

Sample Nephrology Questions & Critiques

Serum	
Calcium	9.4 mg/dL
Creatinine	3.24 mg/dL
Potassium	3.8 mEq/L
Bicarbonate	19 mEq/L
Fasting glucose	63 mg/dL
Phosphate	4.2 mg/dL
Albumin	4.0 g/dL
Blood urea nitrogen	36 mg/dL
Hematocrit	33.1%
Hemoglobin	11.1 g/dL
Mean corpuscular volume	94 μm^3

Estimation of glomerular filtration rate, calculated using the Modification of Diet in Renal Disease (MDRD) Study equation, is 19 mL/min/1.73 m². Measurement of which of the following additional laboratory values is most appropriate to screen for renal osteodystrophy in this patient?

- (A) Erythrocyte sedimentation rate
- (B) Serum C-reactive protein level
- (C) Serum intact parathyroid hormone level
- (D) Serum thyroid-stimulating hormone level
- (E) Serum vitamin B₁₂ level

Content Area: Renal Pathophysiology (15%)

Critique

This question tests the examinee's ability to determine the cause of a condition, based on history and laboratory findings, as well as knowledge of guidelines and appropriate testing for mineral bone disease in patients with chronic kidney disease. The correct answer is Option (C), serum intact parathyroid hormone level. In the patient with stage 4 chronic kidney disease and corresponding abnormal laboratory values, the pathophysiologic response represents mineral bone disease and depletion of serum calcium. The National Kidney Foundation (NKF) Kidney Disease Outcomes Quality Initiative (KDOQI) recommends measurement of serum parathyroid hormone level and therapy for abnormal values to prevent and manage mineral bone disease. Option (A), erythrocyte sedimentation rate, and Option (B), serum C-reactive protein level, are

incorrect because these are markers of inflammation and are not useful in diagnosing mineral bone disease. Option (D), serum thyroid-stimulating hormone level, is incorrect because this test is used for diagnosing primary and secondary hyperthyroidism and hypothyroidism, not mineral bone disease. Option (E), serum vitamin B₁₂ level, is incorrect because this test would be appropriate if anemia secondary to vitamin B₁₂ deficiency were suspected.

Question 7

A 56-year-old woman comes to the emergency department because she has had increasing swelling of the right ankle over the past two days, since she sustained an injury while playing outdoors with her grandchildren. She says she has been taking over-the-counter ibuprofen 400 to 800 mg every four to six hours to relieve the pain. Medical history includes mild hypertension, which is currently controlled with lisinopril. Results of laboratory studies show elevated levels of serum creatinine and blood urea nitrogen. Acute renal failure induced by use of nonsteroidal anti-inflammatory drugs is suspected. If this suspected diagnosis is correct, which of the following additional abnormal laboratory results is most likely?

- (A) Decreased serum chloride level
- (B) Decreased serum potassium level
- (C) Decreased serum sodium level
- (D) Elevated serum potassium level
- (E) Elevated serum sodium level

Content Area: Acute Renal Failure/ICU Nephrology (3%)

Critique

This question tests the examinee's ability to recognize the adverse effects of medications and the associated laboratory findings. The correct answer is Option (D), elevated serum potassium level. The suspected diagnosis is acute renal failure induced by use of nonsteroidal anti-inflammatory drugs (NSAIDs), which are associated with nephrotoxicity. Because hyperkalemia is the most common manifestation of acute renal failure secondary to use of NSAIDs, the laboratory result that is most likely to be abnormal in the patient described is elevated serum potassium level.

Option (A), decreased serum chloride level, is incorrect because chloride ions are not lost excessively in acute renal failure induced by nonsteroidal anti-inflammatory drug (NSAID) therapy. Option (B), decreased serum potassium level, is incorrect because this finding represents hypokalemia, which is the opposite of what would be noted in a patient with acute renal failure secondary to use of NSAIDs. Option (C), decreased serum sodium level, is incorrect because the patient does not have signs of significant volume overload and because sodium abnormalities are not the most common manifestation of acute renal failure. Option (E), elevated serum sodium level, is incorrect because serum sodium level is rarely elevated above the normal range unless significant dehydration is present.

