2015 PEDIATRIC PHARMACY PREPARATORY REVIEW COURSE

Program Faculty Affiliations and Learning Objectives

SESSION 1: PHARMACOKINETICS, PHARMACODYNAMICS, AND PHARMACOGENOMICS, BIOSTATISTICS, NEUROLOGY/PSYCHIATRY AND HEMATOLOGY/ONCOLOGY
Activity No. 0217-0000-15-036-H01-P; 4.0 contact hours.

PHARMACOKINETICS, PHARMACODYNAMICS, AND PHARMACOGENOMICS
Gary Milavetz, Pharm.D., FCCP
Associate Professor of Pharmacy and Head of the Division of Applied Clinical Sciences, Department of Pharmacy Practice and Science, University of Iowa College of Pharmacy, Iowa City, Iowa
And
Susan S. Vos, Pharm.D., BCPS
Clinical Associate Professor and Director, Professional Experience Program, University of Iowa College of Pharmacy, Iowa City, Iowa

1. List alterations in pharmacokinetics (PK) and pharmacodynamics (PD) that result in changes in response to drug therapy in neonates, infants, children, and adolescents.
2. Summarize pharmacogenomics considerations in pediatric patients.
3. Identify medications that cause pediatric-specific adverse reactions.
4. Differentiate routes of administration related to pediatric care and their PK and PD implications.
5. Describe age-associated differences in pathophysiology and clinical manifestations of disease across patient populations.

BIOSTATISTICS
Robert DiCenzo, Pharm.D., FCCP, BCPS
Professor and Chair, Department of Pharmacy Practice, Albany College of Pharmacy and Health Sciences, Albany, New York

1. Describe the differences between descriptive and inferential statistics.
2. Select an appropriate statistical test according to sample distribution, data type (nominal, ordinal, and continuous [ratio and interval]) and study design.
3. Distinguish the primary differences between parametric and nonparametric statistical tests.
4. Explain the strengths and limitations of different measures of central tendency (mean, median, and mode) and distribution of data (standard deviation [SD], range, and interquartile range).
5. Summarize the differences between the SD and the standard error.
6. Identify different types of statistical decision errors (type I and type II) and how they relate to sample size and power.
7. Utilize p values and confidence intervals for hypothesis testing.
8. Explain the application and limitations of statistical significance when interpreting the medical literature.
9. List the differences between correlation and regression analysis.
10. Describe how survival analysis is used in clinical trials.

NEUROLOGY/PSYCHIATRY
Naomi House, Pharm.D., BCPP
Clinical Pharmacy Practitioner, Psychiatry and Pharmacy Residency Coordinator, Wolfson Children’s Hospital/Baptist Medical Center-Jacksonville, Jacksonville, Florida

1. Apply evidence-based medication therapy for acute and prophylactic treatment of migraines.
2. Distinguish between various seizure medications for type of seizure, age, drug interactions, and adverse effects.
3. Differentiate between the medication therapies for cerebral palsy symptoms of spasticity, drooling, and bone mineral density loss.
4. Evaluate between the medications for autism spectrum disorders for target symptoms and adverse effects.
5. Select appropriate medication therapy for pediatric bipolar depression based on symptoms, bipolar phase, and adverse events, including monitoring parameters.
6. Develop treatment plans for attention-deficit/hyperactivity disorder, including medication recommendations, dose, adverse events, and dosage formulations.
7. Describe the medications used for various eating disorders and their place in therapy.
8. Differentiate between various substances of abuse by symptoms of intoxication, symptoms of withdrawal, and treatment options.
9. Identify treatment options and potential adverse effects of medications for pediatric depression.

HEMATOLOGY/ONCOLOGY
M. Brooke Bernhardt, Pharm.D., M.S., BCOP
Assistant Director, Clinical Services and Outcomes, Texas Children’s Hospital, Houston, Texas

1. Discuss the epidemiology, pathophysiology, risk factors, diagnosis, and general treatment approaches to common pediatric malignancies.
2. Explain the role of hematopoietic stem cell transplantation in children with hematologic or oncologic disorders.
3. Identify late treatment-related complications in survivors of childhood cancer.
4. Prescribe preventive pharmacologic measures for the management of children with sickle cell disease.
5. Propose a treatment approach to a bleeding child with hemophilia.

