2019 Updates in Therapeutics®: Pharmacotherapy Pharmacy Preparatory Review and Recertification Course Learning Objectives

Module I
Biostatistics: A Refresher, Study Designs: Fundamentals, Interpretation, and Research Topics, Geriatrics, and Nephrology

1. Describe differences between descriptive and inferential statistics.
2. Identify different types of data (nominal, ordinal, continuous [ratio and interval]) to determine an appropriate type of statistical test (parametric vs. nonparametric).
3. Describe strengths and limitations of different types of measures of central tendency (mean, median, and mode) and data spread (standard deviation, standard error of the mean, range, and interquartile range).
4. Describe the concepts of normal distribution and the associated parameters that describe the distribution.
5. State the types of decision errors that can occur when using statistical tests and the conditions under which they can occur.
6. Describe hypothesis testing, and state the meaning of and distinguish between p-values and confidence intervals.
7. Describe areas of misuse or misrepresentation that are associated with various statistical methods.
8. Select appropriate statistical tests on the basis of the sample distribution, data type, and study design.
9. Interpret statistical significance for results from commonly used statistical tests.
10. Describe the similarities and differences between statistical tests, and state how to apply them appropriately.
11. Identify the use of survival analysis and different ways to perform and report it.
12. Define, compare, and contrast the concepts of internal and external validity, bias, and confounding in clinical study design.
13. Identify potential sources of bias in clinical trials; select strategies to eliminate or control for bias.
14. Outline the hierarchy of evidence generated by various study designs.
15. Compare and contrast the advantages and disadvantages of various study designs (e.g., prospective; retrospective; case-control; cohort; cross-sectional; randomized controlled clinical trials; systematic review; meta-analysis). Delineate the difference between parallel and crossover study designs.
16. Select from various biostatistical measures to appropriately compare groups or their assessments from various study designs and use their findings/ output to interpret results.
17. Define and evaluate odds, odds ratio, risk/incidence rate, risk ratio/relative risks (RRs), and other risk estimates. Compute and evaluate number needed to treat and number needed to harm. Define and calculate terms such as point and period prevalence, incidence rate, prevalence rate, absolute risk difference, and RR difference.
18. Define and calculate terms such as true positive, false positive, true negative, false negative, sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio, and negative likelihood ratio.

19. Define research and differentiate it from quality improvement activities.
20. Define the composition, functions, and roles of the institutional review board (IRB).
21. Describe the various steps of the professional writing and peer-review processes.
22. Summarize common age-related pharmacokinetic and pharmacodynamic changes in older adults.
23. Evaluate the pharmacotherapeutic regimens of older adults to support optimal risk and benefit of medications.
24. Assess inappropriate medication prescribing in older adults using accepted tools.
25. Recommend appropriate pharmacotherapy for patients with dementia.
26. Evaluate the risks and benefits of antipsychotic use in older adults with dementia.
27. Recommend appropriate interventions for patients with BPSD (behavioral and psychological symptoms of dementia).
28. Differentiate between the types of urinary incontinence and recommend appropriate treatments.
29. Recommend an appropriate BPH (benign prostatic hypertrophy) treatment, according to the AUASI (American Urological Association Symptom Index).
30. Recommend appropriate analgesic therapy for older adults with osteoarthritis.
31. Discuss the risks and benefits of medication classes used to treat rheumatoid arthritis and associated comorbidities.
32. Categorize acute kidney injury (AKI) as prerenal, intrinsic, or postrenal on the basis of patient history, physical examination, and laboratory values.
33. Identify risk factors for AKI.
34. Formulate preventive strategies to decrease the risk of AKI in specific patient populations.
35. Formulate a therapeutic plan to manage AKI.
36. Identify medications and medication classes associated with acute and chronic kidney damage.
37. Describe characteristics that determine the efficiency of removal of drugs by dialysis.
38. Classify the stage or category of either AKI or chronic kidney disease (CKD) on the basis of patient history, physical examination, and laboratory values.
39. Identify risk factors for the progression of CKD.
40. Formulate strategies to slow the progression of CKD.
41. Assess for the presence of common complications of CKD.
42. Develop a care plan to manage the common complications observed in patients with CKD (e.g., anemia, secondary hyperthyroidism).

Module II
Cardiology I, Cardiology II, and Critical Care

1. Distinguish between the treatments for acute coronary syndrome: ST-segment elevation myocardial infarction and non–ST-segment elevation acute coronary syndrome.
2. Formulate evidence-based treatment strategies for patients with acute decompensated heart failure.
3. Devise a treatment plan for patients presenting with ventricular or life-threatening arrhythmias.
4. Differentiate between goals and treatment for hypertensive emergencies and hypertension without progressive organ damage.
5. Recommend patient-specific pharmacologic therapy for the management of chronic heart failure, with an emphasis on mortality-reducing agents and their target doses.
6. Develop an evidence-based pharmacologic regimen and monitoring plan for patients with atrial fibrillation.

