

**A Petition to the
Board of Pharmacy Specialties
Requesting Recognition of
Pediatric Pharmacy Practice
as a Specialty**

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American Pharmacists Association (APhA)

American Society of Health-System Pharmacists (ASHP)

Pediatric Pharmacy Advocacy Group (PPAG)

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Definition of Pediatric Pharmacy Practice

Pediatric pharmacy practice specializes in the delivery of patient care services by pharmacists that ensures the safe and effective use of medications for all children from neonates through adolescents. The practice includes direct patient care for children, often provided through interprofessional health care teams, as well as advocacy and education for children and their families, wellness and health promotion, and activities that advance knowledge and skills in pediatric pharmacy.

**American College of Clinical Pharmacy (ACCP)
American Pharmacists Association (APhA)
American Society of Health-System Pharmacists (ASHP)
Pediatric Pharmacy Advocacy Group (PPAG)**

**A Petition to the Board of Pharmacy Specialties (BPS)
Requesting Recognition of
Pediatric Pharmacy Practice as a Specialty**

Executive Summary

Definition of Pediatric Pharmacy Practice

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—ACCP/APhA/ASHP/PPAG Task Group

Background

By acquiring specialized knowledge and skills and creating a unique practice beyond the scope of pharmacy practice defined by licensure examination, an increasing number of pharmacists have distinguished themselves through the care of pediatric patients according to the above Definition of Pediatric Pharmacy Practice. In recognition of these efforts, the American College of Clinical Pharmacy (ACCP), the American Pharmacists Association (APhA), the American Society of Health-System Pharmacists (ASHP), and the Pediatric Pharmacy Advocacy Group (PPAG) have partnered to develop a petition to the Board of Pharmacy Specialties (BPS) to recognize pediatric pharmacy practice as a specialty.

Petition Overview

Children comprise approximately one quarter of the U.S. population, and 13 percent of these children take medication on a regular basis. Due to the varying ages, weights, and developmental stages of children, they also require highly individualized care. Consequently, pediatric patients have substantial unmet needs in the areas of medication error prevention,

medication adherence, therapy management, individualized dosing and dosage forms, preventive care, and management of acute and chronic diseases.

Management of drug therapy for pediatric patients is complex and unique. Children of all ages are treated with medications that have been developed for adults and for which sparse data exist on how best to dose and monitor therapy to ensure optimal outcomes for the pediatric patient. These medications are often used off-label without suitable formulations or appropriate strengths because pediatric products are not commonly commercially available. Pediatric medications are frequently extemporaneously prepared formulations with liquids and injections diluted and tablets split to meet the specific needs of individual patients. These factors increase the likelihood of medication errors and may lead to variations in drug effects.

Drug therapy is further complicated in children because of their lower body weight and age-specific changes in pharmacokinetics and pharmacodynamics. These factors provide unique opportunities for pediatric pharmacists to improve the quality of care for pediatric patients. Many pharmacists who practice in neonatal and pediatric care settings have distinguished themselves by gaining in-depth knowledge, advanced training, and expertise to provide optimal care to pediatric patients across a wide spectrum of diseases. These pediatric pharmacists provide a specialized practice in sites that span both inpatient and outpatient environments.

Employers, health professionals, and society need a mechanism for identifying, recognizing, and providing access to pharmacists with the expertise to provide the specialized care required by pediatric patients.

BPS Petition Process

The *BPS Petitioner's Guide for Recognition of a Pharmacy Practice Specialty* outlines seven criteria, each with a list of supporting guidelines, to be addressed in a petition for specialty recognition. The petitioning organizations conducted a comprehensive literature review and examined, in detail, the 2012 *BPS Report of the Role Delineation Study of Pediatric Pharmacy* to support the development of this petition. We also conducted a web-based survey of pediatric pharmacists and their employers, the Pediatric Pharmacist Survey, to provide additional, timelier data for the petition. The evidence presented in the petition for each of the BPS criteria is briefly summarized below.

Criterion A: Need

This criterion identifies the public health and patient care needs that are currently unmet by pharmacists in generalized practice, pharmacists practicing in other specialty areas, or other

health professionals. The petition establishes how pharmacists in specialized pediatric practice can effectively meet these needs.

Pediatrics is a discipline that deals with biological, social, and environmental influences on the developing child and the impact of disease and dysfunction on development. Children differ from adults anatomically, physiologically, immunologically, psychologically, developmentally, and metabolically. Pediatric pharmacy practice is highly specialized and differentiated from the care of adult patients. Children vary in weight, body surface area, and organ system maturity, affecting their ability to metabolize and excrete medications. In addition, there are few standardized dosing regimens for children, with most medication dosing requiring body weight calculations. The possible causes of drug errors are multifactorial.

Approximately 70 percent of all pediatric hospital bed days are for chronic illnesses. Eighty percent of pediatric health care costs are expended for 20 percent of children. In 2006, approximately 13.9 percent of U.S. children were reported to have special health care needs and 21.8 percent of households with children had at least one child with a special health care need. Although the needs are substantial and diverse in pediatrics, it has been reported by the Children's Hospital Association that shortages of pediatric care means that many young patients must wait weeks and sometimes months to get an appointment. In a nationwide survey of rural hospitals, 36.2 percent responded that they were experiencing a shortage of pediatric providers within all disciplines in their area.

Pharmacists have a responsibility to the American public to ensure that medications are used appropriately and desired medication outcomes are achieved. These pharmacists serve as practice leaders within their institutions, organizations, and the profession. They often serve as preceptors for advanced pharmacy practice experiences (APPEs), introductory pharmacy practice experiences (IPPEs), and postgraduate year one (PGY-1) and postgraduate year two (PGY-2) residency experiences. The health challenges facing today's pediatric patients are not being adequately addressed by pharmacists in general practice or other specialty practices. BPS certification of pediatric pharmacy specialists will lay the groundwork for committed and interested pharmacists to focus their professional development, training, and educational efforts on preparing themselves to fully meet this public health need.

Criterion B: Demand

The criterion establishes that there exists a significant and clear health demand to provide the necessary public reason for certification. This is demonstrated through employer survey data, assessment of employment opportunities for pediatric pharmacy specialists, and letters and

statements by individuals in specific areas within the health care system. Demand is viewed as a willingness and ability to purchase a commodity or service.

The value of clinical pediatric pharmacists with specialized knowledge and skills is increasingly recognized within the profession and among health care professional colleagues. The demand for specialized pediatric pharmacists is demonstrated through sustained growth in employer demand and the increase in specialty training programs for pediatric pharmacists. In addition, 10 individuals and organizations contributed letters of support that specifically attest to the demand for pharmacists with training and knowledge to provide services in pediatric practice.

According to the *American Hospital Association Guide*, there are approximately 250 childrens' hospitals (less than 5 percent of all hospitals). The Pediatric Pharmacist Survey was fielded by the petitioning organizations to individuals with direct responsibility for hiring pediatric pharmacists. The survey yielded 87 responses. Hiring managers from 69 organizations indicated that they had recruited for 288 pediatric pharmacist positions over the past 3 years and had filled more than 96.6 percent of these positions. These same employers estimate that they will fill an additional 226 positions over the next 3 years and currently report 34 vacant positions within their organizations. Employers also estimated that they would see significant growth in the number of pediatric pharmacist positions within their organizations over the next 5 years.

Almost 70 percent of employers responding to the Pediatric Pharmacist Survey indicated that it was "highly likely," "likely," or "somewhat likely" that they would require a new specialty credential in pediatric pharmacy if approved by BPS. The survey also showed that only 11.5 percent of pediatric pharmacist positions currently require BPS certification or other earned credential. These results imply that a credential more targeted to the specific needs of pediatric pharmacists would be in demand in the marketplace.

Criterion C: Number and Time

This criterion quantifies that there are a reasonable number of individuals who devote most of the time of their practice to pediatric pharmacy practice.

The Pediatric Pharmacist Survey was fielded to 2,153 pharmacists in pediatric practice. Individuals were identified through membership records within ACCP, APhA, ASHP, and PPAG. Of the 667 responding pharmacists, 94 percent indicated that they are practicing at a specialty level. Based on these survey results, and estimates by experts in pharmacy practice, we draw the conclusion that 4,000 to 5,000 pharmacists are currently engaged in specialized pediatric practice. Clearly, this survey number is underestimated because not all pharmacists in pediatric specialty practice are members of the four partnering professional organizations. However, we

believe that pharmacists who are engaged as members of professional associations are more likely than others to pursue specialty recognition.

The growth in specialized pediatric practice is reflected in the increased number of PGY2 residency programs in pediatrics. Ten years ago, there were 17 ASHP-accredited specialty residency programs in pediatrics. Today, these programs number 39—an increase of 129 percent. Specialty residencies in pediatrics graduate approximately 44 pharmacists specializing in pediatrics each year.

The Pediatric Pharmacist Survey asked pharmacists to quantify the percentage of time in an average week that they spent engaged in direct patient care activities. Results showed that more than 79 percent of survey respondents spent at least 50 percent of their time engaged in direct patient care activities at the specialty level. The survey also indicated that almost 88 percent of responding pharmacists would be “highly likely,” “likely,” or “somewhat likely” to pursue specialty recognition in pediatric pharmacy practice certification within 5 years if such recognition were made available.

Criterion D: Specialized Knowledge

Criterion E: Specialized Functions

These criteria outline the specialized knowledge of one or more of the pharmaceutical sciences and the biological, physical, behavioral, and administrative sciences which underlie them required by pediatric pharmacy specialists and define the specialized functioning of the pediatric pharmacy specialist, which is distinct from other BPS-recognized pharmacy specialties.

Pediatric pharmacists possess a unique body of knowledge and skills enabling them to perform specialized functions that fulfill unmet patient care needs. Services provided by pediatric pharmacists, and the specialized knowledge that supports these functions, are qualitatively different from those provided by pharmacists in general practice. BPS analyzed these functions in a 2012 role delineation study, which describes and empirically validates the domains, tasks, and knowledge that comprise pediatric pharmacy practice.

According to the task analysis performed for that study, the following domains constitute pediatric pharmacy specialty practice:

- ***Patient Management*** – 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 health care team.

- **Practice Management** – Tasks related to advancing pediatric pharmacy practice and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.
- **Information Management and Education** – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of health care providers, trainees, patients, and caregivers.
- **Public Health and Patient Advocacy** – Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population health care policy.

The role delineation study presents 30 tasks that have been validated on the basis of the importance of the task statement and the frequency that the tasks are performed. The specialized skills required to perform these functions are as follows:

- *Retrieve and assess relevant medical information, manage the drug regimen, develop individualized care plans, and collaborate with other health care professionals.*
- *Design, implement, and monitor systems and policies to optimize the care of pediatric patients.*
- *Retrieve, generate, interpret, and disseminate knowledge related to pediatric pharmacy and the education of health care providers, trainees, patients, and caregivers.*
- *Provide preventive health services, public health information, and advocacy for health care policy that impacts the pediatric patient population.*

Pediatric pharmacists engaged in specialized functions have obtained competencies in the domains of patient management, practice management, information management and education, and public health and patient advocacy. The functions and skills associated with these domains include gathering, assessing, and integrating clinical data and information from multiple sources; managing and optimizing medication use in pediatric patients; developing individualized care plans; and developing effective long-term relationships with patients, caregivers, and other health professionals. Additional skills include conducting and evaluating research; employing evidence-based medicine and clinical guidelines; and using communication, motivation, and negotiation strategies. The petition also compares the differences between the recognized domains and functional areas for pediatric pharmacists and pharmacotherapy specialists.

Criterion F: Education and Training

This criterion describes the education, training, and experience required to acquire specialized knowledge and skills to perform the specialized functions and distinguishes from the generalized practitioner and the requirements of initial licensure.

According to the Accreditation Council for Pharmacy Education (ACPE) *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*, the pharmacy curriculum provides a thorough foundation in the biomedical, pharmaceutical, social/behavioral/administrative, and clinical sciences and prepares graduates with the competencies needed to enter pharmacy practice in any setting and to contribute to the profession of pharmacy throughout their careers. Currently, ACPE does not require APPEs to focus specifically on the area of pediatric care. Therefore, additional training is essential beyond a Doctor of Pharmacy (PharmD) degree for the breadth of knowledge needed to be a pediatric specialist.

Because pediatrics is an evolving specialized discipline that frequently employs an interdisciplinary health care team, many pediatric pharmacists have obtained the needed knowledge, skills, and abilities through mechanisms other than structured training programs. As of September 6, 2012, there are 39 PGY2 pediatric residency programs with 48 to 51 residency positions. There are also 3 pediatric pharmacy fellowship positions.

The state licensure examination sets a minimum standard for pharmacy practice. Following licensure, pharmacists can acquire the knowledge and skills necessary to be able to practice specialized pediatric pharmacy by a variety of methods. These methods may include:

- PharmD degree education, clinical work experience, and self-study.
- PharmD degree education, PGY1 residency training, clinical work experience, and self-study.
- PharmD degree education and PGY1 residency training, followed by PGY2 residency in pediatrics, clinical work experience, and self-study.

The most effective method to prepare an individual for a career as a pediatric pharmacist is through the completion of a PGY1 residency in pharmacy practice followed by completion of a PGY2 residency in pediatrics. Pediatric residencies are structured experimental learning opportunities that allow pharmacists to gain additional knowledge to ensure the safest and most beneficial use of medications in pediatric patients. BPS determines the requirements for education and training for the eligibility of the specialist.

Criterion G: Transmission of Knowledge

The criterion establishes that there is adequate transmission of specialized knowledge through professional, scientific, and technical literature immediately related to specialized pediatric care practice.

The distribution of information pertaining to safe and effective medication use in pediatrics occurs through mainstream peer-reviewed pharmacy journals, periodicals, newsletters, and other publications to expand the knowledge base of pediatric pharmacists. Professional organizations and networking groups help pediatric specialists to provide optimal care by promoting mentorship and expansion of knowledge. Pharmacy practice organizations offer hundreds of hours of live and web-based continuing pharmacy education opportunities related to new developments and issues concerning pediatric practice each year that cause the dissemination of knowledge and practice excellence. Enduring resources also are available through various methods. A substantial number of articles pertaining to pediatric topics are published annually, which shows a need for pediatric pharmacy specialists in providing the safest and most beneficial use of medications in pediatric patients.

Conclusion

Children comprise approximately one quarter of the population in the United States. Many of the diseases and conditions common in pediatric patients are managed primarily through medications that are significantly affected by physiologic differences in the metabolism, action, and toxicity in children compared with adults. Children cannot be viewed as “little adults” when assessing and managing drug therapy. Pediatric patients require a health professional with expertise in medication use and management, augmented by specialized knowledge and skills, to achieve optimal outcomes. Effective and contemporary pharmacy practice in pediatrics requires the acquisition and application of this specialized knowledge to meet the complex medication management needs of pediatric patients and to perform specialized functions.

While there is some overlap among BPS-recognized specialty areas, the needs of pediatric patients who are at heightened risks for medication errors, adverse events, and other complications are significant and growing. Pediatric pharmacy practice requires a deeper knowledge of drug therapies and disease states to make appropriate and safe recommendations for children. Pediatric differences in pharmacokinetics and pharmacodynamics require a vastly different approach to pharmacotherapy and a significantly expanded depth and breadth of knowledge compared with the knowledge required for generalized practice and other specialty practices.

The demand for services provided by pediatric pharmacists has grown consistently over the past 20 years, and at an increasing rate especially over the past decade as improving pediatric health outcomes and improving medication use in this population have taken on greater priority within our health care system and society. The specialized knowledge and functions, supported by societal needs and strong demand, are sufficiently unique to support the recognition of pediatric pharmacy practice as a distinct specialty. Recognition of pediatric

pharmacy practice as a specialty by BPS would provide a mechanism through which pharmacists could attain voluntary certification that measures and recognizes achievement of distinct knowledge, experience, and skill in meeting the unique needs of pediatric patients.

CRITERION A: Need

The area of specialization shall be one for which specifically trained practitioners are needed to fulfill the responsibilities of the profession of pharmacy in improving the health and welfare of the public, which responsibilities may not otherwise be effectively fulfilled. ***This criterion addresses NEED.*** BPS defines NEED as a condition of requiring supply.

The American Academy of Pediatrics has defined pediatrics as the specialty of medical science concerned with the physical, mental, and social health of children from birth until young adulthood. Pediatric practice encompasses a broad group of patients that includes neonates, infants, children, and adolescents. This specialty encompasses a broad spectrum of health services ranging from preventive health care to the diagnosis and treatment of acute and chronic diseases. Pediatrics is a discipline that deals with biological, social, and environmental influences on the developing child and with the impact of disease and dysfunction on development. Children differ from adults anatomically, physiologically, immunologically, psychologically, developmentally, and metabolically.¹

In the United States, approximately 70 percent of all pediatric hospital bed days are for chronic illnesses, with 80 percent of pediatric health expenditures focused on 20 percent of children. In 2006, approximately 13.9 percent of U.S. children were reported to have special health care needs and 21.8 percent of households with children had at least one child with a special health care need.² Although the needs are substantial and diverse in the area of pediatrics, the Children's Hospital Association reports that shortages of pediatric medical specialists mean that many young patients must wait weeks and sometimes months to get an appointment.³ In a nationwide survey of rural hospital chief executive officers (CEOs) (n = 1,031), 36.2 percent indicated they were experiencing a shortage of pediatric specialists.⁴

There are nearly 250 childrens' hospitals (less than 5 percent of all hospitals) with pediatric pharmacists. These childrens' hospitals include approximately⁵:

- 50 freestanding acute care childrens' hospitals, virtually all of which are teaching hospitals.
- 40 freestanding childrens' rehabilitation, specialty, and convalescent hospitals, including 16 short-term care facilities and 24 long-term care facilities.

- 50 freestanding childrens' psychiatric hospitals including approximately 10 short-term care and 40 long-term care facilities.
- 100 joint childrens' hospitals with large pediatric programs organized within larger medical centers that generally (but not always) call themselves childrens' hospitals.

Pediatric clinical pharmacy practice is highly specialized and differentiated from the care of adult patients. Children vary in weight, body surface area, and organ system maturity, which affects their ability to metabolize and excrete medications. In addition, there are few standardized dosing regimens for children, with most medication dosing requiring body weight calculations. Because of the myriad of factors involved in proper dosing for children, these pediatric patients face an increased risk for adverse drug events (ADEs).

GUIDELINE 1. Identify specific public health and/or patient care needs which are not being met currently and which pharmacists in the proposed specialty can meet effectively.

In 2008, children comprised approximately one quarter of the U.S. population, and 13 percent of them received a medication for use on a regular basis for a duration of at least 3 months.^{6,7} In a study assessing pediatric services in community pharmacies, it was found that approximately 30 percent of all prescriptions filled were for pediatric patients.⁸ Pediatric patients utilize a significant portion of drug therapy in the United States. Due to their varying ages, weights, and developmental states, they also require highly individualized pharmaceutical care. Consequently pediatric patients have substantial unmet needs in the areas of medication error prevention, medication adherence, therapy management, individualized dosing and dosage forms, preventive care, and management of acute chronic diseases.

The World Health Organization identified some of the major challenges associated with the use of medicines in the treatment of children and adolescents⁹:

- Medications used for this population are often off-label and unlicensed.
- Over-the-counter, traditional, and herbal medicines are readily available, but their use is generally not evidence-based and is often inappropriate.
- Counterfeit and substandard medicines are widespread.
- Abuse by teenagers occurs with non-medical prescription of legal medicines and illegal drugs.
- New and innovative medicines are available with a pediatric indication, but with no evidence of long-term benefit and risk.

Even managing chronic conditions such as asthma and diabetes in pediatric patients can be extremely challenging. With shortages of pediatric care in many areas of the country, the need for highly trained pediatric pharmacists has never been greater. In addition, many treatment

regimens cannot be easily individualized for the pediatric population. This complexity further emphasizes the importance of understanding pediatric physiology and pharmacotherapeutic response and implementing evidence-based care by a highly trained pediatric pharmacotherapy expert.¹⁰

The difficulty of treating pediatric patients often begins with the patient's inability to communicate symptoms and side effects or express location and intensity of pain. Furthermore, they are dependent on an adult caregiver for medication acquisition, administration, and adherence to their prescribed medications. Pediatric patients have physiologic and epidemiologic differences compared with adults, and these factors must be considered when formulating appropriate drug recommendations. These and other challenges provide unique opportunities for pharmacists to improve the quality of care for pediatric patients.¹¹

Physiologic differences between children and adults may result in age-related alterations in pharmacokinetics and pharmacodynamic responses. Factors such as gastric pH and emptying time, intestinal transit time, hepatic development, immaturity of secretion, and activity of bile and pancreatic fluid among other factors determine the oral bioavailability of medications in pediatric and adult populations. Anatomical, physiological, and biochemical characteristics in children also affect the bioavailability of medications through other routes of administration. Key differences in drug distribution between the pediatric population and adults are attributable to membrane permeability, plasma protein binding, and total body water. Important differences have been found in drug metabolism in the pediatric population compared with adults for both phase I and phase II metabolic enzymes. Immaturity of glomerular filtration, renal tubular secretion, and tubular reabsorption at birth and their maturation determine the different excretion of drugs in the pediatric population compared with the adult population.¹²

Safe medication practice is more complex in children than adults for several reasons¹³:

- There are age-dependent changes in pharmacokinetics, and these changes can affect dosing and patient response.
- As a result of these changes, dosages may vary greatly from patient to patient due to differences in size and maturity of systems responsible for the metabolism and excretion of medications.
- Dosing by weight, as an estimate of growth and development, increases the risk for mathematical errors.
- The majority of drugs are developed for use in adults and require adaptation for use in children.

