ≤ 5 ng/mL provocative stimuli: ≥ 7 ng/mL	≤ 5 µg/L ≥ 7 µg/L
Immunoglobulins, serum		

	provocative stimuli: ≥ 7 ng/mL	≥ 7 µg/L
Immunoglobulins, serum		
IgA	76-390 mg/dL	0.76-3.90 g/L
IgE	0-380 IU/mL	0-380 kIU/L
IgG	650-1500 mg/dL	6.5-15 g/L
IgM	40-345 mg/dL	0.4-3.45 g/L
Iron	50-170 µg/dL	9-30 µmol/L
Lactate dehydrogenase, serum	45-90 U/L	45-90 U/L
Luteinizing hormone, serum/plasma	Male: 6-23 mIU/mL Female: follicular phase 5-30 mIU/mL midcycle 75-150 mIU/mL postmenopause 30-200 mIU/mL	6-23 U/L 5-30 U/L 75-150 U/L 30-200 U/L
Osmolality, serum	275-295 mOsmol/kg	275-295 mOsmol/kg
Parathyroid hormone, serum, N-terminal	230-630 pg/mL	230-630 ng/L
*Phosphatase (alkaline), serum (p-NPP at 30 C)	20-70 U/L	20-70 U/L
*Phosphorus (inorganic), serum	3.0-4.5 mg/dL	1.0-1.5 mmol/L
Prolactin, serum (hPRL)	< 20 ng/mL	< 20 µg/L
*Proteins, serum		
Total (recumbent)	6.0-7.8 g/dL	60-78 g/L
Albumin	3.5-5.5 g/dL	35-55 g/L
Globulin	2.3-3.5 g/dL	23-35 g/L
Thyroid-stimulating hormone, serum or plasma	0.5-5.0 µU/mL	0.5-5.0 mU/L
Thyroidal iodine (^{123}I) uptake	8-30% of administered dose/24 h	0.08-0.30/24 h
Thyroxine (T_4), serum	5-12 µg/dL	64-155 nmol/L
Triglycerides, serum	35-160 mg/dL	0.4-1.81 mmol/L
Triiodothyronine (T_3), serum (RIA)	115-190 ng/dL	1.8-2.9 nmol/L
Triiodothyronine (T_3) resin uptake	25-35%	0.25-0.35
*Urea nitrogen, serum (BUN)	7-18 mg/dL	1.2-3.0 mmol urea/L
*Uric acid, serum	3.0-8.2 mg/dL	0.18-0.48 mmol/L
BODY MASS INDEX (BMI)	**REFERENCE RANGE**	**SI REFERENCE INTERVALS**
Body mass index	Adult: 19-25 kg/m^2	
CEREBROSPINAL FLUID	**REFERENCE RANGE**	**SI REFERENCE INTERVALS**
Cell count	0-5 cells/mm^3	0-5 x 10^6/L
Chloride	118-132 mEq/L	118-132 mmol/L
Gamma globulin	3-12% total proteins	0.03-0.12
Glucose	40-70 mg/dL	2.2-3.9 mmol/L
Pressure	70-180 mm H_2O	70-180 mm H_2O
Proteins, total	≤40 mg/dL	≤0.40 g/L
HEMATOLOGIC	**REFERENCE RANGE**	**SI REFERENCE INTERVALS**
Bleeding time (template)	2-7 minutes	2-7 minutes
Erythrocyte count	Male: 4.3-5.9 million/mm^3 Female: 3.5-5.5 million/mm^3	4.3-5.9 x 10^{12}/L 3.5-5.5 x 10^{12}/L