7. Develop an optimal pharmacologic management plan for a patient with hypertension according to practice guidelines and clinical trial evidence.
8. Identify patients who are at risk of atherosclerotic cardiovascular disease (ASCVD) according to the pooled cohort equation to estimate the 10-year ASCVD risk and determine in whom statin therapy should be initiated and the appropriate intensity of statin therapy when applicable.
9. Determine the appropriate pharmacologic therapy for patients with stable coronary heart disease.
10. Interpret hemodynamic parameters and acid-base status in critically ill patients.
11. Differentiate between presentation of and treatment strategies for hypovolemic, obstructive, cardiogenic, and distributive shock.
12. Discuss the appropriate use of fluids, vasopressors, antibiotics, and corticosteroids in patients with sepsis or septic shock.
13. Discuss strategies to optimize the safety and efficacy of therapeutic hypothermia for patients after cardiac arrest.
14. Recommend therapeutic options to minimize delirium and provide optimal analgesia, sedation, neuromuscular blockade, and nutritional support in critically ill patients.
15. Recommend therapeutic options to prevent stress ulcers, venous thromboembolism, hyperglycemia, and ventilator-associated pneumonia in critically ill patients.
16. Recommend treatment options for acute intracranial hemorrhage.

Module III
Infectious Diseases, HIV/Infectious Diseases, Pediatrics, and Anticoagulation

1. Identify the presenting signs and symptoms, etiology, and risk factors of respiratory tract infections, urinary tract infections, skin and soft tissue infections, osteomyelitis, central nervous system (CNS) infections, intra-abdominal infections, Clostridioides difficile infections, and endocarditis.
2. Recommend appropriate treatment for patients with respiratory tract infections, urinary tract infections, skin and soft tissue infections, osteomyelitis, CNS infections, intra-abdominal infections, C. difficile infections, and endocarditis.
3. Select appropriate preventive therapy for CNS infections, endocarditis, and surgical wound infections.
4. Formulate an appropriate regimen to prevent or treat HIV infections, including initiating and monitoring therapy.
5. Discuss appropriate treatment of the various acquired immunodeficiency syndrome opportunistic infections, including primary and secondary prophylaxis.
6. Describe appropriate treatment and preventive therapy for tuberculosis, including infections with drug-resistant organisms.
7. Design appropriate therapeutic regimens for treating systemic and superficial fungal infections and classify the various antifungal agents.
8. Recommend therapeutic options to target the most common organisms in neonatal and pediatric sepsis and meningitis.
9. Identify the drugs available for preventing and treating respiratory syncytial virus and indications for use.
10. Explain the most common causative organisms of otitis media and potential treatment options.
11. Apply the recommended pediatric immunization schedule and discuss barriers to routine immunization.

12. Examine the differences in anticonvulsant management, including pharmacokinetics and adverse effects, between children and adults.
13. Implement an appropriate treatment regimen for patients with attention-deficit/hyperactivity disorder.
14. Recommend a patient-specific pharmacotherapy plan to reduce the risk of stroke in patients with nonvalvular atrial fibrillation.
15. Develop a feasible pharmacologic management plan to reduce thrombotic events in patients with different valvular diseases and different types of valves.
16. Devise an evidence-based pharmacotherapy plan for preventing and treating venous thromboembolism (VTE).
17. Analyze the need for anticoagulant therapy in patients with atrial fibrillation or VTE.
18. Determine appropriate reversal strategies for patients at risk of active bleeding, or actively bleeding, while receiving oral anticoagulation therapy.
19. Determine appropriate selection and dosing of anticoagulant therapy on the basis of patient-specific factors and drug interactions.

Module IV
General Psychiatry, Neurology, and Endocrine and Metabolic Disorders

1. Examine pharmacotherapeutic options for managing major depression, bipolar disorder, schizophrenia, anxiety disorders, insomnia, and substance use disorder.
2. Select a drug used to treat these disorders on the basis of its unique pharmacologic properties, therapeutic efficacy, adverse effects, and cognitive and behavioral effects.
3. Formulate a pharmacotherapeutic treatment plan for a patient with a diagnosis of major depression, bipolar disorder, schizophrenia, anxiety disorder, insomnia, or substance use disorder.
4. Identify the differences between convulsions, seizures, and status epilepticus.
5. Determine appropriate use of antiepileptic drugs on the basis of their activity, adverse effects, and drug interactions for epilepsy and status epilepticus.
6. Identify appropriate treatment strategies for primary and secondary stroke prevention.
7. Determine the appropriateness of treatment with alteplase for acute stroke.
8. Initiate and monitor pharmacotherapy for Parkinson disease.
9. Differentiate between regimens for acute and prophylactic treatment of migraine, tension, and cluster headaches.
10. Identify appropriate therapies for individuals with multiple sclerosis.
11. Establish appropriate treatment for peripheral neuropathy.
12. Differentiate between the diagnostic and classification criteria for various endocrine and metabolic disorders, including type 1 and type 2 diabetes, diabetes insipidus, polycystic ovary syndrome, obesity, and disorders of the thyroid, adrenal, and pituitary glands.
13. Review the various therapeutic agents used in treating endocrine and metabolic disorders.
14. Select appropriate treatment and monitoring options for a given patient presenting with one of the previously mentioned endocrine or metabolic disorders.
15. Recommend appropriate therapeutic management for secondary complications from diabetes or thyroid disorders.