SESSION 2: PICU I, PICU II AND CARDIOLOGY
Activity No. 0217-0000-15-037-H01-P; 4.0 contact hours

PICU I
Joseph M. LaRochelle, Pharm. D.
Associate Professor, Xavier University of Louisiana College of Pharmacy, New Orleans, Louisiana

1. Identify signs and symptoms of the different classifications of sepsis
2. Develop an appropriate treatment plan for septic patients
3. Identify common sedation strategies.
4. Describe techniques to prevent withdrawal from sedative agents
5. Describe the pharmacokinetic changes that occur during Extracorporeal Membrane Oxygenation (ECMO)
6. Modify drug therapy while a patient is deployed on ECMO.
7. Choose appropriate algorithm to follow based on specific rhythms in cardiac arrest.
8. Based on patient clinical situation differentiate various therapeutic options for cardiac and when to use each therapy.
9. Compare and contrast various modalities for optimizing mean arterial pressure (MAP) in traumatic brain injury (TBI) patients.
10. Given patient scenario select appropriate agents for increased intracranial pressure (ICP) management due to traumatic brain injury.
11. Devise a fluid replacement plan for patients with severe burns.
12. Describe therapies to decrease the secondary responses to burns.
13. Describe some of the basic principles of pediatric sedation.
PICU II
Allison M. Chung, Pharm.D., BCPS, FCCP
Associate Professor of Clinical Pharmacy, Auburn University, Harrison School of Pharmacy, Mobile, Alabama

1. Interpret Arterial Blood Gas (ABG) results and apply them to specific patient cases.
2. Explain the rationale for stress ulcer prophylaxis in the Pediatric Intensive Unit (PICU) and discuss therapeutic options.
3. Describe the risk for gastrointestinal (GI) bleeds in the PICU and outline the best strategy for management.
4. Outline the management of acute respiratory distress syndrome in children and summarize specific therapeutic options.
5. Compare and contrast hospital-acquired pneumonia and ventilator-associated pneumonia in the PICU and discuss recommend prevention strategies.
6. Define status epilepticus and discuss the optimal treatment strategy.
7. Define diabetic ketoacidosis and outline safe and effective acute management.

CARDIOLOGY
Shannan K. Eades, Pharm.D.
Pediatric Pharmacy Clinical Specialist, PGY2 Pediatric Pharmacy Residency Program Director, Children’s Memorial Hermann Hospital, Houston, Texas

1. Develop strategies for the acute treatment and long-term management of patients diagnosed with Kawasaki disease.
2. Differentiate between acyanotic and cyanotic congenital heart defects and discuss the pharmacological agents used to manage consequences associated with congenital heart diseases.
3. Define hypertension in neonates, children, and adolescents and determine appropriate first-line and alternative antihypertensive agents for control of blood pressure in these populations.
4. Describe the pharmacological management of the most commonly occurring arrhythmias in the pediatric population.
5. Identify risk factors for thrombosis and determine appropriate pharmacologic agents for prevention and treatment of thrombosis in the pediatric population with cardiac disease.
6. Describe the underlying pathophysiology of pulmonary hypertension and discuss therapeutic agents used to manage acute and chronic pulmonary hypertension in pediatric patients.

SESSION 3: PULMONARY, PEDIATRIC TRANSPLANT AND NEONATOLOGY
Activity No. 0217-0000-15-038-H01-P; 3.5 contact hours.

PULMONARY
Rebecca S. Pettit, Pharm.D., MBA, BCPS
Pediatric Pulmonary Clinical Specialist, Riley Hospital for Children Indiana University Health, Indianapolis, Indiana

1. Design optimal treatment regimen for pediatric asthma patients.
2. Discuss the role of pharmacologic therapies in the treatment of status asthmaticus.
3. Assess and recommend treatment for a cystic fibrosis acute pulmonary exacerbation.
4. Review the management of cystic fibrosis-related comorbidities including cystic fibrosis-related diabetes and pancreatic insufficiency.
5. Identify the most common causes of community-acquired-pneumonia in pediatric patients.
PEDIATRIC TRANSPLANT
Barrett R. Crowther, Pharm.D., BCPS
Clinical Pharmacist, Pediatrics & Solid Organ Transplant University Health System
San Antonio, Texas