Leukocyte count	4500-11,000/mm^3	4.5-11.0 x 10^9/L
Segmented neutrophils	54-62%	0.54-0.62
Bands	3-5%	0.03-0.05
Eosinophils	1-3%	0.01-0.03
Basophils	0-0.75%	0-0.0075
Lymphocytes	25-33%	0.25-0.33
Monocytes	3-7%	0.03-0.07
Mean corpuscular hemoglobin	25.4-34.6 pg/cell	0.39-0.54 fmol/cell
Mean corpuscular hemoglobin concentration	31-36 % Hb/cell	4.81-5.58 mmol Hb/L
Mean corpuscular volume	80-100 µm^3	80-100 fl
Partial thromboplastin time (activated)	25-40 seconds	25-40 seconds
Platelet count	150,000-400,000/mm^3	150-400 x 10^9/L
Prothrombin time	11-15 seconds	11-15 seconds
Reticulocyte count	0.5-1.5% of red cells	0.005-0.015
Thrombin time	<2 seconds deviation from control	<2 seconds deviation from control
Volume		
Plasma	Male: 25-43 mL/kg Female: 28-45 mL/kg	0.025-0.043 L/kg 0.028-0.045 L/kg
Red cell	Male: 20-36 mL/kg Female: 19-31 mL/kg	0.020-0.036 L/kg 0.019-0.031 L/kg
SWEAT	**REFERENCE RANGE**	**SI REFERENCE INTERVALS**
Chloride	0-35 mmol/L	0-35 mmol/L
URINE	**REFERENCE RANGE**	**SI REFERENCE INTERVALS**
Calcium	100-300 mg/24 h	2.5-7.5 mmol/24 h
Chloride	Varies with intake	Varies with intake
Creatinine clearance	Male: 97-137 mL/min Female: 88-128 mL/min	
Estriol, total (in pregnancy)		
30 wks	6-18 mg/24 h	21-62 µmol/24 h
35 wks	9-28 mg/24 h	31-97 µmol/24 h
40 wks	13-42 mg/24 h	45-146 µmol/24 h
17-Hydroxycorticosteroids	Male: 3.0-10.0 mg/24 h Female: 2.0-8.0 mg/24 h	8.2-27.6 µmol/24 h 5.5-22.0 µmol/24 h
17-Ketosteroids, total	Male: 8-20 mg/24 h Female: 6-15 mg/24 h	28-70 µmol/24 h 21-52 µmol/24 h
Osmolality	50-1400 mOsmol/kg	
Oxalate	8-40 µg/mL	90-445 µmol/L
Potassium	Varies with diet	Varies with diet
Proteins, total	<150 mg/24 h	<0.15 g/24 h
Sodium	Varies with diet	Varies with diet
Uric acid	Varies with diet	Varies with diet

19. A 70-year-old man comes to the physician because of urinary hesitancy and frequency for 9 months. His temperature is 37.5°C (99.5°F). Examination shows a circumcised penis with no urethral discharge. Testicular examination shows no abnormalities. Rectal examination shows an enlarged rubbery prostate that is nontender to palpation. Urinalysis shows many leukocytes and no erythrocytes. Gram stain of urine shows gram-negative rods. Which of the following is the most likely cause of this patient's condition?

- A) Infection of the epididymis
- B) Infection of the prostate
- C) Infection of the urethra
- D) Neurogenic bladder
- E) Outflow obstruction of the bladder

20. A 32-year-old man comes to the physician because of intermittent diarrhea for 6 months. He has had a 5.4-kg (12-lb) weight loss during this period. Vital signs are within normal limits. Examination shows no abnormalities. Serum studies show a calcium concentration of 7.8 mg/dL and a phosphorus concentration of 2.2 mg/dL. Examination of a stool specimen shows fat globules. Which of the following is the most likely explanation for this patient's hypocalcemia?

- A) Parathyroid hormone deficiency
- B) Vitamin A excess
- C) Vitamin B_1 (thiamine) deficiency
- D) Vitamin B_{12} (cobalamin) deficiency
- E) Vitamin D deficiency
- F) Vitamin E deficiency
- G) Vitamin K deficiency

21. A healthy 24-year-old woman comes for a routine health maintenance examination. Menses occur at regular 28-day intervals and last 5 to 6 days. Her last menstrual period was 3 weeks ago. She takes no medications. Bimanual examination shows a 5-cm, mildly tender left adnexa. A pregnancy test is negative. Which of the following is the most appropriate next step in management?