Question 8

A 67-year-old man with mild neurocognitive disorder (dementia), in whom peritoneal dialysis was recently initiated because of end-stage renal disease, is brought to the office by his wife because he has had abdominal pain for the past 48 hours. The patient's wife says he has been reusing one cap to close off his peritoneal dialysis catheter. On analysis, a sample of fluid from the catheter is cloudy and grows gram-positive cocci. Which of the following is the most appropriate next step?

- (A) Intraperitoneal administration of antibiotics
- (B) Intravenous administration of antibiotics
- (C) Retraining of the patient regarding catheter procedures
- (D) Retraining of the patient's wife regarding catheter procedures
- (E) Transfer of the patient to a hemodialysis clinic

Content Area: Chronic Dialysis (Hemo & PD) (CRRT) (19%)

Critique

This question tests the examinee's ability to identify behavior that places a patient at risk and to select the most appropriate intervention. The correct answer is Option (A), intraperitoneal administration of antibiotics. In a patient who is being treated with peritoneal dialysis, reusing one cap to close off the dialysis catheter increases the risk of infection. In the patient described, infection is confirmed by analysis of a sample of fluid from the catheter, which is cloudy and

positive for gram-positive cocci. Therefore, the patient's symptom of abdominal pain is a sign of peritonitis and initiation of antibiotic therapy is the most appropriate next step. The intraperitoneal route is most appropriate for delivery of this therapy because it goes straight to the source of the infection and does not have as much potential for systemic side effects and interactions.

Option (B), intravenous administration of antibiotics, is plausible but incorrect because the intraperitoneal route is preferred. Option (C), retraining of the patient regarding catheter procedures, and Option (D), retraining of the patient's wife regarding catheter procedures, are incorrect because although these are important interventions, antibiotic therapy must be initiated first. Peritonitis must be managed before the patient and/or his primary caregiver can be educated regarding methods of preventing recurrence of infection. Option (E), transfer of the patient to a hemodialysis clinic, is incorrect because there is no indication for a change to the present dialysis modality. The most appropriate next step is management of peritonitis with intraperitoneal antibiotics, which are administered during peritoneal dialysis exchanges and not during hemodialysis.

Question 9

A 60-year-old woman with end-stage renal disease secondary to diabetic nephropathy comes to the clinic for routine hemodialysis. The patient says she has cramping during hemodialysis as well as weakness after each treatment. Post-treatment, pulse rate is 95/min and blood pressure is 90/60 mmHg. On physical examination, auscultation of the chest shows normal breath sounds. Examination of the extremities shows no edema. Which of the following is the most appropriate next step?

- (A) Add sodium modeling
- (B) Continue monitoring blood pressure
- (C) Decrease the dialysate temperature
- (D) Decrease the dialysis time
- (E) Increase the dry weight

Content Area: Chronic Dialysis (Hemo & PD) (CRRT) (19%)

Critique

This question assesses the examinee's ability to identify common complications of hemodialysis and determine the appropriate next step in management. The correct answer is Option (E), increase the dry weight. Development of cramps during hemodialysis and hypotension after hemodialysis are characteristic of excessive volume removal during the treatment. Increasing the dry weight will prevent excess volume removal and alleviate the associated symptoms.

Option (A), add sodium modeling, is plausible but incorrect because this therapy is most useful when an increased amount of volume removal is required during a hemodialysis treatment, which is not consistent with the patient's clear lung sounds, hypotension, and lack of edema. Option (B), continue monitoring blood pressure, is incorrect because this monitoring does not address the patient's symptoms. Option (C), decrease the dialysate temperature, is incorrect because although this intervention might improve the ability to ultrafiltrate fluid in patients with hypotension who are being treated with hemodialysis, ultrafiltration is not required in the patient described because her lungs are clear and no edema is noted. Option (D), decrease the dialysis time, is incorrect because even if the dialysis time is decreased, the same amount of fluid will be removed and the patient will continue to have cramping and hypotension.