1. Summarize the components which are included in the pre-transplant assessment, including ABO compatibility, panel of reactive antibody, human leukocyte antigen (HLA) tissue typing, and crossmatch testing.
2. Examine how current strategies used to prevent and treat solid organ transplant (SOT) rejection impact cellular and antibody-mediated immune responses.
3. Compare therapeutic effects, drug interactions and safety of current immunosuppressants utilized in SOT.
4. Distinguish which immunosuppressants require therapeutic drug monitoring (TDM).
5. Determine therapeutic goals for individual SOT recipients in regards to balancing preventing rejection and avoiding infections and other complications.
6. Discuss pharmacologic agents used to prevent and treat infectious complications in SOT recipients.
7. Differentiate how recommended immunizations for pre-SOT candidates and SOT recipients vary from the United States recommendations for immunocompetent pediatric patients.
8. Describe preventative and treatment strategies for non-infectious pediatric SOT complications, including malignancy, linear growth impairment, posttransplantation diabetes mellitus (PTDM), and cardiovascular complications.
9. Discuss factors which influence adherence and strategies to improve adherence in pediatric SOT recipients.

NEONATOLOGY
Kirsten H. Ohler, Pharm.D., BCPS
Clinical Assistant Professor, University of Illinois Hospital and Health Sciences System, Chicago, Illinois

1. Compare the exogenous surfactant products available for the prevention and treatment of respiratory distress syndrome.
2. Describe the pharmacological options for the prevention and treatment of bronchopulmonary dysplasia.
3. Describe the use of methylxanthines for the treatment of apnea of prematurity.
4. Describe the role of indomethacin for the prevention of intraventricular hemorrhage.
5. Compare the drugs available and the various therapeutic approaches (i.e. prophylaxis, early treatment, delayed treatment) for patent ductus arteriosus.
6. Discuss the supportive and targeted therapies for persistent pulmonary hypertension of the newborn.
7. Discuss therapeutic strategies to prevent and treat necrotizing enterocolitis.
8. Identify potential treatment options for common congenitally-acquired infections including herpes, syphilis, toxoplasmosis, cytomegalovirus, and hepatitis B.
9. Discuss the assessment and management of neonatal abstinence syndrome.
10. Explain important considerations including the risk of fetal / neonatal harm and factors affecting drug transfer across the placenta or into breast milk when choosing drugs for use during pregnancy or lactation.

SESSION 4: INFECTIOUS DISEASES, IMMUNOLOGY, AND FLUIDS, ELECTROLYTES, AND NUTRITION
Activity No. 0217-0000-15-039-H01-P; 3.5 contact hours.

INFECTIOUS DISEASES
Kalen B. Manasco, Pharm.D., BCPS, AE-C
Residency Program Director-General Pediatrics, Clinical Associate Professor, Department of Clinical and Administrative Pharmacy, University of Georgia College of Pharmacy, Atlanta, Georgia
1. Determine appropriate treatment of pediatric patients with respiratory tract infections, central nervous system infections, soft tissue infections, bone and joint infections, urinary tract infections, intra-abdominal infections, and endocarditis.
2. Describe appropriate first line treatment of fungal infections, tuberculosis, and parasitic infections in pediatric patients.
3. Identify appropriate surgical prophylaxis strategies for pediatric patients.
4. Determine appropriate prophylactic agents for pediatric patients with respiratory tract infections, central nervous system (CNS) infections, and endocarditis.