- A) Repeat examination in 2 weeks
- B) Measurement of serum CA 125 concentration
- C) Measurement of serum α-fetoprotein concentration
- D) CT scan of the pelvis
- E) Diagnostic laparoscopy

22. A 72-year-old man comes to the physician because of a 2-month history of urination twice nightly and occasional urinary frequency and urgency. He has a 15-year history of type 2 diabetes mellitus now moderately well controlled with glyburide. His father was diagnosed with prostate cancer at the age of 70 years, and his sister died of complications from systemic lupus erythematosus. His blood pressure is 135/86 mm Hg. Cardiopulmonary examination shows no abnormalities. Abdominal examination shows no suprapubic fullness or tenderness. There is mild enlargement of the prostate with no palpable nodules. His postvoid residual volume is 10 mL. Serum studies show a urea nitrogen concentration of 45 mg/dL and creatinine concentration of 3.8 mg/dL. Urine dipstick shows 3+ protein. Which of the following is most likely to have prevented progression of this patient's renal disease?

- A) Intermittent Foley catheterization
- B) Intravenous mannitol therapy
- C) Oral cyclophosphamide and prednisone therapy
- D) Oral enalapril therapy
- E) Oral finasteride therapy
- F) Oral prednisone therapy only
- G) Oral terazosin therapy

23. A 22-year-old primigravid woman at 16 weeks' gestation is brought to the emergency department because of progressive shortness of breath over the past 48 hours. Her temperature is 37°C (98.6°F), blood pressure is 120/70 mm Hg, pulse is 100/min, and respirations are 24/min. Scattered wheezes are heard. Pelvic examination shows a uterus that extends to the umbilicus. Fetal heart tones are absent. Her hematocrit is 32%, leukocyte count is 11,000/mm^3, and serum β-hCG concentration is 300,000 mIU/mL. Pulse oximetry on room air shows an oxygen saturation of 92%. An x-ray of the chest shows multiple round densities throughout all lung fields. Which of the following is the most likely diagnosis?

- A) Bacterial pneumonia
- B) Choriocarcinoma
- C) Pulmonary embolism
- D) Tuberculosis
- E) Viral pneumonia

24. A healthy 23-year-old woman, gravida 1, para 1, comes to the physician requesting postcoital contraceptive advice. One day ago, her partner's condom broke during sexual intercourse. Her last menstrual period was 2 weeks ago. She takes no medications. Physical examination shows no abnormalities. A urine pregnancy test is negative. Which of the following is the most appropriate recommendation for this patient?

- A) Intravaginal spermicide now
- B) Oral gonadotropin-releasing hormone agonist now and again in 12 hours
- C) Oral levonorgestrel now and again in 12 hours
- D) Oral prostaglandin $F_{2\alpha}$ now and again in 12 hours
- E) Dilatation and curettage immediately

25. A 67-year-old woman comes for a routine health maintenance examination. She drinks 1 ounce of alcohol daily. Her blood pressure is 138/62 mm Hg, pulse is 76/min and regular, and respirations are 14/min. The lungs are clear to auscultation. The remainder of the examination shows no abnormalities. Laboratory studies show:

Hemoglobin	12.8 g/dL
Serum	
Ca^{2+}	11.9 mg/dL
Creatinine	0.8 mg/dL
Phosphorus	2.8 mg/dL
Total protein	6.5 g/dL
Albumin	4.2 g/dL
Ionized calcium	5.8 mg/dL (N=4.5–5.1)

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

- A) Measurement of serum alkaline phosphatase activity
- B) Measurement of serum parathyroid hormone concentration
- C) Measurement of serum vitamin D concentration
- D) Serum and urine protein electrophoresis
- E) X-ray of the chest
- F) Skeletal survey
- G) Bone scan

26. A 67-year-old man is brought to the emergency department because of a 3-day history of fever and headache. Five years ago, he underwent placement of a mechanical aortic valve for treatment of sequelae of rheumatic fever. He appears ill. His temperature is 40°C (104°F), blood pressure is 110/65 mm Hg, pulse is 110/min, and respirations are 22/min. A grade 3/6, systolic ejection murmur is heard. Neurologic examination shows mild left hemiparesis. Babinski's sign is present on the left. There is no nuchal rigidity. This patient is at greatest risk for which of the following complications?

- A) Brain abscess
- B) Carotid artery occlusion
- C) Encephalitis
- D) Hydrocephalus
- E) Venous sinus thrombosis

The response options for the next **2** items are the same. Select one answer for each item in the set.