Question 10

A 38-year-old woman with end-stage renal disease secondary to hypertension comes to the clinic for routine hemodialysis treatment. Blood pressure prior to the treatment is 178/100 mmHg, and the patient has a headache. Blood pressure at the end of the treatment is 150/90 mmHg. Average pulse rate during hemodialysis treatment is 48/min. Decreasing the patient's target weight by 4.4 lb (2 kg) relieves the headache, but blood pressure remains increased and severe leg cramps develop. Which of the following is the most appropriate next step?

- (A) Continue decreasing the target weight
- (B) Initiate hydralazine therapy
- (C) Initiate metoprolol therapy
- (D) Initiate sodium modeling

(E) Initiate ultrafiltration profiling

Content Area: Chronic Dialysis (Hemo & PD) (CRRT) (19%)

Critique

This question assesses the examinee's ability to identify common complications of hemodialysis and determine the appropriate next step in management. The correct answer is Option (E), initiate ultrafiltration profiling. In patients with hypertension who are treated with hemodialysis, volume removal is required during the treatment. In the patient described, presence of leg cramps indicates that the hemodialysis treatment is not being tolerated. Addition of ultrafiltration profiling is most appropriate for this patient because it may allow for periods of equilibration of fluid in the vascular system and prevent cramping without worsening hypertension.

Option (A), continue decreasing the target weight, is incorrect because this intervention will cause more volume removal and will likely worsen the cramping. Option (B), initiate hydralazine therapy, is incorrect because this therapy will not relieve the cramping and is likely to cause headache. Option (C), initiate metoprolol therapy, is incorrect because this therapy worsens bradycardia and will not relieve the cramping. Option (D), initiate sodium modeling, is incorrect because this intervention is inappropriate in patients with hypertension. Sodium modeling helps decrease the incidence of postdialysis hypotension as well as leg cramps and fatigue during and after the treatment.

Question 11

A 62-year-old man comes to the office for routine follow-up. The patient has retired from civil service with full medical benefits. Medical history includes hypertension, hyperlipidemia, coronary artery disease, stage 3 chronic kidney disease, and type 2 diabetes mellitus. Current medications include carvedilol, amlodipine, furosemide, lisinopril, nitroglycerin transdermal patch, insulin, simvastatin, aspirin, and gabapentin. The patient appears well developed and well nourished, and he is not in acute distress. Weight is 178 lb, and body mass index is 27.9 kg/m². Pulse rate is 88/min, and blood pressure is 172/88 mmHg in the left arm and 170/78 mmHg in

the right arm. Which of the following findings in this patient is the most likely cause of continued uncontrolled hypertension?

- (A) Body mass index
- (B) History of hyperlipidemia
- (C) Noncompliance with the drug regimen
- (D) Patient age
- (E) Polypharmacy

Content Area: Hypertension (13%)

Critique

This question tests the examinee's ability to assess factors in the patient's presentation and history. The correct answer is Option (C), noncompliance with the drug regimen. In a patient with hypertension, hyperlipidemia, coronary artery disease, and type 2 diabetes mellitus, for which appropriate drug therapies have been prescribed, the most appropriate initial suspected cause of increased blood pressure (confirmed with bilateral measurements) is noncompliance with the drug regimen.

Option (A), body mass index, and Option (D), patient age, are incorrect because these factors are not extreme enough to cause increased blood pressure. Option (B), history of hyperlipidemia, is incorrect because hyperlipidemia does not cause uncontrolled hypertension. Option (E), polypharmacy, is incorrect because the combination of medications prescribed to this patient would not cause hypertension.