IMMUNOLOGY
Jenana Maker, Pharm.D., BCPS
Assistant Professor, Department of Pharmacy Practice, University of the Pacific School of Pharmacy and Health Sciences, Stockton, California

1. Develop a treatment strategy for childhood atopic dermatitis.
2. Assess different treatment strategies juvenile idiopathic arthritis.
3. Explain the treatment approaches to severe combined immunodeficiency.
4. Describe parental hesitancy to vaccinations and propose solutions to addressing it.
5. Identify adverse effects of standard pediatric vaccinations and determine their appropriateness.
6. Differentiate between preventative and treatment strategies of IgE-mediated hypersensitivity reactions in children.
7. Distinguish between common food allergies and propose preventative and treatment measures to manage common food allergies in children.
8. Determine the appropriateness of prophylactic and treatment strategies for the management of pediatric acute rheumatic fever and rheumatic heart disease.
9. Discuss disease progression and treatment strategies of pediatric systemic lupus erythematosus.
10. Design a pre-exposure prophylaxis regimen for adolescents deemed to be high-risk for acquiring HIV.
11. Design a antiretroviral prophylaxis regimen for infants at risk for perinatal HIV transmission.
12. Discuss commonly used pediatric treatment regimens for HIV/AIDS.
13. Summarize common adverse effects associated with antiretroviral therapies.

FLUIDS, ELECTROLYTES, AND NUTRITION
Allison B. Blackmer, Pharm.D., BCPS
Assistant Professor of Pharmacy, University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Denver, Colorado

1. Identify the changes in total body water, body compartments and electrolytes during development.
2. Calculate maintenance intravenous fluid and electrolyte requirements in pediatric patients.
3. Interpret laboratory data and physical assessment in the evaluation of fluid status and dehydration.
4. Design intravenous fluid regimens to treat identified deficits.
5. Determine adequate nutrition across various states of human development.
6. Compare and contrast human milk to various infant formulas.
7. Explain the benefits of additives such as DHA, Arachidonic Acid, and iron to infant formulas.
8. Recognize indications for enteral and parenteral nutrition.
9. Design enteral and parenteral nutrition regimens based on the changing nutritional needs and clinical status of infants and children at various stages in their development.
10. Identify characteristics, causes, risk factors and treatment approaches to Failure to Thrive.
SESSION 5: GASTROENTEROLOGY/HEPATOLOGY, ENDOCRINE & METABOLIC DISORDERS AND PEDIATRIC NEPHROLOGY
Activity No. 0217-0000-15-040-H01-P; 3.0 contact hours.

GASTROENTEROLOGY/HEPATOLOGY
Christina L. Cox, Pharm.D., BCPS
Assistant Professor - Pediatrics, South Carolina College of Pharmacy, Columbia, South Carolina

1. Review and apply national guideline and consensus statement treatment strategies for the following pediatric gastrointestinal (GI) disorders, where applicable: gastroesophageal reflux disease (GERD), diarrhea, constipation, irritable bowel syndrome (IBS), pediatric Crohn’s Disease (PCD), ulcerative colitis (UC), short bowel syndrome (SBS), appendicitis, nausea and vomiting, and ulcers.
2. Design treatment and monitoring regimens for the management of gastroesophageal reflux disease (GERD) in pediatric patients.
3. Identify causes of diarrhea in pediatric patients and recommend appropriate treatment and supportive care management to prevent associated complications.
4. Recommend appropriate prevention and treatment strategies for pediatric constipation.
5. Differentiate between and recognize clinical criteria for types of IBS in order to provide appropriate recommendations for each type.
6. Discuss the role of pain management in the treatment of IBS and identify treatment options.
7. Review the different clinical signs and symptoms of UC and PCD.
8. Identify severity staging of UC and PCD to recommend corresponding treatment regimens.
9. Discuss the risks and benefits of treatment options for UC and PCD.
10. Describe the influence of bowel length and residual function on the management of SBS in pediatric patients.
11. Design pharmacotherapy and monitoring plans for patients with parenteral nutrition associated liver disease (PNALD).
12. Identify the need for surgical management of appendicitis and recommend appropriate antibiotic therapy.
13. Identify age-related etiology differences of nausea and vomiting and resulting differences in pharmacotherapeutic plans.

ENDOCRINE & METABOLIC DISORDERS
Thomas M. Parker, Pharm.D., CDE, CPT
Assistant Professor, Pharmacy Practice, Pediatrics Division, Texas Tech University Health Sciences Center (TTUHSC) School of Pharmacy, Amarillo, Texas

1. Identify diagnostic and goal levels for common screening or monitoring tests for diabetes in children.
2. Given a specific patient, design or evaluate the effectiveness of an insulin regimen to optimize glycemic control in a child with DM.
3. Identify treatment strategies for obesity in children.
4. Develop a treatment strategy for thyroid disorders in children.
5. Differentiate between various treatment options for water metabolism disorders in children.
6. Create a management plan for a patient diagnosed with PKU.