For each patient with loss of consciousness, select the most likely diagnosis.

- A) Aortic stenosis
- B) Carotid sinus hypersensitivity
- C) Conversion reaction
- D) Hypertrophic obstructive cardiomyopathy
- E) Hypoglycemia
- F) Mitral valve prolapse
- G) Orthostatic hypotension
- H) Pulmonary embolus
- I) Seizure
- J) Vasovagal syncope
- K) Vertebrobasilar insufficiency

27. A 15-year-old boy is brought to the emergency department 30 minutes after a 2-minute episode of loss of consciousness after completing a 400-meter race. On awakening, he says that he feels fine except for shortness of breath. He weighs 82 kg (180 lb) and is 191 cm (75 in) tall. His blood pressure is 110/70 mm Hg, pulse is 70/min and regular, and respirations are 15/min. The lungs are clear to auscultation. A grade 2/6 systolic murmur is heard at the left sternal border with minimal radiation to the neck; the murmur becomes louder when he stands.

For each patient with loss of consciousness, select the most likely diagnosis.

- A) Aortic stenosis
- B) Carotid sinus hypersensitivity
- C) Conversion reaction
- D) Hypertrophic obstructive cardiomyopathy
- E) Hypoglycemia
- F) Mitral valve prolapse
- G) Orthostatic hypotension
- H) Pulmonary embolus
- I) Seizure
- J) Vasovagal syncope
- K) Vertebrobasilar insufficiency

28. A 62-year-old woman is brought to the emergency department 1 hour after a 1-minute episode of loss of consciousness; her symptoms began when she stood up after she passed a dark, watery stool. She has had diarrhea and dark stools for 2 days. She has been receiving warfarin therapy for deep venous thrombosis for 2 weeks. On arrival, her blood pressure is 82/60 mm Hg, and pulse is 150/min and regular. She is unable to stand. The lungs are clear to auscultation. A grade 2/6 systolic murmur is heard at the second right intercostal space with no radiation. Examination shows a soft, nontender abdomen. There is 1+ edema of the right lower extremity with no tenderness. Test of the stool for occult blood is positive.

29. A 47-year-old woman comes to the physician for a follow-up examination. She has a 15-year history of poorly controlled type 2 diabetes mellitus. She currently requires 100 U of insulin daily. She has had no medical complications of her diabetes. She has significant limitations in activities of daily living as a result of obesity. Multiple attempts at weight loss have been unsuccessful. She is compliant with her diet, insulin regimen, and daily monitoring of blood glucose concentrations. She is 163 cm (5 ft 4 in) tall and weighs 198 kg (437 lb); BMI is 75 kg/m^2. Her blood pressure is 150/95 mm Hg. The remainder of the examination shows no abnormalities. Her serum creatinine concentration is 0.8 mg/dL. Which of the following is the most appropriate next step in long-term management?

- A) Liquid protein diet
- B) Measurement of blood glucose concentrations every 4 hours
- C) Implanted insulin pump
- D) Insulin infusion pump
- E) Gastric bypass
- F) Pancreas transplant

30. An 18-year-old man comes to the physician 1 week after he had a blood pressure of 140/110 mm Hg during a routine precollege examination. His temperature is 37.1°C (98.7°F), blood pressure is 140/100 mm Hg, pulse is 92/min, and respirations are 12/min. The upper extremities appear to be more muscular than the lower extremities. Radial pulses are normal; femoral, posterior tibial, and dorsalis pedis pulses are decreased. A grade 2/6 systolic murmur is heard over the precordium, anterior chest, and back. An ECG shows left ventricular hypertrophy. Which of the following is the most appropriate next step in management?