Limited epidemiologic data are available regarding medication errors in the pediatric setting, and the potential for pediatric inpatient medical errors is substantial. Medication errors with the potential to cause harm are 8 times more likely to occur in neonatal intensive care units (NICUs) compared with hospital patient care areas for adults.¹⁴

Colleges and schools of pharmacy recognize the challenges confronting pediatric patients and have called for the expansion of pediatric education in their curricula. In a recent article evaluating pediatric pharmacotherapy education in a college of pharmacy, LaRochelle and Diaz noted that more pediatric education in the pharmacy curriculum would help produce more knowledgeable graduates who could assist in lowering medication error rates for pediatric patients.¹⁵

In comparison with pharmacy, medicine has recognized the need for specialization to meet the multifaceted medical needs of pediatric patients. The American Board of Pediatrics has now established 19 subspecialty certificate programs for its members (Table A-1).¹⁶

Table A-1. American Board of Pediatrics Subspecialties in Medicine

- Adolescent Medicine
- Child Abuse Pediatrics
- Developmental-Behavioral Pediatrics
- Hospice and Palliative Medicine
- Medical Toxicology
- Neonatal-Perinatal Medicine
- Neurodevelopmental Disabilities
- Pediatric Cardiology
- Pediatric Critical Care Medicine
- Pediatric Emergency Medicine
- Pediatric Endocrinology
- Pediatric Gastroenterology
- Pediatric Hematology-Oncology
- Pediatric Infectious Diseases
- Pediatric Nephrology
- Pediatric Pulmonology
- Pediatric Rheumatology
- Pediatric Transplant Hepatology
- Sleep Medicine
- Sports Medicine

Costs of Health Care

Health care costs make up more than 17.9 percent of the gross domestic product (GDP), growing at a rate of 3.9 percent in 2011. Should this rate of growth continue, health care spending will exceed 20 percent of GDP by 2021 and reach almost 30 percent of GDP by 2030.¹⁷ According to the Congressional Budget Office, this exceeds our country's spending on food or housing.¹⁸ Current efforts through the Patient Protection and Affordable Care Act to expand health care to uninsured children and adults place a strong emphasis on prevention for health care solutions. Adverse events, medication errors, increasing prevalence of obesity, and related chronic diseases in children¹⁹ contribute to rapidly rising health care costs and can be positively influenced through the care provided by pediatric pharmacy specialists to improve outcomes.

Pediatric Pharmacists in Specialized Practice

Many pharmacists who practice in neonatal and pediatric settings have distinguished themselves by gaining in-depth knowledge, advanced training, and expertise to provide specialized pharmaceutical care to pediatric patients across a wide spectrum of diseases. These pediatric pharmacists are in a position to be part of the solution to our nation's health care crisis. In specialized practices that span a variety of both institutional and outpatient environments, pediatric pharmacists assist patients in screening and monitoring health conditions, collaboratively manage their medications, ensure appropriate dosing and medication use, and minimize avoidable complications of their diseases, conditions, and pharmacotherapy. They also provide education, counseling, and support for patients, parents, and caregivers.

Pediatric patients with acute and chronic diseases and conditions require pharmacologic management by pharmacists with specialized training, knowledge, and experience in managing pharmacotherapy in infants and children. There is a need for a mechanism for identifying, recognizing, and providing access to pediatric pharmacists who can meet patient needs for specialized medication management. Individuals who have obtained specialist recognition and have attained the additional training, experience, and expertise to lead patients, the profession, other health care providers, and society to better public health are necessary for managing disease and reducing preventable conditions, complications, and sequelae. Specialty recognition of pediatric pharmacy practice by BPS would provide a mechanism through which pharmacists could attain voluntary certification that recognizes achievement of a focused and distinct level of specialized knowledge, experience, and skills in serving the unique medication needs of pediatric patients.

GUIDELINE 2. Specify how the functions performed by pharmacists in the proposed specialty address these specific needs of the public's health and well-being.

Pediatric pharmacists in specialized practice are located in many different settings including health systems, ambulatory clinics, physicians' offices, HMOs, community pharmacies, and managed care organizations. In their specialized practices, these pharmacists establish long-term relationships with patients, caregivers, and providers that form a foundation of trust, education, motivation, and support.

Pediatric pharmacists in specialized practice provide comprehensive pharmacotherapeutic management of pediatric patients that includes obtaining pertinent patient information via medical records, discussions with other health care professionals, and interviews with the patient, parent and/or caregiver. These pharmacists obtain relevant clinical and laboratory data as well as results of diagnostic procedures and they analyze and interpret all collected patient information. Pediatric pharmacists identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems. They establish therapeutic goals with the health care team, patients, parents, and caregivers. The cornerstones of their practice include designing, recommending, and implementing individualized age-appropriate therapeutic regimens and plans for monitoring the safety and efficacy of therapeutic regimens. These pharmacists also participate in the management of pediatric emergencies, reconcile medications across the continuum of care, and identify and refer patients to appropriate levels of care.

Practice management involves advancing pediatric practice through developing and implementing systems to ensure appropriate drug delivery for pediatric patients. Pediatric pharmacists participate in decision-making regarding selection and implementation of equipment and technology and provide decision support in the medication-use process. They are responsible for developing and maintaining a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs. They adopt, adapt, or develop evidence-based practice guidelines and protocols for the management of pediatric patients and establish processes to anticipate, prevent, review, and report medication errors and adverse events. Continuous quality improvement, directing the medication-use process for investigational drugs in pediatric practice, and justifying and documenting the clinical and financial value of pediatric pharmacy services are important aspects to the practice management functions of a pediatric pharmacist.

Pediatric pharmacists in specialized practice have significant responsibilities related to information management and education. They are actively engaged in providing staff development and education along with training for students and residents in pharmacy, medicine, and nursing concerning safe and effective use of medications and other issues about medication use in the care of the pediatric patient. They educate and provide counseling to

patients, parents, and caregivers regarding the safe and effective use of medications, treatment plans, the monitoring of side effects, and the importance of adherence to the treatment regimen. They make important contributions to the medical and scientific literature and retrieve and interpret biomedical literature with regard to study design, statistical analysis, study results, and applicability to pediatric pharmacy practice. Pediatric pharmacists also may be responsible for the development and maintenance of pediatric-specific medical reference libraries.

Specialized functions within pediatric practice include advocacy for public health initiatives to promote health, safety, and wellness in infants, children, and adolescents. Pediatric pharmacists advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and enhanced product labeling to promote the safe use of medication in pediatric patients. Pediatric pharmacists 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) and promote the role of the pediatric pharmacy specialist to health care system administrators, legislators, patients, parents, and caregivers. Engagement and involvement in professional organizations related to pharmacy and pediatric practice is an important component of developing leadership skills and clinical competency. Pediatric pharmacists also facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.

GUIDELINE 3. Describe and document with references how the public's health and well-being may be at risk if the services of practitioners in the proposed specialty are not provided.

Public Health Risks of Medication-Related Problems

The management of conditions that require medication therapy in neonates, infants, and children often necessitates off-label use. Clinical studies for most medications are conducted in adult patient populations and do not include or evaluate dosing and safety in infants and children. This paucity of clinical data specific to pediatric populations exposes pediatric patients to an increased risk of experiencing ADEs, especially if dosing is calculated by extrapolation of adult doses. Pharmacodynamic responses to medications in children may not be the same as in adults, and developmental changes may alter both the action of a drug and the patient's response to it.²⁰ Rapid changes of body mass and composition are associated with additional challenges in identification of adequate dosage regimens to be administered according to the existing developmental stage.

ADEs are a common complication of medical care. In pediatric medicine, doses of medications are usually calculated individually based on the patient's age, weight, and clinical condition. Consequently, there are increased opportunities for, and a relatively high risk of, dosing errors in this population. In a systematic review conducted by Wong and colleagues of 16 pediatric studies evaluating medication errors, dosing errors were found to be the most common type of errors reported. The authors concluded that dosing errors in this population are quite common and that a 10-fold overdose caused by calculation errors has led to serious consequences, including death.²¹ Over an 11-year period (1995-2005), Bourgeois and coworkers estimated the mean incidence of pediatric ADEs requiring medical treatment to be 585,922. Approximately 78 percent of pediatric patients with ADEs requiring treatment were seen in outpatient clinics while 12 percent were seen in emergency departments. Children aged 0 to 4 years had the highest incidence of ADE-related visits.²²

Public Health Risks of Chronic Diseases

An estimated 7.1 million children in the United States had asthma in 2011.²³ Despite the availability of effective controller medications, the annual rate of pediatric hospital admissions for asthma remains high.^{24,25,26} In an analysis of population-based data from California acute-care hospitals, asthma was ranked as the primary cause of hospitalization in children aged 1 to 5 years and the third cause of hospitalization in children aged 6 to 12 years.²⁵ In 1999, the hospitalization rate was 55.4 admissions per 10,000 population among children aged 0 to 4 years and 21.5 admissions per 10,000 population among children aged 5 to 14 years.²⁷ The emergency department visit rates also were high for these age groups.

The disproportionate share of costs for hospitalization and unscheduled emergency care of children with asthma is largely responsible for the significant economic burden of pediatric asthma.²⁸ The national annual health care cost for pediatric asthma is approaching \$3 billion, of which direct treatment costs account for approximately \$2 billion and indirect costs \$1 billion.²⁹ In 2004, a CDC analysis of the state of childhood asthma showed that over 750,000 children visited an emergency department, 198,000 children were hospitalized, and 186 children died from asthma-related complications.³⁰

Diabetes, a leading cause of nephropathy, retinopathy, neuropathy, and coronary and peripheral vascular disease in adults, is now the third most prevalent severe chronic disease of childhood in the United States.³¹ Individuals with diabetes diagnosed before the age of 20 years have a life expectancy that is 15 to 27 years shorter than people without diabetes,³² although prospective data show improvements in mortality for those diagnosed in more recent years.³² Until only a decade ago, diabetes diagnosed in children and adolescents was almost entirely type 1 diabetes, resulting most often from the autoimmune destruction of the β -cells of the

pancreas leading to an absolute deficiency of insulin. Diabetes in children and adolescents is now viewed as a complex disorder with heterogeneity in its pathogenesis, clinical presentation, and clinical outcome. The occurrence of type 2 diabetes in youth, particularly overweight minority youth, has been widely reported and researchers have found that the prevalence of type 2 diabetes increased 21 percent among children and adolescents from 2001 to 2009.³³

Pediatric pharmacy specialists are adept at managing the complex medication needs of pediatric patients with acute and chronic illnesses, as well as in detecting and addressing drug therapy problems, including preventable errors and predictable ADEs. With a solid relationship of trust as a foundation, these pharmacists motivate their patients and caregivers to adhere to treatment regimens and to actively and accurately monitor their chronic diseases. They likewise maintain collaborative, collegial relationships with other members of the health care team, built on a foundation of mutual respect and shared goals. These relationships foster an environment for prompt detection and resolution of medication- and disease-related problems experienced by pediatric patients. Without a sufficient supply of pharmacists who devote the majority of their time to direct, specialized patient care activities focused on pediatric patients, medication-related problems will continue to rise and persist undetected by other health professionals or pharmacists who interface with these patients episodically (or who spend the majority of their time engaged in administrative, dispensing, or general patient-care functions). Undetected preventable or ameliorable drug therapy problems lead to ADEs, nonadherence, disease progression, morbidity, or reduced quality of life for pediatric patients.⁶

GUIDELINE 4. Describe how functions provided by the practitioners in the proposed specialty will fulfill the responsibility of the profession of pharmacy in improving the publics' health.

The mission of pharmacy is to serve society as the profession responsible for the appropriate use of medications, devices, and services to achieve optimal therapeutic outcomes.

The vision of pharmacy states that by 2015, "pharmacists will be the health care professionals responsible for providing patient care that ensures optimal medication therapy outcomes."-Joint Commission of Pharmacy Practitioners³⁴

Pharmacists have a responsibility to the American public to ensure that medications are used appropriately and desired medication outcomes are achieved. Achieving the vision of the Joint Commission of Pharmacy Practitioners will require expansion in the number of specialized pharmacists with the knowledge, skills, and abilities to manage complex medication needs specifically for pediatric patients. Pediatric pharmacy specialists adeptly manage complex

medication regimens, develop and refine individualized patient care plans, work collaboratively as members of the health care team, conduct and publish research, and maintain long-term relationships with patients, parents, and caregivers.

Pediatric pharmacists serve as practice leaders within their institutions, organizations, and the profession. They often serve as preceptors for APPEs, IPPEs, and PGY1 and PGY2 residency experiences. A new specialty in pediatrics would be consistent with the BPS mission: “to improve patient care through recognition and promotion of specialized training, knowledge, and skills in pharmacy and specialty board certification of pharmacists.”³⁵ BPS specialty certification is not only the pharmacist’s path to advancement in contemporary medicine but also a roadmap for pharmacists who desire to gain additional training and knowledge to differentiate themselves from pharmacists in general practice or other specialty practices. By achieving certification, pharmacists acquire a tool that provides assurance of their specialized knowledge and skills to other health professionals, stakeholders, and society. The complexities of care for pediatric patients continue to multiply. Advances in medications and technology are driving a need for specialty-trained pharmacists to expand their knowledge and skills to integrate and manage highly complex medication therapy needs of the pediatric patient population.

GUIDELINE 5. Describe the reasons why the needs as described above are not or cannot be met by pharmacists who do not have specialized education and training.

General practice within pharmacy and medicine are often challenged to successfully meet the medication management needs of pediatric patients. For a myriad of reasons previously outlined, pediatric patients are at higher risk for medication errors, ADEs and other negative consequences of inappropriate medication use. Pediatric patients have immature metabolic systems and variable parameters that alter their response to medications and their reactions to health conditions. Licensure examinations by state boards of pharmacy evaluate some of the core functions performed by pediatric pharmacy specialists, but do so at a generalist level that does not evaluate abilities to manage complex needs of pediatric patients.³⁶ Pharmacists in general practice perform important medication management and patient education functions. However, management of complex pediatric patients frequently requires the advanced knowledge and skills of the specialized practitioner. Relying on general knowledge of medications and their predicted action, pharmacokinetics, and pharmacodynamic responses, based on adults, can have dire consequences for pediatric patients.

A significant number of pharmacists have prepared themselves to meet public health needs by providing specialized care for pediatric patients that includes comprehensive medication

management, collaborating with other health care providers, and addressing a broad range of other health-related needs for their pediatric patients. In addition, pediatric pharmacists in specialty practice have provided leadership among the profession in establishing patient care services, precepting student pharmacists in required APPEs and IPPEs, and training other pharmacists through residencies, fellowships, and live and enduring educational programs.

By any measure, the health challenges facing today's pediatric patients are not being and cannot be adequately addressed by pharmacists with entry-level knowledge and skills in general practice or other types of pharmacy specialties. BPS certification of pediatric pharmacy specialists will lay the groundwork for other committed and interested pharmacists to focus their professional development, training, and educational efforts on preparing themselves to fully meet this public health need.

GUIDELINE 6. Describe in detail how the needs as described above are not or cannot be met by pharmacists in those pharmacy specialties already recognized by BPS.

The health and medication management needs of pediatric patients are complex, and effective management requires distinct knowledge, training, and skills. Pediatric patients have specialized needs based on their age, weight, physical development, and customized dosing needs. ADEs and other medication problems occur much more frequently in this group than in adults.

While there is some overlap between specialized pediatric pharmacy practice and the existing BPS pharmacotherapy specialty, the knowledge and functions of pediatric pharmacy specialists are distinct and specifically focused on the unique needs of pediatric patients. The petitioners acknowledge the existence of a mechanism for added emphasis in certain areas of "added qualifications" within BPS (e.g., infectious diseases and cardiology within the qualifications for the Board Certified Pharmacotherapy Specialist [BCPS]); however, there are significant differences between the specialized practices of pediatric pharmacy practice and pharmacotherapy that make it important to recognize the pediatric specialty independently. The knowledge, skills, training, and functions of pharmacotherapy specialists lack the depth of specificity required to provide specialized pediatric pharmacy practice, without additional training and experience. Precedent for separate recognition of specialties can be found by looking to medicine's specialization structure, as described above in the commentary for Guideline 1.

It has long been recognized that the base of knowledge and skills in medicine far exceeds an individual's ability to master every facet of medicine. Currently, physicians may become certified in any of 145 medical specialties or subspecialties.¹⁶ Among the specialties in medicine,

overlap is apparent in many areas. This overlap is unavoidable given the complexities and commonalities within patient care. In comparison with pediatric pharmacy and pharmacotherapy specialties, separate and distinct medical specialties (i.e., not subspecialties) exist in family medicine, pediatric medicine, internal medicine, and public health/preventive care.

Likewise, in pharmacy, the breadth and depth of knowledge exceed an individual's ability to master content and skills at an advanced level in all areas of practice and pharmacotherapy. Specialty pediatric pharmacy practice is distinct from other BPS specialties in its emphasis on the pediatric patient population that requires substantial specialized knowledge, skills, and abilities working within a distinct and unique patient population.

GUIDELINE 7. Describe the reasons why the needs as described above are not or cannot be met by other health professionals.

Many of the diseases and conditions common in pediatric patients are managed primarily through medication therapy, requiring a health professional with expertise in medication use and management, including alterations in pharmacokinetics and pharmacodynamic responses that vary with age, weight, and level of development in pediatric patients. In addition, health professionals managing the pharmacotherapy of pediatric patients must possess specialized knowledge and skills regarding medication use to achieve optimal outcomes. Pediatric pharmacists are uniquely qualified among all health professionals as the medication-use experts on the health care team. Physicians, nurses, physician assistants, nurse practitioners, and others do not have the pharmacologic and pharmacotherapeutic expertise to identify drug therapy problems and manage nuances of medication use in pediatric patients with the perspective and understanding of the pharmacist. Pharmacists with specialized knowledge, skills, and practices in the care of pediatric patients are best positioned to meet the complex medication management needs of pediatric patients.

GUIDELINE 8. If these needs are currently being met by other areas of pharmacy practice, or by other health professionals, describe how these needs can be met more effectively by pharmacists in the proposed specialty.

Pharmacists in community pharmacies, hospitals, ambulatory care clinics, managed care organizations, and other settings where pediatric patients receive care are providing medication management, conducting screenings and monitoring, and performing important functions to optimize medication use. Patients with general needs are being served more effectively than are the increasing numbers of patients with complicated needs. These

successes contribute to the emerging, impressive data being gathered and published demonstrating the value of pharmacists' services and care for pediatric patients.

All pharmacists perform important patient care functions in serving the public health needs of society. By definition, pharmacists who voluntarily choose to earn BPS certification are prepared to meet the needs of patients within their respective specialty areas more effectively than entry-level pharmacists, because they have acquired specialized knowledge and training beyond the Doctor of Pharmacy degree and minimum standards for licensure. In all areas of pediatric pharmacy practice, collaboration with other members of the health care team is critical to prevent medication errors, ensure appropriate medication use, and ensure that desired therapeutic outcomes are achieved within the pediatric population. The needs of pediatric patients are significant, variable, and growing, and their needs are sufficiently distinct to support recognition of pediatric pharmacy practice as a separate specialty. Effective, successful, high-quality care for neonates, infants, and children will require the full application of specialized knowledge and skills of pediatric pharmacists and those who would seek to achieve specialty recognition in pediatric pharmacy practice.

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CRITERION B: Demand

The area of specialization shall be one in which there exists a significant and clear health demand to provide the necessary public reason for certification. ***This criterion emphasizes DEMAND.*** BPS defines DEMAND as a willingness and ability to purchase the services of a Board Certified Pharmacist.

The demand for pediatric pharmacists practicing at the specialty level can be expressed in terms of requests for services from patients and other health professionals. Employment trends and surveys that document increased demand for pharmacists who provide care to pediatric patients also reflect a significant and clear health demand.

Demand for Pediatric Pharmacist Services

Management of drug therapy for pediatric patients is complex and unique. Children of all ages are treated with medications that have been developed for adults, for which limited data exist on how best to dose and monitor therapy to ensure optimal patient outcomes for the pediatric patient. These medications are often used off-label without suitable formulations or appropriate strengths because pediatric products are not commonly commercially available. Pediatric medications are frequently extemporaneously prepared formulations with liquids and injections diluted and tablets split to meet the specific needs of individual patients. These factors increase the likelihood of medication errors and may lead to variations in drug effects.¹ Drug therapy is further complicated in children because of their lower body weight and age-specific changes in pharmacokinetics and pharmacodynamics. These factors provide unique opportunities for pediatric pharmacists to improve the quality of care for pediatric patients.¹

The value of pediatric pharmacists with specialized knowledge and skills is increasingly recognized. Pediatric groups external to the profession of pharmacy have indicated a demand for highly trained, experienced, and credentialed pediatric pharmacists. The American Academy of Pediatrics recognizes the role of the clinical pharmacist and provides recommendations that encourage a team environment for review of orders among health care professionals, foster pharmacist consultation, and support integration of clinical pharmacists into patient care rounds.² The American Academy of Pediatrics also acknowledges the value of skilled clinical pharmacists who specialize in pediatric oncology.³ In a position statement on medication safety in the NICUs, the National Association of Neonatal Nurses supports the involvement of

pharmacists in medication order review and on patient care rounds as a mechanism to improve medication safety.⁴

In addition, the *California Children's Services Manual of Procedures* has developed standards for NICUs that require pediatric pharmacist expertise within health systems that provide neonatal care. These standards require that⁵:

- There shall be at least one licensed pharmacist holding a Doctor of Pharmacy degree with neonatal expertise available for consultation to the NICU staff.
- Pharmacy staff and pharmaceutical services shall be available on a 24-hour basis.
- Pharmacy staff shall provide neonatal unit doses including individual neonatal intravenous and parenteral nutrition solutions, and neonatal nutritional products, in clearly marked containers, and shall also provide continuous drug surveillance.