PEDIATRIC NEPHROLOGY
Karen Kovey, Pharm.D., BCPS
Pediatric Clinical Specialist, Parkview Women and Children’s Hospital, Fort Wayne, Indiana

1. Differentiate between treatment strategies for primary and secondary nephrotic syndrome.
2. Develop a plan for management of adverse effects from medications used for nephrotic syndrome.
3. Identify the different grades of hydronephrosis and for which treatment is indicated.
4. Determine which alkalinizing agent may be appropriate for a given subset of RTA.
5. Identify acute kidney injury in infants and children and know which AKI criteria are correctly applied to
neonates versus children.

6. Explain to caregivers the management of co-morbidities commonly found in children with chronic kidney disease.

7. Propose empiric therapy and therapy modifications based on culture results for a child with a peritoneal dialysis catheter infection.

8. Summarize the differences between atypical and typical HUS and explain the different treatment approaches to each.

9. Detect medications that may contribute to tubulointerstitial nephritis in children.

SESSION 6: STUDY DESIGN, MEDICATION SAFETY AND TOXICOLOGY, AND PRACTICE MANAGEMENT
Activity No. 0217-0000-15-041-H01-P; 3.0 contact hours.

STUDY DESIGN
Sabrina W. Cole, Pharm.D., BCPS
Medication Policy and Outcomes Director, Intermountain Healthcare, Salt Lake City, Utah

1. Distinguish between observational and explanatory study designs.
2. Describe the differences between superiority, equivalence, and non-inferiority study designs.
3. Describe the differences between parallel and cross-over study designs.
4. Determine the utility, benefits, and limitations of various study designs (e.g., case study, case-control, cohort, cross-sectional, randomized controlled clinical trials, systematic review, meta-analysis).
5. Reconstruct the hierarchy of evidence for various study designs.
6. Define the concepts of internal and external validity, randomization, bias, and confounding describe the advantages and limitations of each.

MEDICATION SAFETY AND TOXICOLOGY
Jeanette D. Trella, Pharm.D.
Managing Director, The Poison Control Center, Children’s Hospital of Philadelphia, Philadelphia, Pennsylvania
And
Sean P. O’Neill, Pharm.D.
Medication Safety Officer, Children’s Hospital of Philadelphia, Philadelphia, Pennsylvania

1. Identify the key vulnerabilities in the pediatric medication use process.
2. Review pediatric specific considerations in the definition, detection and mitigation of harm of medication safety events.
3. Describe the US Poison Control Systems structure and the common pediatric poisonings reported by them.
4. Review the modalities of gastric decontamination and their role in the present day management of ingestion of poisonings.
5. Recognize the common toxidrome classifications.
6. Understand the pathophysiology of and management of select poisonings.

PRACTICE MANAGEMENT
Jennifer L. Morris, Pharm.D., BCPS
Clinical Pharmacy Specialist, Pediatric Critical Care, Texas Children’s Hospital, Houston, Texas

1. Demonstrate skill in the responsibilities of a pediatric pharmacy representative to the pharmacy and therapeutics committee to ensure adequate formulary management for the pediatric population.
2. Design a medication use evaluation that ensures adequate evaluation of use outcomes in a pediatric population.
3. Integrate data and pediatric pharmacist knowledgebase in the development of a medication use guideline or protocol for use in pediatric patients

4. Utilize the American Society of Health-System Pharmacists (ASHP) guidelines and Pediatric Pharmacy Advocacy Group (PPAG) comment to devise a plan for provision of pharmaceutical services to pediatric patients in a health care system

5. Develop a plan to implement optimal information technology for pediatric patients

6. Discuss the strategies for expanding quality and capacity of pediatric clinical pharmacists, pertinent to practice management, recommended by the joint opinion group.

7. Support the development of quality assurance plans to meet the core measures