- A) Limiting physical activity
- B) Repeat blood pressure measurement in 1 month
- C) Initiate a low-sodium diet and exercise program
- D) Pharmacologic management
- E) Operative treatment

31. A previously healthy 3-month-old girl is brought to the emergency department because of a 3-day history of grunting and increasing difficulty breathing. She appears ill. Her temperature is 36.7°C (98°F), pulse is 160/min, and respirations are 76/min. Examination shows grunting, nasal flaring, and marked intercostal retractions. Bronchial breath sounds and occasional bilateral crackles are heard on auscultation. Serum studies show:

Ca^{2+}	5.6 mg/dL
Phosphorus	11 mg/dL
Alkaline phosphatase	250 U/L

Capillary blood gas analysis on 100% oxygen:

pH	7.36
Pco_2	38 mm Hg
Po_2	46 mm Hg

An x-ray of the chest shows bilateral, diffuse interstitial infiltrates and absence of the thymic shadow. Bronchoalveolar lavage is positive for numerous *Pneumocystis jiroveci* (formerly *P. carinii*). Which of the following is the most likely mechanism of these findings?

- A) Adenosine deaminase deficiency
- B) Consumption of complement
- C) Defective opsonization
- D) Destruction of CD4+ T lymphocytes
- E) Developmental arrest of maturation of B lymphocytes
- F) Dysmorphogenesis of the third and fourth pharyngeal pouches
- G) Impaired chemotaxis
- H) Impaired phagocytic oxidative metabolism

32. A 28-month-old boy has a history of cyanosis since birth with episodes of syncope. Examination shows cyanosis and clubbing. The lungs are clear to auscultation. There is a right ventricular heave, a systolic click, a single S_2, and a grade 3/6 systolic murmur. Which of the following is the most likely diagnosis?

- A) Bicuspid aortic valve
- B) Coarctation of the aorta
- C) Mitral stenosis
- D) Patent ductus arteriosus
- E) Tetralogy of Fallot

33. A 13-year-old boy is brought to the physician by his mother for an examination prior to participation in sports. He has no history of serious illness and takes no medications. His maternal and paternal grandfathers have hypertension and type 2 diabetes mellitus. The patient is at the 95th percentile for height and above the 95th percentile for weight and BMI. His temperature is 36.7°C (98.1°F), pulse is 84/min, respirations are 16/min, and blood pressure is 130/83 mm Hg (95th percentile). Examination shows no abnormalities. In addition to recommending participation in sports, which of the following is the most appropriate pharmacotherapy?

- A) ACE inhibitor
- B) β-Adrenergic blocker
- C) Calcium channel blocker
- D) Thiazide diuretic
- E) No pharmacotherapy is indicated

34. A 72-year-old man comes to the physician with his wife because of chronic abdominal pain and headaches for 4 months. His wife states that he has become more forgetful over the past 6 months. He has a history of gout. He has smoked one pack of cigarettes daily for 50 years and drinks 10 oz of homemade whiskey daily. He takes no medications. His temperature is 36.8°C (98.3°F), blood pressure is 160/98 mm Hg, pulse is 74/min, and respirations are 16/min. Neurologic examination shows mild short-term memory loss and decreased sensation to pinprick in the distal extremities. He has an ataxic gait. There are gouty tophi on the dorsal aspect of the left elbow. Laboratory studies show:

Hematocrit	33%
Mean corpuscular volume	70 μm^3
Serum	
Urea nitrogen	17 mg/dL
Glucose	90 mg/dL
Creatinine	2 mg/dL
Uric acid	14 mg/dL

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

- A) Measurement of blood lead concentration
- B) Measurement of serum porphobilinogen concentration
- C) CT scan of the abdomen
- D) MRI of the brain
- E) Carbidopa-levodopa therapy

35. A 4-week-old newborn is brought to the physician because of increasing difficulty feeding, poor weight gain, and excessive perspiration since birth. She was born at term after an uncomplicated pregnancy and delivery and weighed 3500 g (7 lb 11 oz); initial examination showed no abnormalities. Family history is noncontributory. She currently weighs 3800 g (8 lb 6 oz). Her temperature is 37°C (98.6°F), pulse is 160/min, and respirations are 80/min and labored. A grade 2/6 holosystolic murmur is heard over the lower left sternal border. The lungs are clear to auscultation. A chest x-ray shows cardiomegaly with increased pulmonary vascular markings. An ECG shows right ventricular hypertrophy. Which of the following is the most likely explanation for the absence of the murmur on initial examination?

- A) High pulmonary vascular resistance
- B) High systemic vascular resistance
- C) Low pulmonary vascular resistance
- D) Low systemic vascular resistance
- E) Patent ductus arteriosus

The response options for the next **2** items are the same. Select one answer for each item in the set.