Question 12

A 32-year-old man is referred to the office by his primary care provider for initial consultation regarding stage 3 chronic kidney disease. The patient initially sought treatment at the primary care office because he had pain in his lower back. An incidental finding of increased blood pressure was noted at that time. Results of laboratory studies performed at the primary care office included glomerular filtration rate, calculated using the Modification of Diet in Renal Disease (MDRD) Study equation, of 59 mL/min/1.73 m². The patient currently is not taking any

antihypertensive medications. Before further evaluation regarding the cause of hypertension and decreased glomerular filtration rate, initiation of antihypertensive therapy is planned. Which of the following classes of medications is the most appropriate initial antihypertensive therapy for this patient?

- (A) Alpha₂-agonists
- (B) Angiotensin-converting enzyme inhibitors
- (C) Beta-blockers
- (D) Calcium channel blockers
- (E) Vasodilators

Content Area: Hypertension (13%)

Critique

This question tests the examinee's knowledge of pharmacotherapy and the ability to distinguish the mechanisms of action of various classes of drugs that are used to manage the same condition. The correct answer is Option (B), angiotensin-converting enzyme inhibitors. For a patient with stage 3 chronic kidney disease and decreased glomerular filtration rate in whom initiation of antihypertensive therapy is needed, angiotensin-converting enzyme inhibitors are the most appropriate medications because they are recognized for their effect on slowing the progression of chronic kidney disease.

Option (A), alpha₂-agonists, Option (C), beta-blockers, Option (D), calcium channel blockers, and Option (E), vasodilators, are all appropriate therapies for hypertension. However, none of these classes of medications have been shown to slow the progression of kidney disease, and in the case of the patient described, there is no compelling indication to choose another antihypertensive as first-line therapy. Alpha₂-agonists are useful in patients with urinary symptoms from benign prostatic hypertrophy, and patients with heart disease benefit from beta-blocker therapy. Calcium channel blockers are excellent first-line therapy for patients with angina or Raynaud disease, and vasodilators are a last-resort therapy for patients with hypertension that is resistant to multiple classes of medications.

Question 13

A 55-year-old man with stage 3 chronic kidney disease comes to the office for follow-up. Glomerular filtration rate, calculated using the Modification of Diet in Renal Disease (MDRD) Study equation, has been consistent at 39 mL/min/1.73 m², and serum creatinine level has been steady at 1.9 mg/dL. Medical history includes long-standing hypertension and type 2 diabetes mellitus. Current medications include metformin 500 mg twice daily, celecoxib 200 mg daily, nifedipine 30 mg daily, and quinapril 10 mg daily. The patient appears well developed and well nourished. Temperature is 36.4°C (97.5°F), pulse rate is 76/min, respirations are 18/min, and blood pressure is 130/78 mmHg. On physical examination, no abnormalities are noted. Ultrasonography of the kidneys shows bilateral renal cortical atrophy. Discontinuation of which of the following medications in this patient's regimen is most appropriate?

- (A) Metformin and celecoxib
- (B) Nifedipine and celecoxib
- (C) Nifedipine and metformin
- (D) Nifedipine and quinapril
- (E) Quinapril and metformin

Content Area: Clinical Pharmacology and Miscellaneous (10%)

Critique

This question assesses the examinee's knowledge of appropriate pharmacologic therapy for patients with stage 3 chronic kidney disease. The correct answer is Option (A), metformin and celecoxib. In patients with serum creatinine level greater than 1.5 mg/dL, metformin is contraindicated because of the risk of lactic acidosis. Celecoxib and nonsteroidal anti-inflammatory drugs are also to be avoided in patients with kidney disease because of nephrotoxicity.

Option (B), nifedipine and celecoxib, Option (C), nifedipine and metformin, and Option (D), nifedipine and quinapril, are incorrect because nifedipine is appropriate therapy for patients with stage 3 chronic kidney disease. Option (E), quinapril and metformin, is incorrect because

quinapril is appropriate antihypertensive therapy for patients with stage 3 chronic kidney disease.