GUIDELINE 1. Include statements of support by stakeholder organizations and other entities, other than petitioners, that attest to the demand for pharmacists with training and knowledge to provide services in the proposed specialty. Stakeholder organizations can include non-pharmacist health professional organizations, public and private health care entities, and consumer organizations.

Appendix B-1 provides statements from the following individuals and organizations that specifically attest to the demand for pharmacists with training and knowledge to provide services in pediatric practice:

Daniel K. Benjamin Jr., MD, PhD, MPH
Professor, Duke University
Chair, Pediatric Trials Network
Faculty Associate Director, Duke Clinical Research Institute

Robert W. Block, MD, FAAP
Professor Emeritus, Pediatrics
University of Oklahoma School of Community Medicine
President, American Academy of Pediatrics

William Greene, PharmD, BCPS, FASHP
Chief Pharmaceutical Officer
St. Jude Children's Research Hospital
Professor (Affiliated), Department of Clinical Pharmacy
The University of Tennessee College of Pharmacy

Christopher Jerry
President and CEO, Emily Jerry Foundation

Rita K. Jew, PharmD, FASHP
Executive Director, Pharmacy and Clinical Nutrition Services
CHOC Children's Hospital

Gregory L. Kearns, PharmD, PhD
Marion Merrell Dow/Missouri Chair in Pediatric Medical Research
Professor of Pediatrics and Pharmacology, University of Missouri–Kansas City
Clinical Professor of Pediatrics, University of Kansas School of Medicine
Chief Scientific Officer and Chairman, Research Development and Clinical Trials
Associate Chairman, Department of Pediatrics
Co-Principal Investigator, Pediatric Trial Network

Stuart Levine, PharmD
Informatics Specialist
Institute for Safe Medication Practices

Robert Luten, MD
Professor of Emergency Medicine
University of Florida, Division of Pediatric Emergency Medicine

William A. Miller, PharmD, FCCP, FASHP
Chair, *Pharmacotherapy* Board of Directors

Isabelle Von Kohorn, MD, PhD
Program Officer, Institute of Medicine

Key points within these letters of support speak to the demand for pediatric pharmacists practicing at the specialty level. Some of these valuable points that underscore the demand for specialty recognition are outlined below:

In his letter of support, William Greene, PharmD, BCPS, FASHP, Chief Pharmaceutical Officer, St. Jude Children's Research Hospital speaks directly to the demand for clinical pharmacists within his institution. Dr. Greene acknowledges that *pediatric practitioners have long accepted pharmacists as collaborators in care of their patients. However, increasingly, institutions are*

recognizing “advanced practice pharmacists” in a formal manner. Some institutions are pursuing formal pathways of privileging and credentialing that are similar to those currently in place for other “mid level” practitioners. St. Jude Children’s Research Hospital has recently taken the steps to privilege Clinical Pharmacy practitioners. This privileging process uses Board Certification (by BPS) as one of the “criteria” that must be fulfilled to be eligible for privileging.

William A. Miller, PharmD, FCCP, FASHP, Professor Emeritus, University of Iowa, and Chairman, *Pharmacotherapy* Board of Directors speaks directly to the value of pediatric specialists in managing care. *Based upon my experience in serving as a lead surveyor for residency programs in children’s hospitals and hospitals with high-risk pediatric patient populations (e.g., pediatric intensive care units [PICU], neonatal intensive care units [NICU], oncology, transplant, and general and other specialized pediatric patient care units or clinics), I can say with confidence that Chief Executive Officers, Chief Medical Officers, and Directors of Pharmacy in these institutions recognize the high risks of drug therapy in pediatric patient populations. For this reason, it is uncommon to find a hospital with a PICU, NICU, or other specialized unit that does not have pharmacists as members of specialized pediatric teams managing the care of these patient populations.*

Robert W. Block, MD, FAAP, Professor Emeritus of Pediatrics at the University of Oklahoma School of Community Medicine and President of the American Academy of Pediatrics also speaks to the demand for pediatric pharmacy specialists. *Pediatric pharmacy is as important as pediatricians. Family physicians need assistance [from pediatric pharmacists] with clinical prescribing for children. In the pediatric department I used to chair, we had pediatric pharmacists on our faculty as part-time instructors for our pediatric faculty and residents, in addition to their duties in their primary appointment within the College of Pharmacy. In short, they were essential for teaching and developing policy to reduce medical errors. Access to pediatric pharmacists has been an important component of clinical care and education in our department of pediatrics.*

The value of pharmacists practicing at the specialty level in pediatrics also was supported by Gregory Kearns, PharmD, PhD, Marion Merrell Dow/Missouri Chair in Pediatric Medical Research and Professor of Pediatrics and Pharmacology at the University of Missouri–Kansas City. *In both inpatient and outpatient pediatric medical settings, highly skilled, expertly trained clinical pharmacists serve the pharmaceutical needs of infants, children, and adolescents. Their contributions range from direct patient care to the conduct of research, which translates in effective therapeutic decisions that directly impact the lives of patients and their families. The ever-changing physical and psychosocial makeup of pediatric patients requires that pharmacists*

who serve them have a highly specialized body of knowledge that is vastly different from those of their colleagues who provide care to adults.

In speaking to the contributions that pediatrics pharmacists make to the health care team, Isabelle Von Kohorn, MD, PhD, a practicing neonatologist and Program Officer for the Institute of Medicine reflects that *despite extensive training in pharmacology, physicians are often not equipped to handle the increasingly complex pharmacotherapy needs of their patients. This can be particularly true in pediatrics where drugs are often used off-label, and the data are complex and ever changing. Clinical pharmacists deeply skilled and experienced in pediatric pharmacy are invaluable members of the pediatric team and truly impact the ability to improve the triple aim—providing better care for patients, better health for populations, and lowering the costs of health care.*

The demand for clinical pharmacists in pediatrics also extends to ensuring a competent, credible, and effective research network. Daniel K. Benjamin, MD, PhD, MPH, Professor at Duke University and Chair of the Pediatric Trials Network (PTN) speaks to the value of clinical pharmacists in research. The PTN is responsible for designing and completing trials to determine the exposure and safety of all off-label therapeutics in children. *As an investigator conducting clinical research in infants and children, I am very familiar with the challenges in providing optimal drug therapy in this population and believe that it is necessary for pharmacists caring for children to have specialized training. The PTN has a number of prominent pharmacists and pharmacologists in the fields of developmental pharmacology and pharmacogenomics. The expertise that these investigators bring to our program has allowed us to make considerable progress in evaluating the safety and efficacy of drugs in children.*

The role of pharmacists and the value of their knowledge base is highlighted by Robert Luten, MD, Professor, Department of Emergency Medicine, Division of Pediatric Emergency Medicine at the University of Florida–Shands Jacksonville Medical Center. *In my experience, there is frequently a need for recommendations [in translating pediatric doses to adult doses] for specific critical medications that are rarely ever resolved or even addressed by organizational consensus. The significance of these decisions cannot be underestimated. In these instances, the dosing guidelines generated were published and widely disseminated both nationally and internationally and have formed the standard upon which much of pediatric acute medicine is practiced today. The final decisions reached in all of these areas required the distillation of published literature, consensus expert opinion, and represented a unique body of knowledge which did not exist before that permitted clinicians to meet the unique needs of the critically ill child.*

Rita K. Jew, PharmD, FASHP, Executive Director, Pharmacy and Clinical Nutrition Services at CHOC Children's Hospital in Orange, California, quantified the demand for pediatric pharmacists in her letter of support. *The need for pediatric pharmacists has grown exponentially throughout the last decade. During my tenure here at CHOC Children's Hospital, the number of inpatient pharmacists has grown 113 percent from 12.5-full time equivalent (FTE) (or 15 pharmacists) 7 years ago to 26.65 FTE (or 29 pharmacists) today. This number is expected to reach 31.35 FTE (or 34 pharmacists) by July 2013. The same growth is experienced by most other stand-alone children's hospital around the country. In addition, as a specialty, Pediatric Pharmacy Practice has just begun to venture out to the ambulatory care setting. There will be additional demands for pediatric pharmacist specialists to expand to the ambulatory care setting as we move forward with the health care reform, as well as the accountable care organizations (ACO) and medical home models. Therefore, the demand for specialty pediatrics services will continue to grow, as will the need for Board Certified Pediatric Specialists.*

Stuart Levine, PharmD, Informatics Specialist at the Institute for Safe Medication Practices, promotes medication safety through the use of electronic information technology. He was part of the consult team that regularly assessed medication safety in pediatric hospitals around the country and provided his reflection on the lack of expertise in caring for pediatric patients. *As part of our consults, we evaluated the pediatric pharmacy clinical expertise available within both freestanding pediatric hospitals and those pediatric units that were part of primarily adult facilities. In many cases, we were surprised to see a lack of pediatric pharmacy expertise. This might mean the lack of expertise in general or the lack of expertise on off-shifts such as evening, nights, weekends, and holidays. It is very common in adult facilities that adult-oriented pharmacists are responsible for reviewing orders and preparing medications for pediatric and neonatal patients. In some cases, it has been years since they had an orientation to pediatric and neonatal pharmacology.*

Christopher Jerry is the President and CEO of The Emily Jerry Foundation. His daughter Emily died as a result of a medication error in Cleveland, Ohio after overcoming cancer. *Shortly after Emily's death, I decided to honor my beautiful little girl by changing careers and becoming a full-time patient safety advocate. I made this important decision in an effort to positively affect change in medicine in the United States and prevent similar errors from happening. I truly believe that offering this type of recognition to pharmacists across the United States is absolutely imperative. The primary reason being, it would definitely help ensure the safe and effective use of medications on our nation's smallest of patients. Most importantly, it would help significantly reduce the number of overall medication errors and subsequent deaths like my beautiful 2 year-old daughter Emily's that occur every year with our children, neonates, and adolescents.*

These statements are representative of the broad base of support and acceptance for recognition of pediatric pharmacists as specialists and reflect the widespread and growing demand for specialized pharmacy services for pediatric patients. All letter writers indicated their support for the recognition of pediatric pharmacy practice as a specialty.

GUIDELINE 2. Include estimates of positions for pharmacists with specialized training and knowledge in the proposed specialty that are currently filled and those that are currently unfilled. Identify these positions by practice settings. Describe the sources and methods used to determine these estimates.

According to the *American Hospital Association Guide*, there are nearly 250 children's hospitals (less than 5 percent of all hospitals) with pediatric pharmacists. These children's hospitals include approximately⁶:

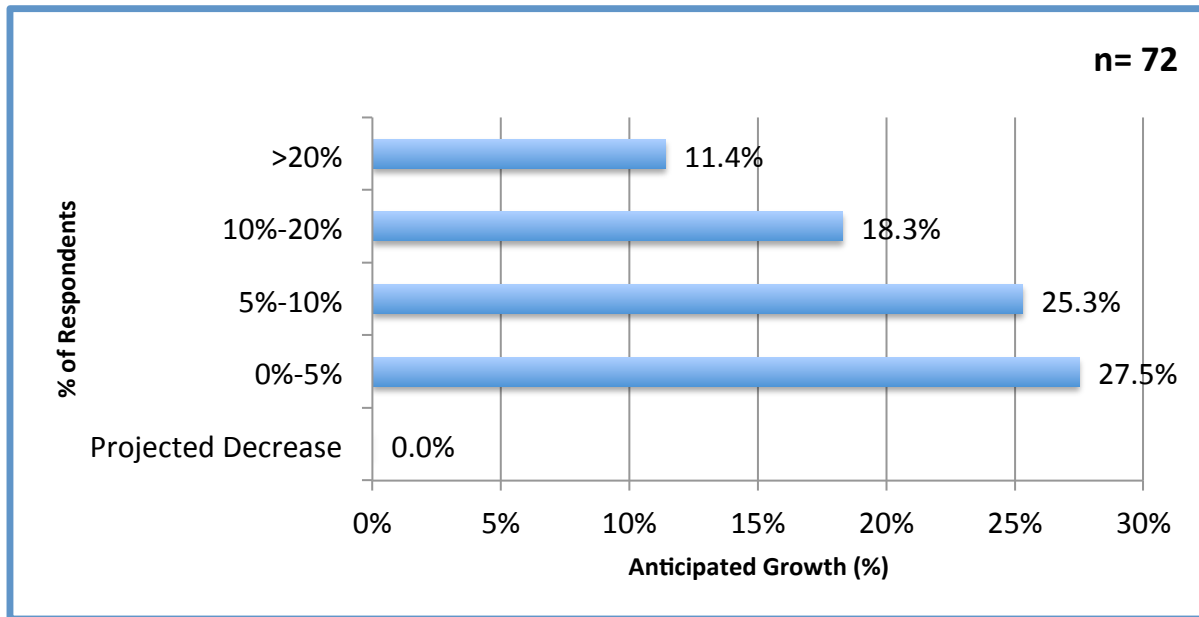
- 50 freestanding acute care children's hospitals, virtually all of which are teaching hospitals.
- 40 freestanding children's rehabilitation, specialty, and convalescent hospitals, including 16 short-term care facilities and 24 long-term care facilities.
- 50 freestanding children's psychiatric hospitals including approximately 10 short-term care and 40 long-term care facilities.
- 100 joint children's hospitals with large pediatric programs organized within larger medical centers that generally (but not always) call themselves children's hospitals.

In an effort to estimate the number of positions for pharmacists with specialized training and knowledge in pediatric practice, the petitioning organizations conducted a survey of pediatric pharmacists. The Pediatric Pharmacist Survey included a subset of questions that were completed by individuals with direct responsibility for hiring pharmacists in pediatric practice. Eighty-seven individuals completed the survey.

Responding employers were asked to provide the total number of FTEs allocated to serving pediatric patients within their organization. Although the number of positions varied greatly (range, 1 to 80 allocated FTEs), the average number of FTEs across responding organizations was 25.7. Hiring managers from 69 organizations that responded indicated that they had recruited for 288 pediatric pharmacy specialists over the past 3 years and had filled more than 96.6 percent of these positions. These same employers estimate that they will fill an additional 226 positions over the next 3 years and currently report 34 vacant positions within their organizations. Employers also estimated the growth in the number of pediatric pharmacy

positions within their organizations over the next 5 years. These results are provided in Figure B-1.

Figure B-1. Anticipated Growth in Pediatric Pharmacist Positions over the Next 5 Years



This information provided by employers of pediatric pharmacists demonstrates a consistent and growing market for pediatric specialists.

GUIDELINE 3. Include estimates of filled and unfilled positions in each of the past three (3) years in order to demonstrate a sustained or increased demand for pharmacists with specialized knowledge and training. Describe the sources and methods used to determine these estimates.

Employer demand for specialized pediatric services can be documented by tabulating employment opportunities for pharmacists that appear in selected pharmacy journals and in online employment sites for pharmacists. Figure B-2 details the numbers and sources for pediatric employment advertisements published from July 1, 2009, through January 1, 2012.

Figure B-2. Pediatric Pharmacist Employment Advertisements within the Profession

Professional Organization	Year	Number of Advertised Positions
ACCP	2009	70
ACCP	2010	89
ACCP	2011	63
Total ACCP Advertisements		222
ASHP	2009	25
ASHP	2010	30
ASHP	2011	21
Total ASHP Advertisements		76
PPAG	2009	17
PPAG	2010	31
PPAG	2011	28
Total PPAG Advertisements		76
<i>TOTAL ADVERTISEMENTS from January 1, 2009–January 1, 2012</i>		374

The quantity of advertisements demonstrates growth in available pediatric pharmacist positions, although the number of positions was likely impacted in 2011 by the economic recession. Organizational partners report that available positions to date in 2012 seem to demonstrate a renewed interest in hiring for pediatric specialists, possibly reflecting a potential positive shift in employer budgets and spending.

In addition, searches on a national employment web site aggregator (www.indeed.com) on July 28, 2012, yielded a significant number of open positions and an active recruiting environment for “pediatric pharmacists.” Results of these searches included 100 positions, 33 posted by organizations and 67 posted by professional recruiters. The same search was conducted on September 10, 2012, with results indicating 80 open positions, 38 posted by organizations and 42 posted by professional recruiters. The petitioning organizations made no attempt to differentiate practice functions requested by the employer in these advertisements. However, all advertisements specifically called for a pediatric pharmacist. Positions were offered primarily within schools and colleges of pharmacy and health systems.

Throughout print and online sources, the number of positions is probably underestimated for two reasons. First, it is not possible to estimate or make accurate assumptions concerning other methods employed to recruit pediatric pharmacy specialists, such as internal placements, word-of-mouth advertising, networking, or use of professional search firms. Second, professional recruiting efforts have shifted from published media (e.g., journals, newsletters) to electronic communication vehicles (online recruiting), where historical records are often not maintained when these positions have been filled. It is highly likely that positions advertised in the past 3 years have been increasingly electronic, and have not been adequately captured within this assessment.

Notably, the value of specialty recognition is becoming increasingly important to employers of pediatric pharmacists. Almost 70 percent of employers responding to the Pediatric Pharmacist Survey indicated that it was “highly likely,” “likely,” or “somewhat likely” that they would require a new specialty credential in pediatrics if approved by BPS. The survey also showed that only 11.5 percent of pediatric pharmacist positions currently require BPS certification or other earned credential. These results imply that a credential more targeted to the specific needs of pediatric pharmacists would be in demand in the marketplace.

¹ Sanghera N, Chan PY, Khaki ZF, et al. Interventions of hospital pharmacists in improving drug therapy in children: a systematic literature review. *Drug Saf.* 2006;29(11):1031-1047.

² American Academy of Pediatrics. Policy statement on prevention of medication errors in the pediatric inpatient setting. *Pediatrics.* 2003;112(2):431-436.

³ Corrigan JJ, Feig SA; American Academy of Pediatrics. Guidelines for pediatric cancer centers. *Pediatrics.* 2004;113(6):1833-1835.

⁴ National Association of Neonatal Nurses. Medication safety in the neonatal intensive care unit. Position statement #3055. July 2011. Accessed at http://www.nann.org/uploads/files/Medication_Safety_in_the_NICU_2011.pdf on August 22, 2012.

⁵ California Department of Health Care Services. Neonatal intensive care unit (NICU) Standards. Accessed at www.dhcs.ca.gov/services/ccs/Documents/CommunityNICU.pdf on August 4, 2012.

⁶ National Association of Children’s Hospitals. History of children’s hospitals. Accessed at http://www.childrenshospitals.net/AM/Template.cfm?Section=Fact_and_Trends&CONTENTID=12693&TEMPLATE=/CM/ContentDisplay.cfm on September 12, 2012.

CRITERION C: Number and Time

The area of specialization shall include a reasonable number of individuals who devote most of the time of their practice to the specialty area. ***This criterion relates to the NUMBER of practitioners and the amount of TIME spent in the practice of the specialty.***

The data sources for determining the number of pharmacists in pediatric practice and the time spent in this proposed specialty area include:

- The *Report of the Role Delineation Study of Pediatric Pharmacy* conducted by the Professional Examination Service on behalf of BPS.
- An analysis of membership records of ACCP, APhA, ASHP, and PPAG.
- Results of a membership survey, conducted by ACCP, on the topic of Recognition of New Specialties administered in March 2011.
- Results of a membership survey, conducted by ACCP, ASHP, and PPAG, on the topic of Board Certification in Pediatric Pharmacy Practice administered in June 2010.
- Results of a survey of pharmacists primarily practicing in pediatric practice as identified by the petitioning organizations. The Pediatric Pharmacist Survey was fielded to 2,153 pharmacists in August 2012.

GUIDELINE 1. Estimate the number of pharmacists currently practicing in the proposed specialty. Identify the types of practice settings for these pharmacists (e.g., academic, hospital, managed health care, community). Describe the sources and methods used to determine these estimates.

Specialty practice in pediatrics has experienced significant growth over the past 10 years. One indicator of this growth is the increased number of PGY2 specialty residency programs in pediatrics. Ten years ago, there were 17 ASHP-accredited specialty residency programs in pediatrics. Today, these programs number 39—an increase of 129 percent. In comparison to other recognized specialties, there are currently 72 PGY2 residency programs in oncology, 60 PGY2 residency programs in ambulatory care, 24 PGY2 residency programs in psychiatry, and 3 PGY2 residency programs in nutrition support. Currently, specialty residencies in pediatrics graduate approximately 44 pediatric pharmacy specialists each year.