For each patient with back pain, select the most likely diagnosis.

- A) Herniated disc
- B) Lumbar spinal stenosis
- C) Metastatic cancer
- D) Muscle strain
- E) Osteoporotic compression fracture
- F) Sacroiliitis
- G) Spinal epidural abscess
- H) Spondylolisthesis

36. A 57-year-old woman is brought to the physician 2 days after the sudden onset of severe low back pain; the pain does not radiate to the lower extremities. The pain began when she was lifting her grandson. She does not have weakness or sensory loss in the legs and has had no urinary incontinence. She has a 10-year history of rheumatoid arthritis treated with prednisone. Her temperature is 37°C (98.6°F), blood pressure is 130/60 mm Hg, and pulse is 64/min. Examination shows deformities of the interphalangeal joints of the hands and exquisite tenderness to percussion over the lumbar spine. Bilateral straight-leg raising to 80 degrees does not increase the pain. Muscle strength and sensation are intact in the lower extremities. Deep tendon reflexes are 2+ bilaterally. Babinski's sign is absent bilaterally.

For each patient with back pain, select the most likely diagnosis.

- A) Herniated disc
- B) Lumbar spinal stenosis
- C) Metastatic cancer
- D) Muscle strain
- E) Osteoporotic compression fracture
- F) Sacroiliitis
- G) Spinal epidural abscess
- H) Spondylolisthesis

37. A previously healthy 32-year-old plumber comes to the physician because of a 3-week history of constant, dull, low back pain that does not radiate to the extremities. The pain began after he unloaded heavy equipment from his van. It increases with activity and is temporarily relieved by bed rest and ibuprofen. Examination shows tenderness to palpation over the lumbar paraspinal region bilaterally. The pain increases with forward or lateral movements of the spine. Muscle strength and sensation are intact in the lower extremities. Bilateral straight-leg raising to 80 degrees does not increase the pain. Deep tendon reflexes are 2+ bilaterally. Babinski's sign is absent bilaterally.

38. A 57-year-old man is brought to the physician by his wife because his skin has appeared yellow for 3 weeks. Examination shows jaundice and scleral icterus. His total serum bilirubin concentration is 8 mg/dL with a direct component of 6.2 mg/dL. A CT scan of the abdomen shows a large lesion in the head of the pancreas. When the results are initially discussed, the patient says that he does not want to hear the report, and his wife agrees to abide by his wishes. Which of the following is the most appropriate course of action?

- A) Withhold the results as the patient wishes
- B) Contact the patient's children to discuss the results
- C) Consult with the hospital ethics committee
- D) Insist on telling the patient the results
- E) Refer him to another physician

39. An 80-year-old woman has had bleeding gums for 3 weeks. Her diet has consisted of only tea and toast for 2 years. She appears thin and weak. Vital signs are normal. Her gums are hypertrophied and exude blood with pressure. There are ecchymoses of the inner thighs and small hemorrhages around the hair follicles. The remainder of the examination shows normal findings. Supplementation with which of the following vitamins is most likely to have prevented this condition?

- A) A
- B) B_{12} (cyanocobalamin)
- C) C
- D) D
- E) E

40. Four days after undergoing resection of an obstructing sigmoid colon cancer and colostomy, a 47-year-old man has a temperature of 39.3°C (102.8°F). During the procedure, a central venous catheter was inserted into the left subclavian vein. His pulse is 94/min, respirations are 20/min, and blood pressure is 128/70 mm Hg. The abdomen is soft and nontender. Examination of the colostomy shows no abnormalities. Blood cultures grow *Staphylococcus aureus*. Which of the following is the most likely source of the bacteria?

- A) Central venous catheter
- B) Intra-abdominal abscess
- C) Lungs
- D) Operative wound
- E) Urinary tract

41. One month after undergoing an uneventful renal transplant for chronic renal failure secondary to glomerulonephritis, a 38-year-old woman is hospitalized because of increased serum urea nitrogen and creatinine concentrations. Prior to transplantation, she had been receiving hemodialysis for 3 years. Current medications include cyclosporine and prednisone. Examination shows no abnormalities. Over the past 48 hours, urine output has remained stable. Both renal biopsy and a radionuclide scan confirm the diagnosis of acute rejection. Which of the following is the most effective treatment?

