

## **CONTENT OUTLINE FOR THE PEDIATRIC PHARMACY CERTIFICATION EXAMINATION**

The following domains, tasks and knowledge statements were delineated by the BPS Pediatric Pharmacy Practice Analysis Taskforce and validated through a role delineation study. The proportion of examination items allotted to each domain was determined through analysis and discussion of the results of the role delineation study by the BPS Pediatric Pharmacy Practice Analysis Taskforce and approved by the BPS Board of Directors.

Each of the major areas/domains of Pediatric Pharmacy practice noted below will be tested. Questions will not be grouped by domain on the exam. Rather, items testing each domain are distributed throughout the total examination. Please note this examination will **SAMPLE** a candidate's knowledge rather than trying to test all of his/her knowledge. Examination items will address problems and situations reflective of the full range of practice.

### **Domain 1: Patient Management (58% of exam) Tasks**

Tasks related to the comprehensive management of a pediatric patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for pediatric patients in collaboration with the healthcare team.

#### For the Pediatric Patient:

- 1.1 Obtain pertinent patient information (e.g., weight, height and/or body surface area, age, allergies, disease states, medication history including herbal and dietary supplements, current medications, dose form preference, immunization status, nutritional status, and social/family history) via medical record, discussion with healthcare colleagues and/or patient/parent/caregiver interview.
- 1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.
- 1.3 Analyze and interpret collected patient information.
- 1.4 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.
- 1.5 Establish therapeutic goals with healthcare team and patient/parents/caregivers.
- 1.6 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.
- 1.7 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.
- 1.8 Participate in the management of pediatric emergencies.
- 1.9 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.
- 1.10 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.

**Knowledge of:**

- k1.1 Normal growth and development of the pediatric population
- k1.2 Age-appropriate interviewing techniques for patients, parents, and caregivers
- k1.3 Essential components of a medical history including maternal and birth history and childhood immunization status, if appropriate
- k1.4 Essential components of a social history, including day care attendance, siblings, smoke exposure, home environment
- k1.5 Pathophysiology, epidemiology, risk factors, diagnosis, prevention, and evidence-based treatment of common diseases and conditions in pediatric patients
- k1.6 Equations to calculate body surface area, creatinine clearance, fluid requirements, and ideal body weight from birth to adult
- k1.7 Pediatric populations for which standard calculated methods of assessment of renal impairment are not reliable
- k1.8 Urine output calculation for body weight and appropriate output per age
- k1.9 Methods for assessment of hepatic function in pediatric populations
- k1.10 Normal laboratory values and vital signs from birth to adult
- k1.11 Age-associated differences in pathophysiology and clinical manifestations of disease across patient populations
- k1.12 Age-specific pharmacokinetic differences in neonates, infants, children, and adolescents: k1.13 Age-specific pharmacodynamic differences in neonates, infants, children, and adolescents: k1.14 Pharmacogenomic considerations in pediatric patients
- k1.15 Appropriate use of off-label medications to treat pediatric patients
- k1.16 Pediatric-specific drug interactions (e.g., ceftriaxone and calcium-containing products in the neonate, calcium and phosphorous in parenteral nutrition)
- k1.17 Clinical or therapeutic implications in the fetus and neonate of placental transfer of medications or other substances (e.g., antenatal steroids, neonatal abstinence syndrome [NAS], anticonvulsant withdrawal)
- k1.18 Influence of medications on the production of breast milk
- k1.19 Excretion of medications and other substances in breast milk
- k1.20 Appropriate dosing based on age and body size (e.g., body surface area, post-menstrual age, gestational age, dosing weight)
- k1.21 Medication dosing in extracorporeal membrane oxygenation (ECMO) and in renal replacement therapy (e.g., continuous renal replacement therapy [CRRT], PD, HD)
- k1.22 Medication dose adjustment in pediatric patients with renal and hepatic impairment
- k1.23 Essential components of medication reconciliation in pediatric patients (e.g., concentration, dose in mg, palatability)
- k1.24 Pediatric-specific adverse effects (e.g., liver failure with valproate, tetracycline and tooth discoloration):
- k1.25 Differences in laboratory sampling for pediatric patients (e.g., blood volume; method, frequency and timing of sampling)
- k1.26 Differences in the management of pediatric emergencies (e.g., respiratory distress, neonatal seizures, cardiopulmonary arrest)
- k1.27 Nutritional and fluid requirements for infants and children for normal growth and disease
- k1.28 Childhood immunization schedules
- k1.29 Factors affecting adherence to the treatment regimen
- k1.30 Specialty needs of pediatric patients requiring referral to other providers (e.g., infant with signs of dehydration, patient needs compounded oral formulation)

## **Domain 2: Practice Management (20% of exam) Tasks**

Tasks related to advancing pediatric pharmacy practice; and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.