To determine the number of practitioners who identified themselves as practicing in pediatric pharmacy, membership records from the four petitioning organizations were analyzed. After removing duplicate entries, we defined 2,153 individuals as currently working in a pediatric pharmacy practice setting. Clearly, this number underestimates the actual number of practicing pediatric pharmacists because not all pharmacists in pediatric practice are members of the organizations from whose records names were drawn and some may not have identified themselves as pediatric pharmacists in the membership records. However, we believe that those pharmacists who are more professionally engaged are more likely to pursue specialty recognition.

The Pediatric Pharmacist Survey was developed by the petitioning organizations to obtain additional quantitative data on the demand for pediatric specialists, the amount of time spent in pediatric practice, and the education and training of those practicing in the proposed specialty. The survey was fielded in mid-August 2012 and distributed to the 2,153 individuals identified through the database analysis of membership records from ACCP, APhA, ASHP, and PPAG. The response rate for this survey was 31 percent (667 pharmacists). More than 430 survey respondents took the initiative to sign the online petition in support of specialty recognition for pharmacists in pediatric practice. A copy of the survey instrument is attached as Appendix C-1.

Based upon these survey results and the estimated percentages of pharmacists who join professional organizations, we estimate that a total of 4,000 to 5,000 pharmacists are currently engaged in specialized pediatric practice.

Of the pharmacists surveyed, 94 percent indicated that they are practicing at a specialty level according to the following definition:

Definition of Pediatric Pharmacy Practice

Pediatric pharmacy practice specializes in the delivery of patient care services by pharmacists that ensures the safe and effective use of medications for all children from neonates through adolescents. The practice includes direct patient care for children, often provided through interprofessional health care teams, as well as advocacy and education for children and their families, wellness and health promotion, and activities that advance knowledge and skills in pediatric pharmacy.

The *Report of the Role Delineation Study of Pediatric Pharmacy* describes surveyed pharmacists' responses to questions about the setting where they provided the majority of their patient care and their primary role within that setting. Pediatric pharmacists worked most frequently at a freestanding, pediatric hospital (43.8 percent), and more than 50 percent of respondents indicated that they were practicing in the role of clinical specialist. The results from the role delineation study are shown in Figures C-1 and C-2.¹

Figure C-1. Practice Settings for Pharmacists in Pediatric Practice

Practice Setting	Number of Responses	Percentage
Adult hospital with pediatric wing/services	81	17.6%
Adult hospital with children's hospital within it	153	33.2%
Pediatric hospital, freestanding	202	43.8%
Pediatric ambulatory care clinic – freestanding	5	1.1%
Home care	2	0.4%
Other	18	3.9%
TOTAL	461	100%

Figure C-2. Roles of Pharmacists in Pediatric Practice

Practice Role	Number of Responses	Percentage
Director of Pharmacy	13	2.8%
Clinical manager	23	5.0%
Operational manager	6	1.3%
Clinical specialist	233	50.5%
Generalist pharmacist/decentralized pharmacist	63	13.7%
Staff pharmacist	43	9.3%
Academia	36	7.8%
Researcher	1	0.2%
Medication safety officer	3	0.7%
Other	40	8.7%
TOTAL	461	100%

GUIDELINE 2. For the pharmacists identified in Guideline 1, estimate the percentage of time they devote exclusively to the practice of the proposed specialty. Describe the sources and methods used to determine these estimates.

In the role delineation study, results show that respondents are highly engaged in the specialty of pediatric pharmacy with an average of 87 percent of work time spent providing pharmacy services to pediatric patients. Of the time spent providing services to pediatric patients, an average of 54 percent of time was spent providing direct patient care.¹

Respondents to the Pediatric Pharmacist Survey indicated the number of hours worked per week in their pediatric practice site and the percentage of time they devoted to exclusively providing patient care and services according to the Definition of Pediatric Pharmacy Practice. These results are outlined in Figures C-3 and C-4 and demonstrate that the vast majority of pediatric pharmacists practice within their pediatric site at least 40 hours per week (74.0 percent) and provide direct patient care and services at the specialty level more than 50 percent of the time (79.8 percent).

Figure C-3. Hours Worked Per Week in Pediatric Practice Site

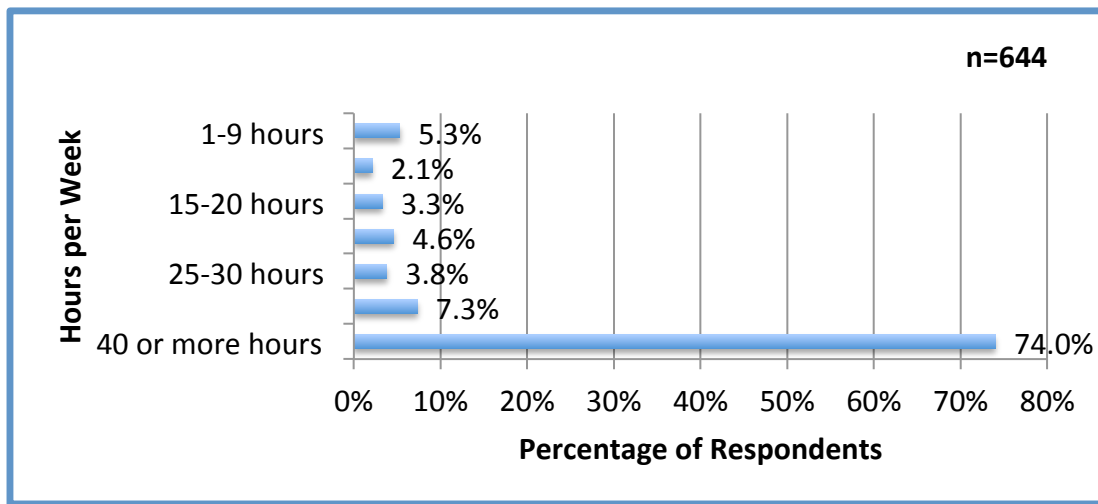
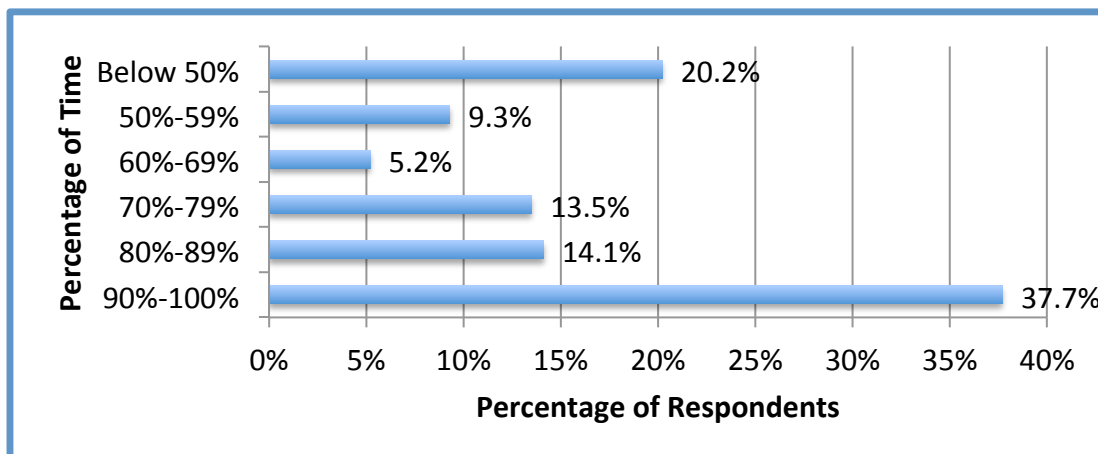


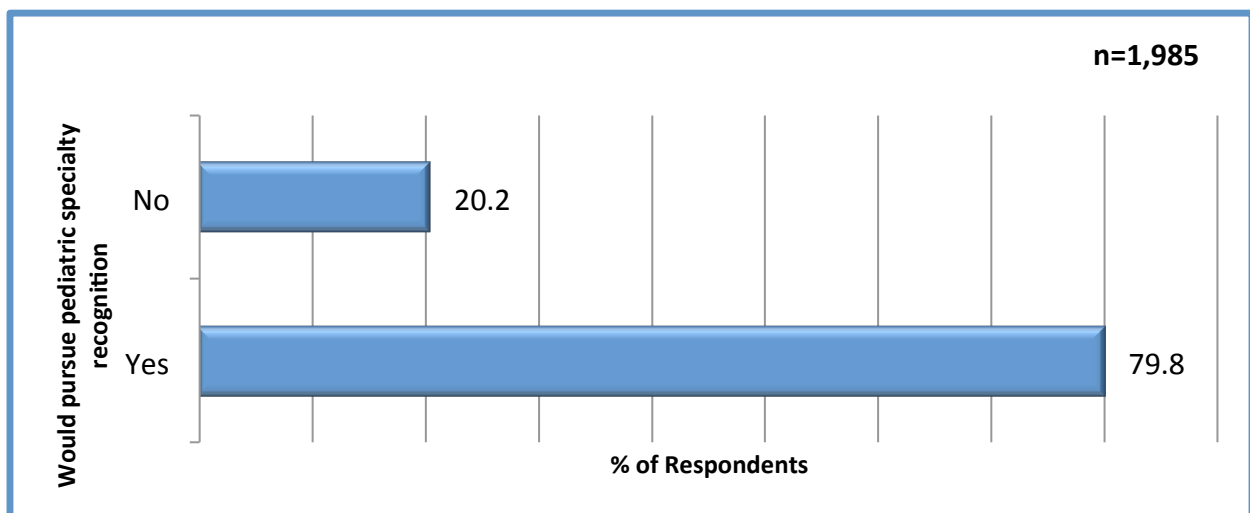
Figure C-4. Percent of Time Devoted Exclusively to Providing Direct Patient Care and Services According to the Definition of Pediatric Pharmacy Practice



GUIDELINE 3. Estimate the number of pharmacists who would likely seek board certification in the proposed specialty during the first five years in which board certification would be available. Describe the sources and methods used to determine these estimates.

In June 2010, ACCP, ASHP, and PPAG surveyed their membership on the topic of board certification in pediatric pharmacy practice. A total of 1,985 pharmacists responded to the question: “If BPS were to develop a Pediatric Certification Exam would you plan to sit for the exam?” Almost 80 percent (1,584) of respondents indicated yes (Figure C-5).

Figure C-5. Likelihood of Pursuing Pediatric Pharmacy Specialty Recognition Among ACCP, ASHP, and PPAG Members

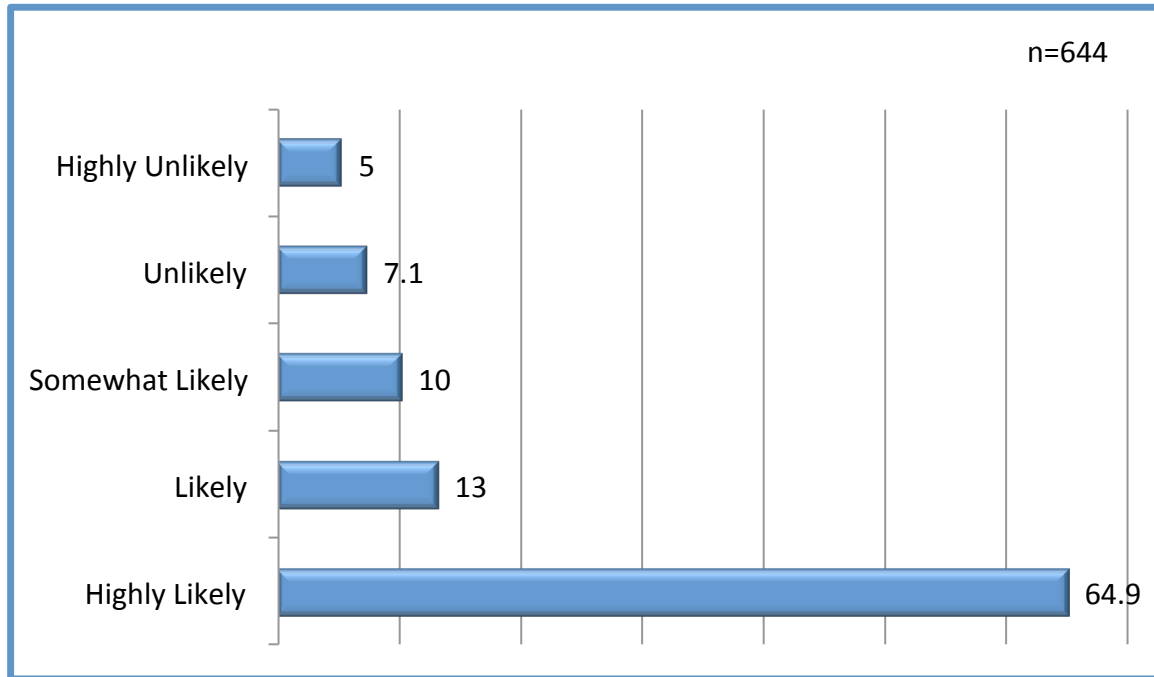


In March 2011, ACCP conducted a survey of their members to assess opinions on the recognition of new specialties. Respondents indicated that a specialty certification in pediatric pharmacy was needed to appropriately certify clinical pharmacy practitioners. Of the 1,099 respondents who are currently board certified, 56.7 percent believed that new BPS specialty certifications are needed to appropriately certify clinical pharmacy practitioners in pediatrics. In addition, the survey indicated that 107 individuals who are currently certified would seek specialty recognition in pediatrics if BPS specialty certification were offered. For respondents who were not currently board certified, 55.8 percent of the 724 respondents felt that new BPS specialty certifications are needed to appropriately certify clinical pharmacy practitioners in pediatrics. Ninety-seven individuals who currently are not certified would seek specialty recognition in pediatrics if BPS specialty certification in pediatrics were offered.

In addition, the Pediatric Pharmacist Survey conducted by the petitioning organizations asked respondents to indicate how likely they would be to pursue this specialty recognition within the

next 5 years if the petition to recognize pediatric pharmacy practice as a specialty is approved. Almost 88 percent of respondents, or 567 pharmacists, indicated that they would be “highly likely,” “likely,” or “somewhat likely” to pursue specialty recognition in pediatrics (Figure C-6).

Figure C-6. Likelihood of Pursuing Specialty Recognition within the Next 5 Years



Since this survey sampled only a portion of the individuals who may be engaged in pediatric specialty practice, the number of individuals who would seek certification is probably underrepresented. The growth and number of residency programs and the number of individuals who have indicated that they would be interested in certification are comparable to those of specialties currently recognized by BPS. Recognition of pediatric practice as a specialty has broad acceptance within the profession, as evidenced by the petitioning organizations, and will certainly increase the number of individuals who are likely to seek certification.

¹ Professional Examination Service on behalf of the Board of Pharmacy Specialties. *Report of the Role Delineation Study of Pediatric Pharmacy*. Washington, DC: Board of Pharmacy Specialties; April 2012.

CRITERION D: Specialized Knowledge

The area of specialization shall be based on specialized knowledge of one or more of the pharmaceutical sciences and the biological, physical, behavioral, and administrative sciences which underlie them. Procedural or technical services and the specific environment in which pharmacy is practiced are not applicable to this criterion.

This criterion relates to SPECIALIZED KNOWLEDGE.

The pediatric population represents a spectrum of physiologies, and children cannot be viewed as “little adults” when assessing and managing drug therapy. Substantial changes in body proportions and composition accompany growth and development in pediatric patients. The developmental changes in physiology and, subsequently, changes in pharmacology, influence the efficacy, toxicity, and dosing regimens of medications in children. These changes result in differences in absorption, distribution, elimination, hepatic and renal function, pharmacodynamics, and pharmacogenomics¹ and thus profoundly influence the decisions made by pediatric pharmacy specialists. Diseases in neonates, infants, and children also may be qualitatively and quantitatively different from those observed in adult patients, and both benefits and risks of drug therapies are unique in this population.² Specialized knowledge is required to assess and evaluate all of these intersecting concerns and make appropriate decisions for individual patients. A number of diseases typically affect the pediatric population and are not commonly diagnosed in adults. In addition, a large proportion of routine vaccination protocols involve care of pediatric patients.

Specialized pharmacy practice in pediatrics requires the acquisition and application of specialized knowledge to meet the complex medication management needs of pediatric patients and to perform the specialized functions detailed in Criterion E (Specialized Functions). Pediatric pharmacy specialists obtain this knowledge through a variety of means, which are discussed in detail under Criterion F (Education and/or Training) and Criterion G (Transmission of Knowledge).

The specialized knowledge of pharmaceutical sciences required to practice in this specialty is outlined below in Guideline 1. Guideline 2 associates this knowledge with the biological, physical, and behavioral sciences. Guidelines 3 and 4 explain how the knowledge applied by the

pediatric pharmacy specialist differs from that of the general practice pharmacist and of pharmacists practicing specialists in other recognized specialty areas of pharmacy practice.

GUIDELINE 1. Describe in detail the specialized knowledge of pharmaceutical sciences required for the proposed specialty.

There are significant differences between adult pharmacy practice and pediatric pharmacy practice. Patients with a broad range of diseases and conditions are managed in pediatric settings. These conditions often require complicated medication therapy and other interventions. Doses are much more individualized in pediatric practice, and there is often a lack of evidence for the therapies prescribed. In fact, greater than 70 percent of drugs used in pediatrics do not have a Food and Drug Administration–approved indication for use in pediatric patients.³ To effectively care for this complex patient population and take responsibility for achieving intended therapeutic outcomes, pediatric pharmacy specialists rely on a specialized body of knowledge that is distinct in both breadth and depth.

In 2012, a role delineation study was conducted to describe and empirically validate the domains, tasks, and knowledge that comprise specialty practice in pediatrics.⁴ The complete study is attached as Appendix D-1: *Report of the Role Delineation Study of Pediatric Pharmacy*. The role delineation study identified and validated four domains of specialty practice in pediatrics and the knowledge areas associated with each domain. The domains are:

- **Patient Management** – 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 health care team.
- **Practice Management** – Tasks related to advancing pediatric pharmacy practice and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.
- **Information Management and Education** – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of health care providers, trainees, patients, and caregivers.
- **Public Health and Patient Advocacy** – Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population health care policy.

This criterion documents the specialized knowledge required for professional practice as a pediatric pharmacy specialist. In order to perform functions of specialized pediatric practice, pharmacists must attain specialized knowledge in each of the four domains. This knowledge is

unique and required at a significantly deeper level, in comparison with the knowledge required by individuals in general practice or in other BPS-recognized specialties.

The *Report of the Role Delineation Study of Pediatric Pharmacy* lists 58 areas of knowledge identified within the four domains of pediatric practice. These areas of specialized knowledge are summarized in Table D-1.