Module V
Fluids, Electrolytes and Nutrition, Pharmacokinetics, and Gastrointestinal Disorders

1. Calculate the osmolarity of intravenous fluids and compare each with normal plasma osmolarity.
2. Recommend an appropriate intravenous fluid regimen and monitoring parameters given a patient clinical scenario.
3. Discuss the appropriate roles and risks of hypertonic and hypotonic saline, recommend treatment regimens, and discuss appropriate monitoring parameters to ensure safe and effective use of these intravenous fluids.
4. Assess electrolyte abnormalities and recommend an appropriate pharmacologic treatment plan based on individual patient signs and symptoms.
5. Discuss appropriate indications for the use of enteral nutrition (EN) and parenteral nutrition (PN).
6. Recommend a patient-specific EN formula, infusion rate, and monitoring parameters based on nutritional needs, comorbidities, and clinical condition.
7. Recommend a patient-specific PN formula and monitoring plan based on the type of intravenous access, nutritional needs, comorbidities, and clinical condition.
8. Discuss strategies for preventing complications associated with EN and PN.
9. Identify and solve pharmacotherapy problems using basic pharmacokinetic concepts, including bioavailability, volume of distribution, clearance, and the elimination rate constant.
10. Describe clinically relevant issues related to drug transport proteins, cytochrome P450 metabolism, pharmacogenomics, and drug sampling and interpretation.
11. Describe specific pharmacokinetic characteristics of commonly used therapeutic agents, including aminoglycosides, vancomycin, phenytoin, and digoxin, as well as pharmacokinetic alterations in patients with renal and hepatic disease.
12. Review national guideline treatment strategies for the following gastrointestinal (GI) disorders: gastroesophageal reflux disease (GERD); peptic ulcer disease (PUD); ulcerative colitis (UC); Crohn disease (CD); chronic liver disease, including viral hepatitis and cirrhosis; constipation; diarrhea; irritable bowel syndrome (IBS); nausea; vomiting; pancreatitis; and upper GI bleeding, including prevention of stress-related mucosal disease (SRMD).
13. Recommend appropriate pharmacologic and nonpharmacologic interventions given a specific patient with one or more GI disorders.
14. Recognize pertinent information for educating patients and prescribers regarding the appropriate use of pharmacologic agents for various GI disorders.
15. Describe commonly encountered statistical tests and concepts, using GI disorders as examples.

Module VI
Men's and Women's Health, Pulmonary Disorders, Gout, and Immunizations, Oncology Support Care, and Policy, Practice, and Regulatory Issues

1. Recommend appropriate treatment options for patients with menopausal symptoms; osteoporosis; conditions in pregnancy; infertility; and sexual dysfunction.
2. Identify drugs that are considered safe and unsafe during pregnancy and lactation.
3. Modify contraceptive regimens on the basis of estrogen- and progestin-related adverse effects or drug interactions.
4. Devise a pharmacotherapeutic plan for appropriate contraceptive use, contraceptive method mishaps, and use of emergency contraception.

5. Identify common menstrual disorders and sexually transmitted diseases, and recommend appropriate pharmacotherapy.
6. Accurately classify patients, assess control, and select and monitor appropriate acute and preventive treatments for pediatric and adult patients with asthma and for adult patients with chronic obstructive pulmonary disease, incorporating patient-specific factors.
7. Appropriately assess, classify, and select pharmacotherapy (acute and long term, including nonpharmacologic therapy), and monitor, reassess, and adjust pharmacotherapy in patients with gout.
8. Determine appropriate immunizations for an adult given his or her age and medical conditions, and correctly apply cautions, contraindications, and drug interactions with immunizations to adult patients.
9. Identify, assess, and recommend appropriate pharmacotherapy for managing common complications of cancer chemotherapy, including nausea and vomiting, myelosuppression and the appropriate use of growth factors, infection, anemia and fatigue, cardiotoxicity, and extravasation injury.
10. Assess and recommend appropriate pharmacotherapy for managing cancer-related pain.
11. Assess and recommend appropriate pharmacotherapy for managing oncologic emergencies, including hypercalcemia, tumor lysis syndrome, and spinal cord compression.
12. List the congressional committees and government agencies that regulate health care in the United States.
13. Identify the regulatory and oversight bodies with jurisdiction over health system delivery of care.
14. Explain recent federal legislative and regulatory activity that affects the delivery of health care.
15. Describe the regulatory actions that govern the prescription drug approval process and the conduct of human subjects research.
16. Describe national quality initiatives aimed at improving health care delivery and patient health outcomes.
17. Explain medication policy implications at an institutional level.