- 2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.
- 2.2 Participate in decision-making regarding selection and implementation of equipment/technology and decision support involved in the medication use process (e.g. infusion pumps, CPOE, bar coding).
- 2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.
- 2.4 Adopt, adapt or develop evidence-based practice guidelines and protocols for the management of pediatric patients in accordance with health-system policies and procedures.
- 2.5 Establish processes to anticipate, prevent, review, and report medication use events (e.g., trigger review, root cause analysis, failure mode and effects analysis, MedWatch, Vaccine Adverse Event Reporting System [VAERS]).
- 2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.
- 2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.
- 2.8 Justify and document the clinical and financial value of pediatric pharmacy services.

### **Knowledge of:**

- k2.1 Medication safety considerations (e.g., Institute for Safe Medication Practices [ISMP] and Joint Commission recommendations, Food and Drug Administration [FDA] alerts)
- k2.2 Position statements, white papers, and national guidelines as an aid to the development of health-system policies and procedures
- k2.3 Pediatric-specific considerations (e.g., age and body size) in the design or improvement of medication use processes (e.g., computerized physician order entry [CPOE], infusion pumps, electronic medical record [EMR])
- k2.4 Routes of administration (e.g., intraosseous, oral/enteral, parenteral, IM, transdermal, intranasal, intraventricular)
- k2.5 Impact of medication administration techniques on drug delivery in pediatric patients (e.g., inhalers, dead space in IV tubing, overfill, j-tip device)
- k2.6 Medication administration technology (e.g., infusion pumps, subcutaneous needle devices, intranasal administration devices, aerosols)
- k2.7 Appropriate references to support the preparation of pediatric formulations (e.g., IV dilutions, extemporaneously compounded preparations)
- k2.8 Considerations when selecting pediatric-appropriate dosage formulations
- k2.9 Metrics for evaluating quality of pediatric pharmacy services (e.g., patient/parent/caregiver satisfaction, length of stay, readmission, medication errors)

## **Domain 3: Information Management and Education (18% of exam)**

### **Tasks**

Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of healthcare providers, trainees, patients and caregivers.

- 3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.
- 3.2 Educate healthcare professionals or students in other health professions concerning safe and effective use of medications and other issues related to the care of the pediatric patient.

3.3 Educate and provide counseling to patients/parents/caregivers regarding the safe and effective use of medications, the treatment regimen, the monitoring of side effects, and the importance of adherence to the treatment regimen.

3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).

3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.

3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).

**Knowledge of:**

k3.1 Principles and methods of educating pharmacy staff, fellows, residents, student pharmacists and/or other healthcare professionals regarding pediatric health-related issues

k3.2 Age-appropriate patient education principles and methods

k3.3 Health literacy and cultural considerations in educating patients/parents/caregivers:

k3.4 Tools, methods and counseling techniques to increase adherence to the treatment regimen :

k3.5 Research design, methodology, and statistical analysis:

k3.6 Clinical application and limitations of published data and reports

k3.7 Regulatory/IRB/human subjects safety requirements and concerns for conducting research in the pediatric population

k3.8 Medical literature publication and review process

k3.9 Opportunities for disseminating pediatric knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)

k3.10 Appropriate pediatric-specific references

**Domain 4: Public Health and Patient Advocacy (4% of exam)**

**Tasks**

Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population healthcare policy.

4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.

4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.

4.3 Educate the public regarding the importance of health, safety, and wellness in infants, children and adolescents (e.g., poison prevention, vaccination, safe and effective medication use, substance abuse/misuse).

4.4 Participate in professional organizations related to pharmacy and pediatric practice.

4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.

**Knowledge of:**

k4.1 Healthcare disparities in pediatric patients

k4.2 Access to care disparities in pediatric patients

k4.3 Emergency preparedness resources for pediatric patients

k4.4 Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics)

k4.5 Public health initiatives and legislation to improve the overall well-being of children (e.g., smoking cessation, child proof caps, poison prevention, Best Pharmaceuticals for Children Act)

k4.6 Resources that improve access to medications and other therapies necessary for the care of pediatric patients (e.g., WIC, patient assistance programs, specialty pharmacies, compounding pharmacies)

k4.7 Professional organizations and their roles and resources related to advocacy

k4.8 Appropriate avenues to advocate for safe and effective use of medications in the pediatric populations (e.g., pediatric-specific formulations, removal of dangerous substances from the market, pediatric-specific product labeling)

k4.9 Evidence demonstrating value of post doctoral pediatric training and the pediatric pharmacy specialist (e.g., decreasing medication errors, decreased cost, decreased length of stay, improved outcomes)