Table D-1. Specialized Knowledge Unique to or Applied with Greater Emphasis and/or Depth by Pediatric Pharmacy Specialists

Domain	Knowledge Unique or Required with Greater Emphasis/Depth by Pediatric Pharmacy Specialists
Domain 1: Patient Management	<ul style="list-style-type: none"> ▪ Normal growth and development of the pediatric population ▪ Age-appropriate interviewing techniques for patients, parents, and caregivers ▪ Essential components of a medical history including maternal and birth history and childhood immunization status, if appropriate ▪ Essential components of a social history, including day care attendance, siblings, smoke exposure, home environment ▪ Pathophysiology, epidemiology, risk factors, diagnosis, prevention, and evidence-based treatment of common diseases and conditions in pediatric patients ▪ Equations to calculate body surface area, creatinine clearance, fluid requirements, and ideal body weight from birth to adult ▪ Pediatric populations for which standard calculated methods of assessment of renal impairment are not reliable ▪ Urine output calculation for body weight and appropriate output per age ▪ Methods for assessment of hepatic function in pediatric populations ▪ Normal laboratory values and vital signs from birth to adult ▪ Age-associated differences in pathophysiology and clinical manifestations of disease across patient populations ▪ Age-specific pharmacokinetic differences in neonates, infants, children, and adolescents ▪ Age-specific pharmacodynamic differences in neonates, infants, children, and adolescents ▪ Pharmacogenomic considerations in pediatric patients

	<ul style="list-style-type: none"> ▪ Appropriate use of off-label medications to treat pediatric patients ▪ Pediatric-specific drug interactions (e.g., ceftriaxone and calcium-containing products in the neonate, calcium and phosphorous in parenteral nutrition) ▪ 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) ▪ Influence of medications on the production of breast milk ▪ Excretion of medications and other substances in breast milk ▪ Appropriate dosing based on age and body size (e.g., body surface area, post-menstrual age, gestational age, dosing weight) ▪ Medication dosing in extracorporeal membrane oxygenation (ECMO) and in renal replacement therapy (e.g., continuous renal replacement therapy [CRRT], peritoneal dialysis [PD], hemodialysis [HD]) ▪ Medication dose adjustment in pediatric patients with renal and hepatic impairment ▪ Essential components of medication reconciliation in pediatric patients (e.g., concentration, dose in mg, palatability) ▪ Pediatric-specific adverse effects (e.g., liver failure with valproate, tetracycline and tooth discoloration) ▪ Differences in laboratory sampling for pediatric patients (e.g., blood volume; method, frequency and timing of sampling) ▪ Differences in the management of pediatric emergencies (e.g., respiratory distress, neonatal seizures, cardiopulmonary arrest) ▪ Nutritional and fluid requirements for infants and children for normal growth and disease ▪ Childhood immunization schedules ▪ Factors affecting adherence to the treatment regimen ▪ Specialty needs of pediatric patients requiring referral to other providers (e.g., infant with signs of dehydration, patient needs compounded oral formulation)
<p>Domain 2: Practice Management</p>	<ul style="list-style-type: none"> ▪ Medication safety considerations (e.g., Institute for Safe Medication Practices [ISMP] and Joint Commission recommendations, Food and Drug Administration [FDA] alerts) ▪ Position statements, white papers, and national guidelines as an aid to the development of health-system policies and procedures ▪ Pediatric-specific considerations (e.g., age and body size) in the design or

	<p>improvement of medication use processes (e.g., computerized physician order entry [CPOE], infusion pumps, electronic medical record [EMR])</p> <ul style="list-style-type: none"> ▪ Routes of administration (e.g., intraosseous, oral/enteral, parenteral, IM, transdermal, intranasal, intraventricular) ▪ Impact of medication administration techniques on drug delivery in pediatric patients (e.g., inhalers, dead space in intravenous (IV) tubing, overfill, j-tip device) ▪ Medication administration technology (e.g., infusion pumps, subcutaneous needle devices, intranasal administration devices, aerosols) ▪ Appropriate references to support the preparation of pediatric formulations (e.g., IV dilutions, extemporaneously compounded preparations) ▪ Considerations when selecting pediatric-appropriate dosage formulations ▪ Metrics for evaluating quality of pediatric pharmacy services (e.g., patient/parent/caregiver satisfaction, length of stay, readmission, medication errors)
<p>Domain 3: Information Management and Education</p>	<ul style="list-style-type: none"> ▪ Principles and methods of educating pharmacy staff, fellows, residents, student pharmacists and/or other health care professionals regarding pediatric health-related issues ▪ Age-appropriate patient education principles and methods ▪ Health literacy and cultural considerations in educating patients/parents/caregivers ▪ Tools, methods and counseling techniques to increase adherence to the treatment regimen ▪ Research design, methodology, and statistical analysis ▪ Clinical application and limitations of published data and reports ▪ Regulatory/Institutional Review Board (IRB)/human subjects safety requirements and concerns for conducting research in the pediatric population ▪ Medical literature publication and review process ▪ Opportunities for disseminating pediatric knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters) ▪ Appropriate pediatric-specific references
<p>Domain 4: Public Health and Patient Advocacy</p>	<ul style="list-style-type: none"> ▪ Health care disparities in pediatric patients ▪ Access to care disparities in pediatric patients

	<ul style="list-style-type: none"> ▪ Emergency preparedness resources for pediatric patients ▪ Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics) ▪ 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) ▪ Resources that improve access to medications and other therapies necessary for the care of pediatric patients (e.g., Women’s, Infants and Children Special Supplemental Nutrition Program (WIC), patient assistance programs, specialty pharmacies, compounding pharmacies) ▪ Professional organizations and their roles and resources related to advocacy ▪ 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) ▪ 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)
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Specifically related to pharmaceutical sciences, in-depth knowledge of drugs used in all disease states and conditions prevalent in pediatrics are required. Knowledge of integrated pharmacotherapeutic principles associated with medications and diseases managed in pediatrics—and the interplay of each—is particularly important in specialized pediatric practice. Specialized knowledge of pharmaceutical sciences in pediatrics requires a solid educational foundation, such as that acquired through entry-level Doctor of Pharmacy programs and defined in the ACPE *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*.⁵

Pediatric pharmacy specialists build on a foundation of knowledge in medicinal chemistry, including the chemical basis of pharmacology and therapeutics and structural activity relationships that lead to drug-target interactions, and chemical pathways of drug metabolism, coupled with a broad understanding of pharmacology. Pharmacologic principles of medications used in pediatrics, including mechanism of action, pharmacodynamics, pharmacokinetics, bioavailability, bioequivalence, potential ADEs, and interactions between drug-target, drug-drug, drug-food, and drug-lab tests underpin these pharmacists’ ability to analyze individual patient situations and make determinations regarding medication treatment. Knowledge of pharmaceuticals and biopharmaceuticals provides important insights into drug delivery through varying dosage forms and their associated physical-chemical properties, which may influence adherence and product selection for patients. Knowledge of toxicology, exposure, and poison

control, and a baseline understanding of pharmacogenomics, extemporaneous compounding, and enteral and parenteral nutrition add to this foundation.

Bloom's taxonomy of learning states that acquiring knowledge is only the first step in the hierarchy of cognitive learning that enables critical thinking, synthesis, and problem solving.⁶ Specialized knowledge provides the foundation—the means to the desired end—enabling pharmacists to perform the specialized tasks and functions required to identify and solve drug therapy problems.^{3,7}

Knowledge associated with the detection, assessment, understanding, and prevention of ADEs is critical. Pediatric patients, especially all newborns and infants, are particularly at risk for experiencing ADEs. These ADEs may have a more severe effect in pediatric patients compared with adults and can lead to significant morbidity and mortality.⁸ For example, weight-based (mg/kg) or body surface area (mg/m²) dosing results in an infinite number of possible doses. Neonatal and pediatric patients can vary in weights from the 0.5 kg premature neonate to the 200 kg obese adolescent, which makes for the potential of a 400-fold dosing error. In adult patients, a 2-fold dosing error is usually the maximum encountered.³ Pediatric pharmacy specialists enhance their ability to prevent, detect, or ameliorate ADEs through acquiring and maintaining specialized knowledge of potential ADEs associated with medications and combinations of medications used in the management of pediatric patients.

GUIDELINE 2. Explain fully the relationship of this specialized knowledge to the biological, physical, and behavioral sciences.

A broad-based, in-depth, specialized knowledge of the pharmaceutical sciences provides the critical underpinning of the complex knowledge in the biological, physical, and behavioral and social sciences required to manage the needs of pediatric patients. Increasing attention is being given to the importance of knowledge acquisition and maintenance and its influence on health care quality in the United States.⁹ Pediatric pharmacy specialists must possess specialized knowledge in anatomy and physiology, pathophysiology, and pathogenesis of diseases and conditions commonly experienced by patients in pediatrics, along with knowledge of physical and clinical assessment techniques. They must keep abreast of changes in technology associated with detecting, diagnosing, and managing patients, as well as integrate knowledge of laboratory analyses and their relation to health status and drug therapy. To ensure quality, pediatric pharmacy specialists must maintain specialized and up-to-date knowledge of evidence-based medicine, clinical practice guidelines, and clinical research. They must often understand systems and processes in pediatric research. The ability to interpret the published literature to determine the validity of the research methods, results, and outcomes and to

make judgments regarding the relative merits of conflicting information is a critical, foundational skill used by the pediatric pharmacy specialist.

In the behavioral sciences, pediatric pharmacy specialists must understand theory and strategies of motivational interviewing, interpersonal communication, listening, negotiation, cultural competence, and health literacy. These skills must be applied broadly to patients, caregivers, and other health care professionals. In addition, the pediatric patient population in the United States is becoming more culturally diverse. It is estimated that by the year 2020, approximately 40 percent of school-aged children will be from minority groups.¹⁰

This knowledge also sustains skills required to motivate patients and/or caregivers to adhere to medication therapies, to make choices that have a positive influence on the patient's health, and to detect ADEs or other medication problems.

Collaboration with prescribers and other members of the health care team in managing complex pediatric patients requires specialized knowledge in communication and negotiation strategies with peers, subordinates, and superiors. In addition, the pediatric pharmacy specialist must be knowledgeable regarding the methods and systems for documenting patient-care activities and plans (e.g., through SOAP notes, electronic communication systems).

Pediatric pharmacy specialists need to be highly skilled in the public health, social, and political dimensions of health care, including expertise in drug development, medication evaluation, regulation and reimbursement issues, and evidence-based therapeutic decision-making skills to inform both clinical practice and broader medication policy. Pediatric pharmacy specialists also require sophisticated knowledge of, and skills in, ethical interactions with the pharmaceutical industry, whether through involvement in the design, conduct, or review of medication research, or through playing a key role in helping achieve rational use of medicines in clinical practice across a range of settings. These pharmacists also must be highly skilled in conducting high-quality research to generate needed evidence in pediatric practice.¹¹

The body of specialized knowledge described in Guidelines 1 and 2 provides the required foundation for the development of the analysis, synthesis, and problem-solving skills required by pediatric pharmacy specialists. As Bloom suggests, learning is hierarchical. Learning and performance at high levels, such as that required for the management of complex chronic diseases and associated drug therapy follows a process that begins with obtaining knowledge (i.e., learning facts) and comprehending that knowledge.⁶ Applying the knowledge is an interim step, leading ultimately to the ability to fully use the knowledge in analysis, synthesis, and evaluation. The skills and functions performed by pediatric pharmacy specialists that

demonstrate the highest levels of specialized knowledge acquisition needed to make determinations regarding drug choice, treatment of pediatric diseases, and synthesis of care plans are described in Criterion E.

GUIDELINE 3. Discuss in detail how this specialized knowledge differs from the knowledge base of a recent graduate with a Doctor of Pharmacy degree.

An individual who has earned a Doctor of Pharmacy degree is educated to provide care in generalized practice in a variety of patient care settings. The scope of practice defined by licensure examination (through the North American Pharmacist Licensure Examination [NAPLEX] in most states) assures that a licensed pharmacist has met the baseline, minimum standards to practice pharmacy. An earned degree from an accredited school or college of pharmacy and licensure by examination prepare an entry-level pharmacist to deliver generalized pharmaceutical care more effectively than any other type of health professional in the U.S. health care system.

The licensure examination, by definition, sets a *minimum* competency standard. Specialty certification, by contrast, confirms the acquisition of specialized knowledge that prepares a pharmacist to contribute at evolved and advanced practice levels.” Most patients who receive care in pediatric settings require the skillful, specialized knowledge and medication therapy management provided by pediatric pharmacy specialists in order to reach their desired health outcomes.

The NAPLEX Blueprint (see Appendix D-2) is a list of competency statements describing the knowledge, judgment, and skills expected of an entry-level pharmacist. The licensure examination establishes the acquisition, comprehension, and application of basic, general pharmacy practice knowledge but not the analysis, synthesis, and evaluation of specialized knowledge in relation to complex medication therapy. The minimum competency standards set by licensure fall short of the validated knowledge and expertise required of a pediatric pharmacy specialist.

Pediatric pharmacy specialists apply specialized knowledge in the domains of patient management, practice management, information management and education, and public health and patient advocacy. These domains include specialized knowledge in the pharmaceutical, biological, and behavioral sciences associated with managing and optimizing medication use, developing individualized care plans (including clinical pharmacokinetic dosing when necessary), and developing long-term relationships with patients and other health professionals. Required specialized knowledge also includes expertise associated with the

conduct and evaluation of research; evidence-based medicine and clinical guidelines; and communication, motivation, and negotiation strategies.

While many of these concepts are introduced in the Doctor of Pharmacy curriculum, they are neither mastered at a specialty level during entry-level education nor measured by the licensure examination. Doctor of Pharmacy curricula generally devote minimal hours to the diseases that occur and the drug therapies used in pediatric populations.¹² Remarkably, in a survey of entry-level Doctor of Pharmacy programs in the United States, only 18 percent of programs offered an elective course in pediatric pharmacology.¹³ In a 2005 opinion paper, the ACCP Pediatric Practice and Research Network stated that the ideal pediatric curriculum within an entry-level program should consist of 25 to 30 hours of didactic instruction in pediatric-specific topics, the availability of an elective course in pediatric pharmacotherapy, and at least one required APPE that is facilitated by a pediatric specialist.¹⁴ However, many programs appear to fall short of these recommendations.

There are expectations that pediatric pharmacy specialists are able to continuously evaluate new data and put them in the appropriate context. The capacity to critically appraise data and information in all pharmaceutical sciences as well as synthesize and translate the information into effective solutions are primary functions of the pediatric pharmacy specialist. These abilities often require significant practical experience beyond the completion of the Doctor of Pharmacy degree.

Specialty pediatric practice requires a deeper knowledge of drug therapies and disease states to make appropriate and safe recommendations for children. Pediatric differences in pharmacokinetics, pharmacodynamics, and pharmacogenomics require a completely different approach to pharmacotherapy and a significantly expanded depth and breadth of knowledge compared with generalized practice. This knowledge and required approaches to applying this knowledge in pediatric practice are not routinely integrated into the current Doctor of Pharmacy curriculum.

GUIDELINE 4. Discuss in detail how this specialized knowledge differs from the knowledge base of those specialty areas already recognized by BPS.

No currently recognized BPS specialty encompasses the domains and specialized areas of knowledge required of pediatric pharmacy specialists. Nuclear pharmacy lacks the fundamental pharmacotherapeutic, medication management, and direct patient care–related knowledge of pediatrics. Specialties in ambulatory care, nutritional support, psychiatry, and oncology focus on relatively narrow segments of pediatric patients and therefore lack the required breadth.

The sole BPS specialty that initially appears to require specialized knowledge in areas that overlap with some of those of the proposed pediatric specialty is pharmacotherapy.

Pediatrics has a unique body of knowledge that is not currently assessed on the pharmacotherapy specialist examination. Currently, there are an extremely limited number of questions that deal specifically with pediatric practice on either the pharmacotherapy or nutrition support specialty exams. While some overlap in knowledge domains exists, the significant differences in the needs and care requirements of the pediatric patient population are substantial. The proposed specialty in pediatric practice requires, at its foundation, knowledge of similar domains to those in pharmacotherapy¹⁵, but with a much greater focus on medication knowledge and its application in the pediatric population. In contrast, knowledge domains for pharmacotherapy specialists are primarily focus on adults. Table D-2 compares these domains with the four domains of the proposed pediatric specialty.

Table D-2. Comparison of Domains in Pediatric Pharmacy and Pharmacotherapy

Pediatric Pharmacy Specialist Domains (Proposed Examination Percentage)	Pharmacotherapy Specialist Domains (Examination Percentage)
Patient Management (60%)	Patient-Specific Pharmacotherapy (60%)
Practice Management (20%)	Retrieval, Generation, Interpretation, and Dissemination of Knowledge in Pharmacotherapy (25%)
Information Management and Education (18%)	Systems and Population-Based Pharmacotherapy (15%)
Public Health and Patient Advocacy (2%)	

Knowledge in pediatrics demands in-depth assessment of pharmacology, toxicology, pharmacokinetic, and dosing challenges specifically within pediatric populations. For example, pharmacists practicing in the NICU deal with disease states that are uncommonly seen in other patient populations (i.e., necrotizing enterocolitis, congenital surgical issues). Disease state management is also very different between children and adults. In oncology, adults commonly confront prostate, lung, and breast cancer, while these diseases are not seen in pediatric populations. Pediatric pharmacy specialists must be prepared to manage conditions such as acute lymphoblastic leukemia that only affect children and are not likely a practice focus for pharmacotherapy specialists.

Pediatric pharmacy specialists must engage in higher level, more complex evaluation of pediatric patients, often requiring the evaluation and interpretation of literature to guide drug treatment and patient management decisions. An understanding of ethical issues associated with caring for and/or studying drug effects in a vulnerable population is also required. These

are examples of issues that are not part of routine practice for most pharmacotherapy specialists.

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- ¹ World Health Organization. *Promoting Safety of Medicines for Children*. 2007. Accessed at http://www.who.int/medicines/publications/essentialmedicines/Promotion_safe_med_childrens.pdf on September 2, 2012.
- ² Fabiano V, Mameli C, Zuccotti G. Adverse drug reactions in newborns, infants and toddlers: pediatric pharmacovigilance between present and future. *Expert Opin Drug Saf*. 2012;11(1):95-105.
- ³ Poole R, Carleton B. Medication errors: neonates, infants and children are the most vulnerable! *J Pediatr Pharmacol Ther*. 2008;13(2):65-67.
- ⁴ Professional Examination Service on behalf of the Board of Pharmacy Specialists. *Report of the Role Delineation Study of Pediatric Pharmacy*. Washington, DC: Board of Pharmacy Specialties; April 2012.
- ⁵ Accreditation Council for Pharmacy Education. *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*. 2007. Accessed at: <http://www.acpe-accredit.org/standards/default.asp> on August 10, 2012.
- ⁶ Bloom BS, ed. *Taxonomy of Educational Objectives: The Classification of Educational Goals*. Chicago, IL: Susan Fauer Company, Inc.; 1956.
- ⁷ Anderson LW, Krathwohl DR, Airasian PW, et al. *A Taxonomy for Learning, Teaching, and Assessing — A Revision of Bloom's Taxonomy of Educational Objectives*. New York, NY: Addison Wesley Longman, Inc.; 2001.
- ⁸ Priyadharsini R, Surendiran A, Adithan C, et al. A study of adverse drug reactions in pediatric patients. *J Pharmacol Pharmacother*. 2011;2(4):277-280.
- ⁹ Holmboe ES, Lipner R, Greiner A. Assessing quality of care: knowledge matters. *JAMA*. 2008;299(3):338-340.
- ¹⁰ American Academy of Pediatrics Committee on Pediatric Workforce. Culturally effective pediatric care education and training issues. *Pediatrics*. 1999;103(1):167-170.
- ¹¹ Gazarian M. Training pediatric clinical pharmacology and therapeutics specialists of the future: the needs, the reality, and opportunities for international networking. *Paediatr Drugs*. 2009;11:63-66.
- ¹² Low JK, Baldwin JN, Greiner GE. Pediatric pharmacy education for U.S. entry-level doctor of pharmacy programs. *Am J Pharm Educ*. 1999;63(3):324-327.
- ¹³ Morris J, Knoderer C. Assessment of web-based training modules on learning facilitation for advanced pharmacy practice experiences in pediatrics. *J Pediatr Pharmacol Ther*. 2011;16(3):210-215.
- ¹⁴ Aucoin RG, Buck ML, Dupuis LL, et al. Pediatric pharmacotherapeutic education: current status and recommendation to fill the growing need. *Pharmacotherapy*. 2005;25(9):1277-1282.
- ¹⁵ Board of Pharmacy Specialties. Content Outline for the Pharmacotherapy Specialty Certification Examination. April 2010. Accessed at http://www.bpsweb.org/pdfs/content_outline_pharmacotherapy.pdf on August 12, 2012.

CRITERION E: Specialized Functions

The area of specialization shall represent an identifiable field of pharmacy practice which requires specialized functioning by the practitioner and which is distinct from other BPS-recognized pharmacy specialties. ***This criterion refers to SPECIALIZED FUNCTIONS.***

GUIDELINE 1. Specify and describe in detail, specialized functions performed routinely by practitioners in the proposed specialty which are not performed by pharmacists in general.

Functions performed by pediatric pharmacy specialists are qualitatively different from those provided by general practice pharmacists. While pediatric pharmacy specialists may occasionally perform some of the same functions as a general pharmacy practitioner, many functions performed by a specialist are distinctly different. Pharmacists in specialized practice routinely perform functions that are unique and require greater depth, or greater emphasis, than do their counterparts in general pharmacy practice.

BPS analyzed these functions in the *Report of the Role Delineation Study of Pediatric Pharmacy*, which describes and empirically validates the domains, tasks, and knowledge that comprise pediatric pharmacy practice.¹ According to the BPS task analysis, the following four domains are associated with pediatric pharmacy specialty practice:

- ***Patient Management*** – 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 health care team.
- ***Practice Management*** – Tasks related to advancing pediatric pharmacy practice and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.
- ***Information Management and Education*** – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of health care providers, trainees, patients, and caregivers.
- ***Public Health and Patient Advocacy*** – Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population health care policy.

Within these domains, the role delineation study presents 30 tasks that have been validated on the basis of the importance of the task statement and the frequency that the tasks are performed. The full list of validated tasks in pediatric pharmacy practice can be found in Appendix D-1. The essential functions in specialized pediatric pharmacy practice are reported in Table E-1.

Table E-1. Essential Functions in Specialized Pediatric Pharmacy Practice

Domain	Essential Functions in Managing Complex Pediatric Patients
<p>Domain 1: Patient Management</p>	<ul style="list-style-type: none"> ▪ 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 health care colleagues and/or patient/parent/caregiver interview. ▪ Obtain relevant clinical and laboratory data and results of diagnostic procedures. ▪ Analyze and interpret collected patient information. ▪ Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems. ▪ Establish therapeutic goals with health care team and patient/parents/caregivers. ▪ Design, recommend and/or implement an age-appropriate therapeutic regimen with health care team and patient/parents/caregivers. ▪ Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary. ▪ Participate in the management of pediatric emergencies. ▪ Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters. ▪ Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to

	an appropriate alternative level of care.
Domain 2: Practice Management	<ul style="list-style-type: none"> ▪ Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients. ▪ Participate in decision-making regarding selection and implementation of equipment/technology and decision support involved in the medication use process (e.g., infusion pumps, computerized physician order entry, bar coding). ▪ Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs. ▪ Adopt, adapt or develop evidence-based practice guidelines and protocols for the management of pediatric patients in accordance with health-system policies and procedures. ▪ 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]). ▪ Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use. ▪ Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population. ▪ Justify and document the clinical and financial value of pediatric pharmacy services.
Domain 3: Information Management and Education	<ul style="list-style-type: none"> ▪ Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists. ▪ Educate health care 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. ▪ Educate and provide counseling to

	<p>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.</p> <ul style="list-style-type: none"> ▪ Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish). ▪ Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice. ▪ Develop and maintain a pediatric-specific medical reference library (electronic or print).
<p>Domain 4: Public Health and Patient Advocacy</p>	<ul style="list-style-type: none"> ▪ Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents. ▪ Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients. ▪ 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). ▪ Participate in professional organizations related to pharmacy and pediatric practice. ▪ Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat. ▪ Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., health care system administrators, legislators, patients/parents/caregivers).