- A) Immediate discontinuation of cyclosporine
- B) Increased dosage of corticosteroids
- C) Diuresis and alkalinization of the urine
- D) Renal dialysis for 1–2 weeks
- E) Transplant nephrectomy

42. A 5-year-old girl is brought to the physician because of temperatures to 40°C (104°F), tachypnea, and a nonproductive cough for 12 hours. Four days ago she was treated with an oral antibiotic for suspected pneumococcal pneumonia. Examination shows diminished breath sounds over the lower right lung fields and dullness to percussion at the right costophrenic angle. Which of the following is the most likely diagnosis?

- A) Bronchopleural fistula
- B) Empyema
- C) Lung abscess
- D) Pleurodynia
- E) Pneumothorax

43. A previously healthy 52-year-old woman comes to the physician because she has had a large pimple on her right hand for 2 weeks that has failed to heal. She resides in southeastern USA where she owns a nursery and garden shop. Examination shows a painless red papule on the hand with several nontender subcutaneous nodular lesions above it. Which of the following is the most likely diagnosis?

- A) Blastomycosis
- B) Candidiasis
- C) Coccidioidomycosis
- D) Histoplasmosis
- E) Sporotrichosis

44. A study is conducted to compare the effectiveness of lorazepam and midazolam in providing sedation for children who require mechanical ventilation. One hundred children from the ages of 2 to 12 years who require mechanical ventilation are randomly assigned to receive a continuous infusion of lorazepam or midazolam. Paralytic agents are administered to 26 of the 50 children in the lorazepam group and to 2 of the 50 children in the midazolam group to allow more synchronized mechanical ventilation. A sedation score of 1 to 5 is used to assess the amount of movement for each child over the course of 3 days (with 1 indicating no movement and 5 indicating thrashing movements). Results show a sedation score of 1 for 92% of the lorazepam group and 12% of the midazolam group. The authors conclude that lorazepam was significantly more effective than midazolam in providing complete sedation. Which of the following features of this study raises the most concern regarding the validity of this conclusion?

- A) Confounding variables
- B) Lack of a control group
- C) Sample size
- D) Statistical power
- E) Univariate scale

45. A 67-year-old woman has been intubated for 1 week after undergoing a left lobectomy for lung cancer. She has chronic obstructive pulmonary disease. Her preoperative functional vital capacity was 40% of predicted. She is awake and alert. Her blood pressure is 130/75 mm Hg, and pulse is 72/min. The ventilator settings are a synchronized intermittent mandatory ventilation of 8/min, Fio_2 of 40%, and positive-end expiratory pressure of 5 cm H_2O. Arterial blood gas analysis shows:

pH	7.42
Pco_2	47 mm Hg
Po_2	90 mm Hg
O_2 saturation	96%

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

- A) Antibiotic therapy
- B) Bronchodilator therapy
- C) Chest physiotherapy
- D) Decrease inotropes
- E) Diuretic therapy
- F) Fiberoptic bronchoscopy
- G) Heparin therapy
- H) Incentive spirometry
- I) Increase Fio_2
- J) Increase inotropes
- K) Increase respiratory rate
- L) Placement of thoracostomy tube
- M) Tracheostomy
- N) Wean from the ventilator

46. A 37-year-old primigravid woman at 9 weeks' gestation is admitted to the hospital because of progressive nausea and vomiting. Her symptoms began at 6 weeks' gestation but have worsened so that she can no longer keep food or fluids down. Her temperature is 36.9°C (98.4°F), pulse is 105/min, respirations are 16/min, and blood pressure is 110/60 mm Hg. Examination shows a uterus consistent in size with a 9-week gestation. Serum electrolyte concentrations are within the reference range. Urinalysis shows 3+ ketones. In addition to beginning intravenous hydration, which of the following is the most appropriate initial step in management?

- A) High-protein diet
- B) Total parenteral nutrition
- C) Antiemetic therapy
- D) Insertion of a nasogastric tube
- E) Therapeutic abortion