Question 14

A 36-year-old man comes to the office for consultation regarding results of recent laboratory studies. Medical history includes stage 3 chronic kidney disease and hypertension, which is currently well controlled with lisinopril and furosemide. The patient has a 20-pack-year history of cigarette smoking. Results of laboratory studies of serum include the following:

Alanine aminotransferase	Aspartate aminotransferase	23 U/L
		24 U/L
Total cholesterol		236 mg/dL
Low-density lipoprotein cholesterol		128 mg/dL
High-density lipoprotein cholesterol		39 mg/dL
Triglycerides		110 mg/dL

Initiation of therapy with which of the following agents is most appropriate for management of hyperlipidemia in this patient?

- (A) Ezetimibe
- (B) Fenofibrate
- (C) Fish oil
- (D) Niacin
- (E) Simvastatin

Content Area: Clinical Pharmacology and Miscellaneous (10%)

Critique

This question assesses the examinee's knowledge of recommended guidelines for management for patients with stage 3 chronic kidney disease and comorbid hyperlipidemia. The correct answer is Option (E), simvastatin. Statin therapy to decrease the serum low-density lipoprotein cholesterol level to the goal of less than 100 mg/dL has been shown to delay the progression of chronic kidney disease.

Option (A), ezetimibe, is incorrect because this medication has not been proven to delay the progression of chronic kidney disease in patients with hyperlipidemia. Option (B), fenofibrate, Option (C), fish oil, and Option (D), niacin, are incorrect because these medications are not first-line therapies for hyperlipidemia and have not been shown to delay the progression of chronic kidney disease.

Question 15

A 43-year-old man who has had recurrent sinusitis during the past year comes to the emergency department because he has had shortness of breath and cough productive of green sputum for the past two weeks. Physical examination shows tenderness over the maxillary region. On auscultation of the chest, crackles are noted bilaterally in the lung bases. Trace edema of the extremities is noted. Chest x-ray study shows bilateral pleural effusions with apical opacities. Laboratory studies show serum creatinine level of 3.0 mg/dL and blood urea nitrogen level of 60 mg/dL. Result of antiglomerular basement membrane antibody test is negative and result of antineutrophil cytoplasmic antibody test is positive. Urinalysis shows pH of 5.5, specific gravity of 1.020, 2+ protein, and 2+ blood. Red blood cells are visible in the urine sediment. Which of the following is the most likely diagnosis?

- (A) Allergic interstitial nephritis
- (B) Goodpasture syndrome
- (C) IgA nephropathy
- (D) Poststreptococcal glomerulonephritis
- (E) Wegener granulomatosis

Content Area: Secondary Glomerular/Vascular Disorders (7%)

Critique

This question tests the examinee's knowledge of disease processes and the ability to determine the most likely diagnosis. The correct answer is Option (E), Wegener granulomatosis. The patient has elevated serum creatinine level, sinusitis, hematuria, pleural effusions, and positive result of antineutrophil cytoplasmic antibody test, all of which are characteristic of Wegener granulomatosis.

Sample Nephrology Questions & Critiques

Option (A), allergic interstitial nephritis, is incorrect because no eosinophils are noted on urinalysis and there is no history of recent drug therapy or an event that would have precipitated allergic interstitial nephritis. Option (B), Goodpasture syndrome, is incorrect because the history of sinusitis, positive result of antineutrophil cytoplasmic antibody test, and negative result of antiglomerular basement membrane test is not consistent with Goodpasture syndrome. Option (C), IgA nephropathy, is incorrect because this condition has an insidious onset with hematuria and is not associated with a positive result of antineutrophil cytoplasmic antibody test. Option (D), poststreptococcal glomerulonephritis, is incorrect because the patient has no documented recent history of streptococcal infection and because result of antineutrophil cytoplasmic antibody test is not usually positive in patients with poststreptococcal glomerulonephritis.