GUIDELINE 2. Describe the special skills required to perform functions specified above.

All pharmacists are educated to obtain, interpret, and evaluate patient information to appropriately manage drug therapy, assess the need for treatment and/or referral, and identify patient-specific factors that affect health, pharmacotherapy, and disease management. Pediatric pharmacy specialists have refined and expanded these skills, often through additional training, experience, and credentials, and they more frequently perform specialized functions in caring for pediatric patients. The specialized functions described in Guideline 1 are the foundation for the analytic and problem-solving skills required by pediatric pharmacy specialists. Based on the role delineation study, the following skills are required to perform specialized functions:

1. Retrieve and assess relevant medical information, manage the drug regimen, develop individualized care plans, and collaborate with other health care professionals.

Specialists treat, assess, and appropriately triage pediatric patients. Specialists gather appropriate and required information from medical records, caregivers, and other health professionals to evaluate the patient's medication regimen. They analyze and interpret information on agents, dosing regimens, dosage forms, routes of administration, and delivery systems and work with the health care team, the patient, and caregivers to establish appropriate medication therapy. They are skillful in detecting and preventing ADEs and other medication problems. Specialists monitor the safety and effectiveness of prescribed agents and reconcile any issues with drug therapy. This requires specialists to be skillful in gathering and assessing complete information related to drug problems and response to therapy. Pediatric pharmacy specialists rely on close collaboration with caregivers and other members of the health care team in managing pediatric patients. These professional interactions require performance of specialized functions in communication and negotiation strategies with both peers and subordinates.

2. Design, implement, and monitor systems and policies to optimize the care of pediatric patients.

Specialists must have organizational and management skills that support the identification and analysis of issues and problems in conjunction with subsequent development and implementation of solutions. Pediatric pharmacy specialists employ evidence-based medicine and clinical guidelines to plan, develop, and implement systems and processes to ensure appropriate drug use in pediatric patients. They must understand evidence-based guidelines and protocols as well as implement methods and systems for documenting patient care

activities and plans (e.g., through SOAP notes or electronic communication systems). Specialists also have the skills necessary to perform continuous quality improvement activities aimed at enhancing the safety and effectiveness of drug use.

3. Retrieve, generate, interpret, and disseminate knowledge related to pediatric pharmacy and the education of health care providers, trainees, patients, and caregivers.

Specialists must have the skills to investigate, search for, retrieve, and assess information from a variety of sources, including the peer-reviewed scientific literature, clinical guidelines, and other information and resources for patients and health care professionals. Specialists are able to analyze information from multiple sources and to synthesize and apply this knowledge to the management and care of individual patients.

Specialists employ exceptional communications skills, negotiation skills, and conflict-resolution techniques. They possess interviewing skills that enable them to obtain information relevant to the care of the patient, discover pertinent elements of the patient's history, assess information to identify nonmedication factors that may affect patient outcomes, and determine potential issues with health literacy or cultural competency.

4. Provide preventive health services, public health information, and advocacy for health care policy that impacts the pediatric patient population.

Specialists must understand and appreciate the health care disparities in pediatric patients and possess planning and management skills that support engagement in public health initiatives that promote the health, safety, and wellness of pediatric patients. Skills in research can help provide a needed evidence base for use of medications in pediatric populations. Public speaking skills, leadership abilities, negotiation strategies, and communications skills are often required to facilitate access to care, advocate for patients, resolve financial issues or drug shortage concerns, and demonstrate leadership in the event of a public health threat.

GUIDELINE 3. Discuss in detail how these specialized functions differ from the functioning of a recent graduate with a Doctor of Pharmacy degree.

A recent graduate with a Doctor of Pharmacy degree is educated to provide care in generalized practice in a variety of settings. The scope of practice defined by the licensure examination assures that a licensed pharmacist has met the baseline, minimum standards to practice pharmacy. The licensure examination, by definition, sets a minimum competency standard. BPS certification is a voluntary process by which a pharmacist's education, experience, knowledge,

and skills in a particular practice area are confirmed well beyond what is required for licensure.² Pediatric patients who receive care require the specialized skills provided by pediatric pharmacy specialists in order to optimize health and medication-use outcomes.

The NAPLEX Blueprint³ (see Appendix D-2) is a list of competency statements describing the knowledge, judgment, and skills expected of an entry-level pharmacist. Achieving a passing score on the licensure examination confirms the acquisition, comprehension, and application of basic, general pharmacy practice skills; it does not indicate the ability to engage in the specialized tasks or functions in relation to complex medication therapy as outlined in the *Report of the Role Delineation of Pediatric Pharmacy*. These minimum competency standards do not encompass the validated functions and skills required of the pediatric pharmacy specialist.

Pediatric pharmacy specialists engaged in specialized functions have obtained competencies in the domains of patient management, practice management, information management and education, and public health and patient advocacy. The functions and skills associated with these domains include gathering, assessing, and integrating clinical data and information from multiple sources; managing and optimizing medication use in pediatric patients; developing individualized care plans; and developing effective long-term relationships with patients, caregivers, and other health professionals. Additional skills include conducting and evaluating research; employing evidence-based medicine and clinical guidelines; and using communication, motivation, and negotiation strategies. While pharmacy students acquire and practice some of these skills and functions during their Doctor of Pharmacy program, they are neither mastered at a specialty level during entry-level education nor measured by the licensure examination.

GUIDELINE 4. Discuss in detail how these specialized functions differ from the functions required in those pharmacy specialties already recognized by BPS.

No currently recognized BPS specialty encompasses the specialized functions required of the pediatric pharmacy specialist. For example, specialists in nuclear pharmacy lack the fundamental pharmacotherapeutic, medication management, and direct patient-care skills of pediatric pharmacy specialists. Specialties in ambulatory care, nutritional support, psychiatry, and oncology do not focus on the care of pediatric patients and consequently lack the required breadth. The sole currently recognized specialty area that appears to require specialized knowledge in areas that overlap with those of the proposed pediatric specialty is pharmacotherapy. A closer look at the domains and specialized areas of knowledge for both specialty areas, however, reveals important differences.

The BPS-recognized specialty in pharmacotherapy is divided into three domains: patient-specific pharmacotherapy; retrieval, generation, interpretation, and dissemination of knowledge in pharmacotherapy, and systems and population-based pharmacotherapy.

Table E-2 compares the pharmacotherapy specialist domains with those outlined in the *Report of the Role Delineation Study of Pediatric Pharmacy*.

Table E-2. Comparison of Domains in Pediatric Pharmacy and Pharmacotherapy

Pediatric Pharmacy Specialist Domains (Proposed Examination Percentage)	Pharmacotherapy Specialist Domains (Examination Percentage)
Patient Management (60%)	Patient-Specific Pharmacotherapy (60%)
Practice Management (20%)	Retrieval, Generation, Interpretation, and Dissemination of Knowledge in Pharmacotherapy (25%)
Information Management and Education (18%)	Systems and Population-Based Pharmacotherapy (15%)
Public Health and Patient Advocacy (2%)	

While some overlap in functional domains exist, the differences are significant. Pediatric pharmacy specialists require skills that allow them to engage in defined and important tasks and functions specific to the care of pediatric patients. Indeed, as the role delineation survey reveals, the pediatric pharmacy specialist performs in depth a substantial range of direct management functions such as obtaining required patient information via medical record or engaging in discussions with health care colleagues, parents, patients, and caregivers. Pediatric specialists then analyze and interpret collected information to prioritize current or potential patient-specific medical, medication, and nutrition-related problems. They often perform these functions without the benefit of an evidence-based literature base owing to the nature of the patient population that they serve. Domains of practice management and public health and patient advocacy within pediatric pharmacy practice do not significantly overlap with pharmacotherapy.

Significant differences in the depth of the functional areas with regard to the care of pediatric patients differentiate the pediatrics and pharmacotherapy. Functions associated with the care and management of pediatric patients are focused on the unique, and often nuanced care required due to variations in development and age-related pharmacokinetic changes. Examples

of functions that are unique to pediatric specialists would include managing pediatric emergencies, performing age-appropriate medication counseling with the child and family members, and ensuring that infants or children are appropriately immunized according to the current CDC Recommended Immunization Schedule for Children. Pediatric pharmacy specialists also bear responsibility for the development and maintenance of pediatric-specific medical reference libraries. These specialists also advocate for the availability of age-appropriate formulations, for safety and efficacy studies in children, and for information product labeling for children.

¹ Professional Examination Service on behalf of the Board of Pharmacy Specialties. Report of the Role Delineation Study of Pediatric Pharmacy. Washington, DC: Board of Pharmacy Specialties; April 2012.

² Board of Pharmacy Specialties. The objective standard-bearer. Accessed at <http://www.bpsweb.org/about/objective.cfm> on September 2, 2012.

³ National Association of Boards of Pharmacy. NAPLEX blueprint. Accessed at: <http://www.nabp.net/programs/examination/naplex/naplex-blueprint/> on September 10, 2012.

⁴ Board of Pharmacy Specialties. Content outline for the Pharmacotherapy Specialty Certification Examination. April 2010. Accessed at http://www.bpsweb.org/pdfs/content_outline_pharmacotherapy.pdf on August 12, 2012.

CRITERION F: Education and/or Training

The area of specialization shall be one in which schools and colleges of pharmacy and/or other organizations offer recognized education and training programs to those seeking advanced knowledge and skills in the area of specialty practice. ***This criterion addresses EDUCATION and/or TRAINING.***

GUIDELINE 1. Describe in detail the education, post-graduate training programs, and/or experience required to acquire such specialized knowledge and skills. Discuss how such education, post-graduate training programs, and/or experience differ from the education, post-graduate training programs, and/or experience of a recent graduate with a Doctor of Pharmacy degree.

According to the ACPE Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree, the pharmacy curriculum provides a thorough foundation in the biomedical, pharmaceutical, social/behavioral/administrative, and clinical sciences; the Doctor of Pharmacy degree program prepares graduates with the competencies needed to enter pharmacy practice in any setting and contribute to the profession of pharmacy throughout their careers.¹

The pharmacy curriculum ensures optimal medication therapy outcomes and patient safety, satisfies the educational requirements for licensure as a pharmacist, and meets the requirements of universities for the degree. The curriculum also develops in graduates the knowledge that meets the criteria of good sciences, professional skills, attitudes, and values as well as the ability to integrate and apply learning both to the present practice of pharmacy and to the advancement of the profession. The Doctor of Pharmacy degree curriculum provides the basic education and training that graduates need to practice at a generalist level. It also provides general education and training for the pediatric pharmacist.

ACPE's standards and guidelines also require a pharmacy practitioner to be knowledgeable and competent in many areas critical to the foundation and delivery of effective patient care. The standards outline broad, general requirements for pharmacist-provided care for special populations, including pediatric patients. These requirements indicate that pharmacists must

be competent in pathophysiologic and pharmacotherapeutic alterations specific for special-population patients, prescription and nonprescription medications dosage calculations, and adjustments in drug monitoring for positive/negative outcomes in special populations of patients. However, according to a review published in 2012, the mean time devoted to pediatric topics in U.S. Doctor of Pharmacy programs is only 17 hours (range, 2.8 to 52.8 hours), despite the fact that pediatric patients are a significant patient population for pharmacists in practice.²

Experientially, ACPE standards require students to complete IPPEs and APPEs. Furthermore, ACPE standards require that APPEs include primary, acute, chronic, and preventive care among patients of all ages and that these experiences develop pharmacist-delivered patient care competencies. ACPE standards do not require APPEs to specifically address the area of pediatric practice. However, some schools and colleges of pharmacy do require completion of an APPE and/or IPPE in pediatrics. In other schools and colleges, pediatrics can be chosen as an elective or, to some extent, may be experienced during an inpatient or acute care medicine rotation.

Following completion of the academic degree program, pharmacists must pass the NAPLEX, developed by the National Association of Boards of Pharmacy. Successful performance on the NAPLEX is an indication that the candidate demonstrates the knowledge, judgment, and skills required of an entry-level pharmacist. The three areas of expected competency assessed on the NAPLEX are as follows³:

- Area 1: Assure safe and effective pharmacotherapy and optimize therapeutic outcomes.
- Area 2: Assure safe and accurate preparation and dispensing of medications.
- Area 3: Provide health care information and promote public health.

Following licensure, pharmacists can acquire the differentiated knowledge and skills required for specialized pediatric pharmacy practice by a variety of methods. These methods may include:

- PharmD degree education, clinical work experience, and self-study.
- PharmD degree education PGY1 residency training, clinical work experience, and self-study.
- PharmD degree education and PGY1 residency training, followed by PGY2 residency in pediatrics, clinical work experience, and self-study.

The most effective way to prepare for a career as a pediatric pharmacist is to complete a PGY1 pharmacy residency followed by completion of a PGY2 residency in pediatrics. Residency programs provide the most effective structured experiential learning opportunities in pediatric pharmacy practice.

The petitioning organizations conducted the Pediatric Pharmacist Survey that asked employers of pediatric pharmacists the desired level of training for pharmacists practicing in their pediatric pharmacy. In ranked order of preference, the responses from 68 individuals responsible for hiring within their organizations, were as follows (from most desirable to least desirable):

- PGY2 residency program.
- PGY2 residency program in pediatrics.
- PGY1 residency with pediatric emphasis (located at a freestanding children's hospital or a health system with a pediatric hospital).
- Employer-provided training program.
- PGY1 pharmacy practice residency.
- None required or desired.

The Doctor of Pharmacy degree alone does not provide knowledge of sufficient depth and breadth for pediatric pharmacists to provide specialized care. Additional training, clinical work experience, and study are necessary. Because pediatrics is an evolving specialty, many pediatric pharmacists have obtained specialized knowledge, skills, and abilities through mechanisms other than structured training programs.

GUIDELINE 2. Describe in detail the nature of training programs in the area of specialty practice including their length, content, and objectives.

As stated above, there are several ways in which pharmacists can acquire the knowledge and skills needed to provide a specialized practice in pediatrics. The most efficient way is through an accredited residency program in pediatric pharmacy practice. In 2008, ASHP, in collaboration with PPAG and ACCP, approved accreditation standards for PGY2 pharmacy residencies and published educational outcomes, goals, and objectives for PGY2 pediatric pharmacy residency programs (see Appendix F-1). In addition, approximately 30 PGY1 residency programs are conducted within freestanding children's hospitals or health systems that include children's hospitals. These experiences, by nature of their primary patient populations, have an emphasis in pediatrics and thereby provide a unique opportunity to build initial skills in the specialty prior to entering a PGY2 residency program.

Residency Training

PGY2 residency training is an organized, directed, accredited program that builds upon the competencies established in PGY1 residency training. The PGY2 program increases the resident's depth of knowledge, skills, attitudes, and abilities and is designed to develop accountability, practice patterns, and habits in order to raise the resident's level of expertise in medication management and clinical leadership in the area of focus.

PGY2 residencies build upon the broad-based competencies achieved in a PGY1 residency, deepening the resident's ability to provide care in the most complex cases or to support care through practice leadership. Therefore, PGY2 residencies provide residents with opportunities to function independently as practitioners by conceptualizing and integrating accumulated experience and knowledge, transforming both into improved medication therapy. A resident who successfully completes an accredited PGY2 residency program should possess the competencies needed to earn board certification in the practice area (provided that certification for the particular practice area exists).

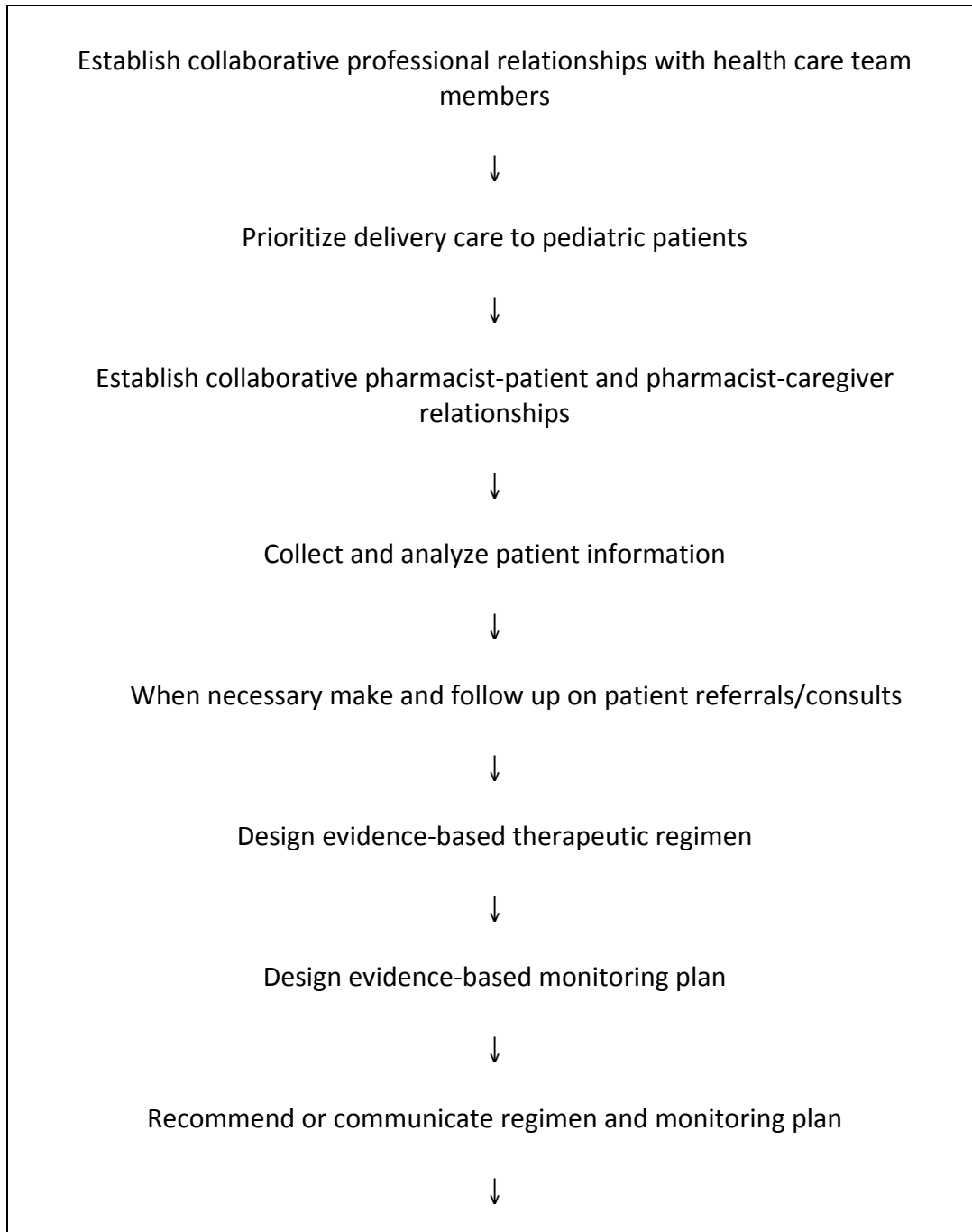
The PGY2 pharmacy residency in pediatrics is designed to transition PGY1 residency graduates from generalized practice to specialized practice focused on the care of pediatric patients. Residency graduates are equipped to participate as integral members of interdisciplinary teams caring for pediatric patients and assuming responsibility for pharmaceutical care. These residents acquire the capacity to deliver evidence-based care to pediatric patients within the limitations presented by the shortage of research on medication use in this patient population. They are able to prepare or supervise the preparation of the unique formulations required by pediatric patients as those patients' needs change according to their stage of growth and development.

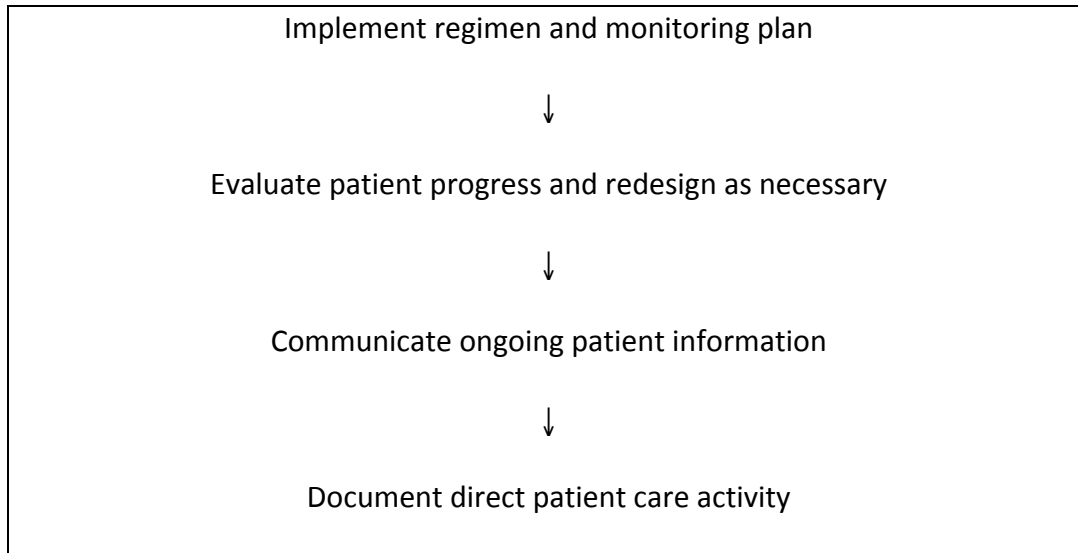
Pediatric pharmacy residency graduates will serve health care organizations successfully as the ultimate resource for information about medications used in the care of children and for decision making affecting the care of these patients. Their expertise includes leadership in decision making related to the use or modification of guidelines for the care of individual patients and active participation in organizational planning, implementation, and maintenance of technology and automation systems.

Exiting residents have been trained to assume responsibility for identifying and implementing opportunities to improve the medication-use system in pediatric practice. Groomed for practice leadership, pediatric pharmacy residency graduates can be expected to continue their pursuit of expertise in practice; to possess advanced skills to identify the pharmacotherapy and medication-use training needs of other health care professionals caring for pediatric patients; to deliver effective training to those health care professionals; and to contribute to public health efforts for health improvement, wellness, and disease prevention.

Expected outcomes for PGY2 residencies in pediatric care include the following ⁴:

- Outcome R1: Demonstrate leadership and practice management skills in the pediatric patient care setting.
- Outcome R2: Optimize the care of inpatient and outpatient pediatric patients by providing evidence-based, patient-centered medication therapy as an integral part of an interdisciplinary team.





- Outcome R3: Serve as an authoritative resource on the optimal use of medications used to treat pediatric patients.
- Outcome R4: Evaluate, manage, and improve the medication-use process in pediatric patient care areas.
- Outcome R5: Demonstrate excellence in the provision of training or educational activities for pediatric health care professionals, health care professionals in training, and the public.
- Outcome R6: Conduct pediatric pharmacy research.

A copy of the *Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Pediatrics* is attached as Appendix F-1. Traditionally, completion of these goals and objectives would provide the education and training needed to sit for the BPS certification exam.

Fellowship Training

According to the *ACCP Guidelines for Clinical Research Fellowship Training Programs*, a fellowship program is a directed, individualized postgraduate training program designed to prepare the fellow to function as an independent investigator. Fellowships typically require prior completion of a master's degree or doctoral degree in a health science discipline, completion of a residency or equivalent clinical experience, and demonstrated interest in research. Fellowship programs prepare the pharmacist to be competent in the scientific

research process. The training is typically divided as approximately 80 percent research and 20 percent advanced practice experiences.

Pediatric fellowship programs model other fellowships and emphasize research and practice in the pediatric setting. Fellowship experience is typically gained in protocol design; study design; data acquisition, analysis, and interpretation; grant writing; manuscript preparation; implementation of institutional review board (IRB) submission; and conducting clinical and laboratory research projects. Didactic and clinical training of pharmacy students and other health care professionals is also a common component of these programs. The ultimate goal of a pediatric fellowship program is to provide the pharmacist with specialized practice experience and essential knowledge, skills, and abilities to conduct research and function as a primary investigator in pediatrics.⁵

A copy of the *AACP Guidelines for Clinical Research Fellowship Training Programs* is attached as Appendix F-2.

GUIDELINE 3. Provide a comprehensive listing of such programs, detailing sponsoring organizations or institutions, locations, and individuals in charge.

Table F-1 lists PGY2 pediatric residency programs as of September 6, 2012, including 39 programs with 48 to 51 residency positions. There are also 3 pediatric pharmacy fellowship positions as detailed in Table F-2.

Table F-1. PGY2 Pediatric Residency Programs as of September 6, 2012

Sponsoring Organization	Status	City	State	Program Director	Number of Residency Positions
All Children's Hospital	Accredited	St. Petersburg	FL	Marla C. Tanski	1
Arnold Palmer Medical Center – Orlando Health	Accredited	Orlando	FL	Jennifer Shenk	1
Boston Children's Hospital	Accredited	Boston	MA	Crystal Tom	1
Children's Hospital Colorado	Candidate	Aurora	CO	Jennifer Hamner	1
The Children's Hospital of Philadelphia	Accredited	Philadelphia	PA	Sarah C. Erush	3

Children's Hospital of Wisconsin	Accredited	Milwaukee	WI	Thomas J. Nelson	1
Children's Memorial Hermann Hospital/ Memorial Hermann – Texas Medical Center	Candidate	Houston	TX	Shannan K. Eades	1
Children's National Medical Center	Candidate	Washington	DC	Katherine D. Pham	2
Duke University Hospital	Candidate	Durham	NC	Julia L. Lawrence	1
Elliot Health System	Pre-Candidate	Manchester	NH	Marianne Miscioscia	1
Fairview Health Services and the University of Minnesota Medical Center/University of Minnesota Amplatz Children's Hospital	Candidate	Minneapolis	MN	Melissa K. Carlson	1
Florida Hospital for Children	Candidate	Orlando	FL	Kristen M. Jones	1
Indiana University Health	Accredited	Indianapolis	IN	Jennifer L. Morris	1
The Johns Hopkins Hospital	Accredited	Baltimore	MD	Carlton K. Lee	1 or 2
Le Bonheur Children's Hospital and The University of Tennessee Health Science Center	Accredited	Memphis	TN	Kelly S. Bobo	2
Medical University of South Carolina Medical Center/ College of Pharmacy	Accredited	Charleston	SC	Kathy H. Chessman	2
Monroe Carell Jr. Children's Hospital at Vanderbilt	Accredited	Nashville	TN	Alison Grisso	2
Nationwide Children's Hospital	Accredited	Columbus	OH	Kimberly J. Novak	2
OSF St. Francis Medical Center – Children's Hospital of Illinois	Pre-Candidate	Peoria	IL	Margaret Heger	1
Palmetto Health Children's Hospital	Accredited	Columbia	SC	Jennifer D. Bair	1
Shands at the University of Florida	Accredited	Gainesville	FL	Lisa T. Thames	1
Spectrum Health	Candidate	Grand Rapids	MI	Morgan R. Cole	1

St. Joseph's Children's Hospital	Candidate	Tampa	FL	Pamela L. DeLuna	1
St. Louis Children's Hospital	Accredited	St. Louis	MO	Melissa K. Heigham	1
St. Vincent Indianapolis Hospital	Accredited	Indianapolis	IN	J. Maria Whitmore	1
Texas Children's Hospital	Accredited	Houston	TX	Sara J.D. Bork	2
Texas Tech University Health Sciences Center School of Pharmacy	Accredited	Amarillo	TX	Sherry A. Luedtke	1 or 2
University of Arizona University Medical Center/College of Pharmacy	Accredited	Tucson	AZ	Hanna Phan	1
University of California, San Francisco Medical Center, Children's Hospital	Accredited	San Francisco	CA	Sarah B. Scarpace	1
University of Chicago Medical Center	Accredited	Chicago	IL	Elisabeth M. Simmons	2
University of Georgia College of Pharmacy/ Medical College of Georgia Health System	Candidate	Augusta	GA	Kalen B. Manasco	1
University of Illinois College of Pharmacy	Accredited	Chicago	IL	Donna M. Kraus	1
UK HealthCare and Kentucky Children's Hospital	Accredited	Lexington	KY	Robert J. Kuhn	1 or 2
University of Maryland	Accredited	Baltimore	MD	Jill A. Morgan	1
University of Michigan Hospitals and Health Centers	Accredited	Ann Arbor	MI	Regine L. Caruthers	1
University of North Carolina Hospitals and Clinics/ UNC School of Pharmacy	Accredited	Chapel Hill	NC	Leah M. Hatfield	1
University of Oklahoma College of Pharmacy and The Children's Hospital at OU Medical Center	Accredited	Oklahoma City	OK	Tracy M. Hagemann	1

Upstate Golisano Children's Hospital – SUNY Upstate Medical University	Accredited	Syracuse	NY	Luke A. Probst	1
Wake Forest University Baptist Medical Center	Candidate	Winston-Salem	NC	Robin Dills	1

Table F-2. Pediatric Pharmacy Fellowship Programs

Sponsoring Organization	Status	City	State	Program Contact	Number of Fellowship Positions	Primary Specialty	Secondary Specialty
The Ohio State University	ACCP-Accredited	Columbus	OH	Milap C. Nahata	2	Pediatrics	
The University of Tennessee		Memphis	TN	Richard A. Helms	1	Pediatrics	Nutrition and Metabolic Support

¹ Accreditation Council for Pharmacy Education. *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*. 2007. Accessed at <http://www.acpe-accredit.org/standards/default.asp> on August 10, 2012.

² Elliott J, Koerner P, Heasley J, Kamal K. Impact of elective active-learning courses in pregnancy/lactation and pediatric pharmacotherapy. *Am J Pharm Educ*. 2012;76(2):1-8.

³ National Association of Boards of Pharmacy. NAPLEX blueprint. Accessed at: <http://www.nabp.net/programs/examination/naplex/naplex-blueprint/> on September 10, 2012.

⁴ American Society of Health-System Pharmacists. Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Pediatrics. Accessed at <http://www.ashp.org/DocLibrary/Accrediation/Regulations-Standards/RTPObjPediatricMarch2008.aspx> on July 20, 2012.

⁵ American College of Clinical Pharmacy. *ACCP Guidelines for Clinical Research Fellowship Training Programs*. 2004. Accessed at <http://www.accp.com/docs/positions/guidelines/pos15.pdf> on August 10, 2012.

CRITERION G: Transmission of Knowledge

The area of specialization shall be one in which there is an adequate transmission of specialized knowledge through professional, scientific and technical literature immediately related to the specialty area. ***This criterion refers to the TRANSMISSION OF KNOWLEDGE.***

Transmission and dissemination of specialized knowledge in pediatric pharmacy practice occurs through formal networking groups within professional practice associations, peer-reviewed publications and periodicals, live educational programming, and enduring educational resources in print- and web-based vehicles.

Formal Networking Groups

Major pharmacy practice associations have formal networking sections and groups dedicated to pediatric pharmacists. These groups foster professional interaction and provide opportunities for practice advancement through educational programming, newsletters, research networks, and leadership. As an example, networking groups that currently exist within the structure of the four petitioning organizations are shown in Table G-1.

Table G-1. Pediatric Networking Groups within Pharmacy Practice Associations

Association	Networking Groups	Description
American College of Clinical Pharmacy	Pediatric Practice and Research Network (PRN)	<p>Provides a national forum for professional interaction and networking that leads to opportunities for collaborative research, problem solving, and professional discussion of issues relevant to the practices of all members. The primary goal of the Pediatrics PRN is to support the development and promotion of excellent and innovative pediatric clinical pharmacy practice, research, and education that will positively influence the total pharmaceutical care of the patient.</p> <p>Activities of the Pediatrics PRN include collaborative research, organization of a business meeting and networking forum at the ACCP annual meeting to promote networking, and organizing continuing pharmacy education</p>

		<p>sessions and PRN focus sessions on cutting-edge drug therapies in the area of pediatrics.</p> <p>The Pediatrics PRN currently has more than 550 members.</p>
American Pharmacists Association	APhA Academy of Pharmacy Practice and Management (APPM) Section on Clinical/Pharmacotherapeutic Practice	<p>The APhA-APPM Section on Clinical/Pharmacotherapeutic Practice serves pharmacists whose primary practice responsibilities include the provision of professional non-dispensing services targeted at optimizing drug therapy for patients directly or indirectly through education of other clinicians.</p> <p>This national networking forum supports exploring methods for enhancing the provision and justification of clinical pharmacy services in all practice settings and providing the tools necessary to accomplish this goal.</p> <p>The APhA-APPM Section on Clinical/Pharmacotherapeutic Practice currently has almost 200 members who practice in pediatric pharmacy.</p>
American Society of Health-System Pharmacists	Section of Clinical Specialists and Scientists	<p>Represents clinical experts and advocates for practice advancement and focuses on improving patient care by creating and translating scientific advances into practice.</p> <p>The section provides a formal mechanism for national networking among section members. This group has responsibility for planning and developing education programming, tracks, and workshops offered at ASHP meetings.</p> <p>The Section of Clinical Specialists and Scientists currently has nearly 700 members who practice in pediatric pharmacy.</p>
Pediatric Pharmacy Advocacy Group		<p>This international, nonprofit, professional association represents the interests of pediatric pharmacists and their patients. PPAG is dedicated to improving medication therapy</p>

		<p>in children and promoting safe and effective medication use in children through communication, education, and research.</p> <p>PPAG has almost 1,200 members.</p>
Cleveland Akron Area Pediatric Pharmacists	PPAG Regional Networking Group	Supports local pediatric practitioners by providing an avenue to exchange ideas and practices and provide additional educational opportunities for continuing pharmacy education in the Greater Cleveland and Akron/Canton area.
Gateway Pediatric Pharmacy Group (St. Louis)	PPAG Regional Networking Group	Supports the professional growth of pediatric pharmacists in the Greater St. Louis area.
PPAG at the University of Connecticut	PPAG Student Group	Promotes optimal medication therapy to pediatric patients. Offers students an opportunity to network with practicing pediatric pharmacists.
Duquesne University PPAG	PPAG Student Group	The mission of Duquesne University PPAG is to promote safe and effective medication use and healthy lifestyles in pediatric populations through the education of children, parents, and fellow pharmacy students.
Pediatric Pharmacy Student Group – Virginia Commonwealth University	PPAG Student Group	Represents the pediatric population by improving the health of children within the community and surrounding areas. Strives to advocate for pediatric health education and medication safety through various outreach and community events and the opportunity for members to interact with practicing pediatric pharmacists.
PediCats – University of Arizona	PPAG Student Group	Committed to improving the health of children by advocating for health education through philanthropic events. Unites students in a joint effort to improve the well-being of children in the community while emphasizing the nature of pediatrics as a specialty.
Wilkes University PPAG	PPAG Student Group	Raises awareness regarding pediatric pharmacy and encourages members to

		promote the well-being of children at work, school, and in life. The overall goal is for students to become more familiar with pediatric pharmacy as a career opportunity and help students align their skills with their passion for helping children.
Student Society of Pediatric Advocates – University of Georgia	PPAG Student Group	Brings awareness to the proper use of medication therapy in pediatric populations through various service and education-based initiatives.

GUIDELINE 1. Identify journals and other periodicals dealing specifically with the proposed specialty.

Journals

Issues of interest in pediatric pharmacy practice span many areas of pharmacy practice and topics in pediatric research, clinical care, and health promotion. Many pharmacy and primary care practice journals consistently publish articles highlighting evidence, outcomes, and contributions to patient care through pediatric pharmacy practice. Examples of such journals include:

- ***Academic Pediatrics*** – The official journal of the Academic Pediatric Association. A peer-reviewed publication that provides leadership in pediatric education, research, patient care, and advocacy. The journal emphasizes important research relating to the quality of child health care, health care policy, and the organization of child health services.
- ***Archives of Pediatrics and Adolescent Medicine*** – Monthly, peer-reviewed journal for physicians and other health care professionals who contribute to the health of children and adolescents. It is the oldest continuously published pediatric journal in the country and is a vehicle for increased attention to adolescent health, the education of pediatric health care professionals, and disease prevention and health promotion.
- ***Clinical Pediatric Emergency Medicine*** – Journal devoted to helping pediatricians and emergency physicians provide the best possible care for their young patients.
- ***Clinical Pediatrics*** – A peer-reviewed monthly journal containing information on practical, everyday child care topics involving clinical, scientific, behavioral, educational, and ethical issues.
- ***Current Opinion in Pediatrics*** – Reader-friendly resource that allows health care professionals to keep up-to-date with the most important advances in the pediatric field. Delivers diverse and comprehensive coverage of all key issues related to

pediatrics, including genetics, therapeutics and toxicology, adolescent medicine, neonatology and perinatology, and orthopedics.

- ***Current Problems in Pediatric and Adolescent Health Care*** – Recognized for its probing, comprehensive, and evidence-based reviews. The publication devotes each issue to a timely and practical topic in pediatric medicine, presented by leading authorities in the field. Offers readers easily accessible information that enhances professional experience and is pertinent to daily pediatric practice.
- ***Fetal and Pediatric Pathology*** – Established, bimonthly international journal that publishes data on diseases of the developing embryo, newborns, children, and adolescents. Publishes original and review articles and reportable case reports.
- ***Journal of Pediatric Health Care*** – Official journal of the National Association of Pediatric Nurse Practitioners, provides up-to-date clinical information and research findings regarding primary, acute, and specialty health care for children of newborn age through young adulthood within a family-centered context. The publication disseminates multidisciplinary perspectives on evidenced-based practice as well as emerging educational, policy, and advocacy issues of importance to all pediatric nurses and other health care professionals.
- ***Journal of Pediatric Infectious Diseases*** – Complete, up-to-the-minute resource on infectious diseases in children. Delivers the latest insights on combating disease in children.
- ***The Journal of Pediatric Pharmacology and Therapeutics*** – Official journal of the Pediatric Pharmacy Advocacy Group. A peer-reviewed multidisciplinary journal devoted to promoting the safe and effective use of medications in infants and children. The journal publishes practical information for all practitioners who provide care to pediatric patients.
- ***The Journal of Pediatrics*** – International peer-reviewed journal that advances pediatric research and serves as a practical guide for pediatricians who manage health and diagnose and treat disorders in infants, children, and adolescents.
- ***Neonatology*** – Prime source of information on fetal and neonatal research. Original papers present research on all aspects of neonatology, fetal medicine, and developmental biology; these papers encompass both basic science and clinical research including randomized trials, observational studies, and epidemiology.
- ***Pediatric Critical Care Medicine*** – Official journal of the Society of Critical Care Medicine, the World Federation of Pediatric Intensive and Critical Care Societies, the Pediatric Intensive Care Society UK, the Latin American Society of Pediatric Intensive Care, and the Japanese Society of Pediatric Intensive and Critical Care. The journal is written for the entire critical care team: pediatricians, neonatologists, respiratory

therapists, nurses, pharmacists, and others who deal with pediatric patients who are critically ill or injured.

- ***Pediatric Drugs*** – Official journal of the International Alliance for Better Medicines for Children. The journal is dedicated to improving the effective and safe use of drugs in pediatrics, and covers all aspects of pharmacotherapy for health care professionals interested in pediatric drug therapy.
- ***Pediatrics*** – Official peer-reviewed journal of the American Academy of Pediatrics. Publishes original research, clinical observations, and special feature articles in the field of pediatrics, as broadly defined. Contributions pertinent to pediatrics are included from related fields such as nutrition, surgery, dentistry, public health, child health services, human genetics, basic sciences, psychology, psychiatry, education, sociology, and nursing.

Pediatric pharmacy columns and features are published in the *American Journal of Health System Pharmacy (AJHP)*, *The Annals of Pharmacotherapy*, *Journal of the American Pharmacists Association (JAPhA)*, *The Journal of Family Practice (JFP)*, and *Pharmacotherapy*.

- *AJHP* is the official publication of the American Society of Health-System Pharmacists. It publishes peer reviewed scientific papers on contemporary drug therapy and pharmacy practice innovations in hospitals and health systems.
- *The Annals of Pharmacotherapy* is an independent, peer-reviewed journal that publishes evidence-based articles on practice, research, and education. Four pediatric pharmacists are members of its Pediatric Editorial Board.
- *JAPhA* is an official publication of the American Pharmacists Association. It provides a peer-reviewed forum for original research, review, experience, and opinion articles that link science with contemporary pharmacy practice to improve patient care.
- *JFP* is a peer-reviewed journal that publishes primary and secondary research reports of relevant, valid, evidence-based research in a form useful to family medicine physicians and other clinicians in the provision of primary and pediatric care. *JFP* publishes original research that reports outcomes immediately applicable to clinical practice. In the past 3 years, pharmacists have contributed 38 articles on medication use.
- *Pharmacotherapy* publishes peer-reviewed, innovative scientific and professional information and knowledge that catalyze change to improve patient outcomes through optimal pharmacotherapy. The publication often focuses on advances in drug therapy for pediatric patients.

Newsletters and Online Periodicals

Professional pharmacy practice associations publish a variety of print and online media that disseminate pediatric practice information. *Pediatric Pharmacy Advocate* is the official

newsletter of PPAG. This electronic publication is distributed to PPAG members on a quarterly basis. It is also publically available on the organization's web site at www.ppag.org.

The ACCP Pediatric PRN Listserv is a mechanism for sharing, obtaining, and reporting data among pediatric pharmacist members. The ASHP Section of Clinical Specialists and Scientists also hosts a listserv to facilitate communication and problem solving among members.

GUIDELINE 2. Provide a comprehensive bibliography of published abstracts, articles, position papers, and white papers in the professional literature dealing with the proposed specialty published during the three most recent calendar years.

As of June 30, 2012, 244 articles related to pediatric pharmacy practice had been published in the professional literature over the past 3 years. The prevalence of articles in pharmacy and medical journals focusing on pediatric pharmacy practice and patient care of complex patients by pediatric pharmacists in specialty practice provides further evidence of this emerging specialty. A bibliography of articles and resources published on specialized pediatric pharmacy practice and related issues is attached as Appendix G-1.

GUIDELINE 3. Include copies of selected experimental and quasi-experimental, peer-reviewed articles demonstrating the value of the proposed specialty.

Pediatric pharmacists in a variety of settings are demonstrating and publishing positive clinical and economic outcomes resulting from effective management of pediatric patients. Their collective work provides support for the validity of this proposed specialty. The following examples illustrate the scope and substance of specialized pediatric pharmacy practice information disseminated through such publications:

- Benavides S, Kohler LA, Souffrant G. A clinical pharmacist's role in screening for metabolic syndrome in a rural pediatric ambulatory clinic. *J Rural Health*. 2011;27(2):184-189.
- Costello JL, Torowicz DL, Yeh TS. Effects of a pharmacist-led pediatrics medication safety team on medication-error reporting. *Am J Health Syst Pharm*. 2007;64(13):1422-1426.
- Gardner B, Graner K. Pharmacists' medication reconciliation-related clinical interventions in a children's hospital. *Jt Comm J Qual Patient Saf*. 2009;35(5):278-282.
- Gazarian M. Training pediatric clinical pharmacology and therapeutics specialists of the future: the needs, the reality, and opportunities for international networking. *Paediatr Drugs*. 2009;11(1):63-66.
- Hahn K, Marlowe K, Chicella M. Survey of pharmaceutical services in pediatric resuscitation. *Am J Health Syst Pharm*. 2001;58:1626-1628.
- Kaushal R, Bates DW, Abramson EL, et al. Unit-based clinical pharmacists' prevention of

serious medication errors in pediatric inpatients. *Am J Health Syst Pharm*. 2008;65(13):1254-1260.

- Krupicka MI, Bratton SL, Sonnenthal K, Goldstein B. Impact of a pediatric clinical pharmacist in the pediatric intensive care unit. *Crit Care Med*. 2002;30(4):919-921.
- Moffett BS, Mott AR, Nelson DP, Gurwitch KD. Medication dosing and renal insufficiency in a pediatric cardiac intensive care unit: impact of pharmacist consultation. *Pediatr Cardiol*. 2008;29(4):744-748.
- Nahata MC. Evolution of pediatric clinical pharmacy. *Ann Pharmacother*. 2006;40(6):1170-1171.
- Potts AL, Barr FE, Gregory DF, et al. Computerized physician order entry and medication errors in a pediatric critical care unit. *Pediatrics*. 2004;113(1 Pt 1):59-63.

The full text of these peer-reviewed articles are attached as Appendix G-2.

GUIDELINE 4. Describe methods of knowledge transmission through symposia, seminars, workshops, etc., and enclose representative programs concerning these activities.

The specialized knowledge required for pediatric pharmacy specialty practice is transmitted through a variety of methods, including symposia, live and web seminars, interactive workshops, and enduring resources. Each year, national and state pharmacy associations, schools and colleges of pharmacy, and for-profit educational companies offer live and enduring programming to disseminate the latest evidence for managing the unique needs of pediatric patients and share innovations in specialized pediatric pharmacy practice. Hundreds of hours of programs are available annually to pediatric pharmacists through local, regional, and national meetings and events; web-based programs; and online learning.

According to the ACPE Pharmacists' Learning Assistance Network (PLAN) database, providers of ACPE-approved continuing pharmacy education have collectively offered more than 900 hours of pediatric programming over the past 3 years (June 30, 2009–July 1, 2012). This programming includes:

- 616 hours of live, knowledge-based programs. A complete listing of these ACPE-approved activities is provided as Appendix G-3.
- 138 hours of live, application-based programs. A complete listing of these ACPE-approved activities is provided as Appendix G-4.
- 113 hours of home study, knowledge-based programs. A complete listing of these ACPE-approved activities is provided as Appendix G-5.
- 41 hours of home study, application-based programs. A complete listing of these ACPE-approved activities is provided as Appendix G-6.

Sample program materials from select live educational activities are attached as Appendix G-7 and include programming from the following events:

- 2009 PPAG Annual Conference
- 2010 PPAG Annual Conference
- 2010 PPAG Specialty Conference
- 2011 PPAG Annual Conference

GUIDELINE 5. Provide the number of such events, included in Guideline 4 above, which occur on an annual basis, and estimate average and total attendance at such programs.

Live, national events are one mechanism for dissemination of knowledge to pediatric pharmacists. Over the last 3 years, the four petitioning organizations have collectively hosted 336 live educational events with 18,207 certificates of credit issued across all programs. Recognizing that pharmacists attend multiple programs, the total number of certificates does not equate to the number of unique participants. The total number of certificates of credit issued reflects the strong interest in programming for pediatric pharmacists. Table G-2 outlines these programs.

Table G-2. Pediatric Pharmacy Educational Programming and Attendance

Sponsoring Organization	Pediatric Pharmacy Programming and Attendance
ACCP	2009 – 10 programs; 424 certificates of credit issued 2010 – 1 programs; 39 certificates of credit issued 2011 – 1 program; 49 certificates of credit issued
APhA	2009 – 1 program; 434 certificates of credit issued 2010 – 5 programs; 123 certificates of credit issued 2011 – 1 program; 166 certificates of credit issued
ASHP	2009 – 4 programs; 642 certificates of credit issued 2010 – 6 programs; 1,020 certificates of credit issued 2011 – 4 programs; 541 certificates of credit issued
PPAG	2009 – 64 programs; 4,297 certificates of credit issued 2010 – 99 programs; 3,467 certificates of credit issued 2011 – 140 programs; 7,005 certificates of credit issued

Other organizations, such as the Society for Critical Care Medicine and the American Academy of Pediatrics, also provide live, print, and online educational programs that are of interest to pediatric pharmacists practicing at a specialty level.

Additional Mechanisms for Dissemination of Knowledge

In addition to the methods discussed in each of the guidelines above, enduring publications and professional award programs serve an important function in the dissemination of knowledge in the proposed specialty.

Nonperiodical Publications

Many enduring publications and resources that have been published in recent years enhance the skills and knowledge of pediatric pharmacists. Examples of such publications include:

- *Antibiotic Basics for Clinicians*, 2nd edition (Hauser AR; 2012)
- *Application and Review of Pediatric Pharmacotherapy*, 2nd edition (Glover ML; 2011)
- *Extemporaneous Formulations for Pediatric, Geriatric, and Special Needs Patients*, 2nd edition (Jew RK, Soo-Hoo W, Erush SC; 2010)
- *The Harriet Lane Handbook*, 19th edition (Johns Hopkins Hospital, Arcara K, Tschudy M; 2012)
- *The Harriet Lane Handbook of Pediatric Antimicrobial Therapy*, 19th edition (Arcara K, Tschudy M; 2012)
- *Nelson's Pediatric Antimicrobial Therapy*, 19th edition (Bradley J, Nelson J; 2012)
- *NeoFax 2009*, 22nd edition (Physicians' Desk Reference; 2009)
- *Neonatal and Pediatric Pharmacology: Therapeutic Principles in Practice*, 4th edition (Yaffe SJ, Aranda JV; 2011)
- *PDR Concise Drug Guide for Pediatrics*, 2nd edition (Thomson Healthcare Staff; 2008)
- *Pediatric and Neonatal Dosage Handbook*, 19th edition (Taketomo CK, Hodding JH, Kraus DM; 2012)
- *Pediatric Injectable Drugs*, 9th edition, (Phelps SJ, Hak EB, Crill CM; 2010)
- *Pediatric Medication Education Text* (Buck ML, Hendrick AE; 2009)
- *Pediatric Pharmacotherapy* (Benavides S, Nahata M; 2012)
- *PSAP-VII, Book 4, Pediatrics* (ACCP; 2010)

Professional Awards

Award programs in pharmacy practice serve to enhance and recognize accomplishments of pharmacists. Through PPAG, several awards specifically recognize the distinguished practice of pediatric pharmacists in specialty practice (Table G-3).

Table G-3. PPAG Awards for Recognition of Excellence in Pediatric Pharmacy

Award	Description/Comments
Christensen Memorial Young Investigator Award	The Christensen Memorial Young Investigator Award is available to investigators who have been in practice 5 years or less. This award is granted to the investigator based on his or her written abstract and the quality of his or her poster presentation at the PPAG annual meeting each year.
Fellow in the Pediatric Pharmacy Advocacy Group	The Fellow in the Pediatric Pharmacy Advocacy Group (FPPAG) Recognition Program recognizes excellence in pediatric pharmacy practice and grants recognition that promotes public awareness of pharmacists who have distinguished themselves in pediatric pharmacy practice.
Lexi-Comp Best Practice Awards	The awards are given to innovative and creative pharmacy programs that advance the mission, vision, and goals of the organization. Awards are evaluated based upon innovation, creativity, cost effectiveness, improvement in practice, and leadership. Up to two awards are awarded annually.
Outstanding Original Paper	Investigators are evaluated on the basis of their written abstract and the quality of their presentation at the meeting. The winner receives complimentary registration to next years' annual meeting and a framed certificate.
Richard A. Helms Award of Excellence in Pharmacy Practice	Recognizes sustained and meritorious contributions to PPAG and to pediatric pharmacy practice, and contributions of importance to education, new knowledge, and outreach.
Sumner J. Yaffe Lifetime Achievement Award	Recognizes an individual who has made outstanding and sustained contributions to improving or expanding the health of children. This contribution may relate to the discipline of pediatric pharmacology and therapeutics, professional service, basic or clinical research, patient care, models of care, or patient advocacy. The award is not limited to pharmacists or to members of PPAG.

In addition, other professional awards, although not designated specifically for pharmacists in pediatric practice, have recognized pediatric pharmacists for their contributions to the profession and advancing clinical practice in pediatrics. These awards, and their recipients, are outlined in Table G-4.

Table G-4. Pediatric Pharmacist Recipients of National Professional Awards

Organization/Award	Description	Year/Recipient
ACCP: Clinical Practice Award	The Clinical Practice Award recognizes an ACCP member who has developed an innovative clinical pharmacy service, provided innovative documentation of the impact of clinical pharmacy services, provided leadership in the development of cost-effective clinical pharmacy services, or shown sustained excellence in providing clinical pharmacy services.	1990, Peter Gal

ACCP: Education Award	The Education Award recognizes an ACCP member who has shown excellence in the classroom or clinical training site, conducted innovative research in clinical pharmacy education, demonstrated exceptional dedication to continuous professional development, or shown leadership in the development of clinical pharmacy education programs.	1990, Milap Nahata 1995, Rosalie Sagraves 2011, Mary Ensom
ACCP: Paul F. Parker Medal	The Paul F. Parker Medal is awarded to an individual who has made outstanding and sustained contributions to improving or expanding the profession of pharmacy in an area of professional service, including but not limited to patient care, leadership, administration, financial, technological, information processing, service delivery, models of care, and advocacy.	2009, Milap Nahata
ACCP: Robert M. Elenbaas Service Award	The Robert M. Elenbaas Service Award is given only when a particularly noteworthy candidate is identified in recognition of outstanding contributions to the vitality of ACCP or to the advancement of its goals that are well above the usual devotion of time, energy, or material goods.	1998, John Rodman
ACCP: Russell R. Miller Award	The Russell R. Miller Award recognizes an ACCP member who has made substantial contributions to the literature of clinical pharmacy, either in the form of a single, especially noteworthy contribution or sustained contributions over time.	1987, Les Hendeles 1992, William Evans 1997, Milhap Nahata 2002, Mary Relling 2006, Mary Ensom
ACCP: Therapeutic Frontier Lecture Award	The Therapeutic Frontiers Lecture Award honors an internationally recognized scientist whose research is actively advancing the frontiers of pharmacotherapy. Recipients need not be ACCP members.	1989, William Evans 1995, Leslie Hendeles 2003, Mary Relling
APhA: Remington Honor Medal	The Remington Honor Medal was established in 1918 to recognize distinguished service on behalf of American pharmacy during the preceding years, culminating in the past year, or during a long period of outstanding activity or fruitful achievement.	2012, William Evans
APhA: Research Achievement Award in the Pharmaceutical Sciences	This award, administered by the APhA Academy of Pharmaceutical Research and Science, encourages and recognizes outstanding meritorious achievement in any of the pharmaceutical sciences. Contributions to be recognized are in the areas of basic pharmaceutical, clinical, and economic, social, and administrative sciences, which develop knowledge and integrate the process of science into the profession of pharmacy.	2002, Leslie Hendeles 1999, Milap Nahata 1996, William Evans
ASHP: Board of Directors'	The ASHP Board of Directors' Award of Honor recognizes	2007, William Evans

Award of Honor	individuals outside the pharmacy discipline who have made extraordinary national or worldwide contributions to the health field.	
ASHP: Distinguished Service Award	The ASHP Pharmacy Practice Sections and New Practitioners Forum (NPF) Distinguished Service Award recognizes a member from each Section and NPF whose volunteer activities have supported the mission of their Section or NPF and helped advance the profession.	2010, Rita K. Jew
National Academies of Practice: Distinguished Practitioner	<p>The National Academies of Practice was founded in 1981 to advise governmental bodies on our health care system. It is the only interdisciplinary group of health care practitioners dedicated to these issues.</p> <p>Elected members are distinguished practitioners, scholars, and public policy professionals who have achieved distinction while spending a significant portion or all of their careers in direct patient care. Only 150 Fellows may be elected to each Academy. Fellows are elected by their peers from 10 different health professions, including practice in pharmacy.</p>	Robert Kuhn Milap Nahata Stephanie Phelps

Appendix B-1

Letters of Support



Duke Clinical Research Institute

From Thought Leadership to Clinical Practice

August 27, 2012

William M. Ellis, BSP Pharm, MS
Executive Director
Board of Pharmaceutical Specialties
2215 Constitution Ave, NW
Washington, DC 20037

Dear Mr. Ellis:

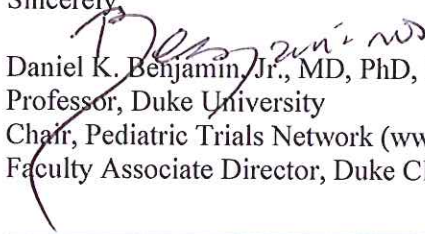
It is my pleasure to provide a letter of support for recognition of pediatric pharmacy practice as a specialty. I have worked with many pediatric pharmacists during my training and in my current clinical practice. I value the role of the pediatric pharmacist on an interprofessional team, not only in ensuring the appropriate use of drugs in our patients, but also in teaching medical and pharmacy students and residents. As an investigator conducting clinical research in infants and children, I am very familiar with the challenges in providing optimal drug therapy in this population and believe that it is necessary for pharmacists caring for children to have specialized training.

I am the Chair and Principle Investigator for the Pediatric Trials Network (PTN www.pediatrictrials.org). The PTN is an alliance of clinical research sites sponsored by the National Institutes of Child Health and Human Development. We are charged with designing and completing trials to determine the exposure and safety of all off-patent therapeutics in children. We initiate ~10 trials each year. I am therefore primarily responsible for \$15,000,000/year pediatric clinical pharmacology and pediatric trials network of investigators who are working together to improve healthcare for children.

The PTN has a number of prominent pediatric pharmacists and pharmacologists in the fields of developmental pharmacology and pharmacogenomics. Drs. Greg Kearns and Steve Leeder serve as Co-chairs of the PTN Clinical Pharmacology Core, and Dr. Edmund Capparelli is the Chair, and Dr. Jeff Barrett is the co-Chair, of the PTN Pharmacometrics Core. The expertise that these investigators, along with many others at PTN sites throughout the United States, bring to our program has allowed us to make considerable progress in evaluating the safety and efficacy of drug in children.

Several studies have already led to changes in the regulatory labeling of medications commonly prescribed in the pediatric population. Growth in the number of pediatric pharmacists involved in research will help to ensure that we will have adequate numbers of investigators to continue expanding the work of the PTN in the future. Recognition of pediatric pharmacy as a specialty is a positive step towards supporting the work of these pharmacists and encouraging new practitioners to consider a career in pediatrics.

Sincerely,


Daniel K. Benjamin, Jr., MD, PhD, MPH
Professor, Duke University
Chair, Pediatric Trials Network (www.pediatrictrials.org)
Faculty Associate Director, Duke Clinical Research Institute (www.dcri.org)

From Robert W. Block, MD, FAAP, Professor Emeritus, Pediatrics, The University of Oklahoma School of Community Medicine, Tulsa

August 20, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmaceutical Specialties
2215 Constitution Ave, NW
Washington, DC 20037

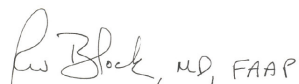
Dear Sir:

I am writing this letter of support for recognition of pediatric pharmacy as a specialty. For the last several years, until my recent election as president of the American Academy of Pediatrics (AAP), I worked alongside pediatric pharmacists here at the University of Oklahoma in Tulsa.

As we all know, children are far more than little adults. Medications for children are often prescribed "off label," as so many drugs are not studied in children. Although this is improving due to extensive work by many people, including the AAP working with the FDA, the fact remains that prescribing for children is a very special area indeed. Consequently, the demand for pharmacists with training and knowledge in pediatrics is essential for optimal child health.

Pediatric pharmacy is also important as pediatricians and family physicians need assistance with clinical prescribing for children. In the pediatric department I used to Chair, we had pediatric pharmacists on our faculty, as part-time instructors for our pediatric faculty and residents, in addition to their duties in their primary appointment within the College of Pharmacy. In short, they were essential for teaching, and for developing policy to reduce medical errors. Access to pediatric pharmacists has been an important component of clinical care and education in our department of pediatrics.

In my current role, I have visited private practices and academic centers across the country, and can relate that the needs and rewards described above are replicated wherever I visit. I am very much in favor of pediatric pharmacist specialists, and hope you and the Board will agree.



Robert W. Block, MD, FAAP



Pharmaceutical Services

August 31, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, DC 20037

RE: Recognition of Pediatric Pharmacy Practice as a Specialty Certification

Dear Mr. Ellis,

I am writing in support of recent efforts to recognize Pediatric Pharmacy Practice as a specialty within the purview of the Board of Pharmacy Specialties.

There are several justifications behind the recognition of Pediatric Pharmacy Practice as a specialty certification. These include the fact that there is a specialized body of knowledge related to pharmacotherapy in pediatric patients, there are focused practice settings where relatively large numbers of pediatric patients are seen for inpatient and/or outpatient care, and there is a growing demand for specialty certification for the purpose of supporting advanced pharmacy roles in care of these patients.

Drug therapy for pediatric patients is becoming increasingly complex. Children of various ages are treated with drugs for which little data exists on how best to dose and monitor therapy to assure optimal patient outcomes. The ontogeny of development related to pharmacology requires deep understanding of the relationship between physical development over time and the development of drug metabolizing and transport enzymes. Complex combinations of drug therapy may present special issues related to drug interactions or adverse events that are unique in the pediatric population. All these and other factors argue strongly for the development of pharmacists who are expert in the knowledge and practice of pharmacotherapy in the pediatric population. Most of these complex patients are treated in inpatient or outpatient centers where a number of other similarly complex pediatric patients are seen. This concentration of patients in these centers creates a demand for placement of pharmacists to help manage their drug therapy, in collaboration with other caregivers.

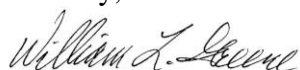
262 Danny Thomas Place, Memphis, TN 38105-3678

Pediatric practitioners have long accepted pharmacists as collaborators in care of their patients. Increasingly, “advanced practice pharmacists” are being recognized by institutions in a formal manner. Some institutions are pursuing formal pathways of privileging and credentialing that are similar to those currently in place for other “mid level” practitioners. At St Jude Children’s Research Hospital, we have recently taken the steps to privilege our Clinical Pharmacy practitioners. This privileging process uses Board Certification (by BPS) as one of the “criteria” that must be fulfilled to be eligible for privileging. While Board Certification in Pharmacotherapy, Oncology, or even Nutritional Support seem to be adequate evidence of relevant competency, I would argue that Board Certification in Pediatric Pharmacotherapy will be a more relevant criterion that would apply effectively here.

At our institution, board certification is not, in itself, justification for increased pay. However, this certification does fulfill criteria for job advancement, and it also is viewed as tangible evidence of excellence. Hence, increased reimbursement does result. All of our Clinical Pharmacy Specialists (n=9) are or soon will be board certified in one or more of the following areas: Pharmacotherapy, Oncology, or Nutrition Support.

In my career as a clinical pharmacist and pharmacy administrator, I have found that medical staff, other hospital leaders, and the public in general recognize “board certification” as an important evidence of some degree of competency. Hence, I have long supported the efforts toward certification for those engaged in clinical practice. Further, I have found it interesting to note that US News and World Report survey questions oriented toward defining the “best hospitals” have asked us whether our pharmacy staff includes board certified pharmacists. In the pediatric care setting we need a credential which would provide evidence that the individual manifests expertise in managing pharmacotherapy in children. The Pediatric Pharmacy Specialist credential will provide this credential; I therefore strongly encourage pursuit of this petition.

Sincerely,



William L. Greene, PharmD, BCPS, FASHP
Chief Pharmaceutical Officer, and
Professor (Affiliated), Department of Clinical Pharmacy, UT College of Pharmacy
St Jude Children’s Research Hospital, MS150
901-595-3686
William.greene@stjude.org

To Whom It May Concern:

I wanted to take a brief moment to introduce myself. My name is Christopher Jerry and I am the father of Emily Jerry, as well as, the President & CEO of The Emily Jerry Foundation. My daughter Emily died as a result of a tragic medication error, here in Cleveland in 2006, after miraculously overcoming cancer. Shortly after Emily's death, I decided to honor my beautiful little girl by changing careers and becoming a full-time patient safety advocate. I made this important decision in an effort to positively affect change in medicine in the United States and prevent similar errors from happening over and over again.

On behalf of The Emily Jerry Foundation, the primary reason for this letter is to show our support for the recognition of pediatric pharmacy practice as a specialty. Being the father of Emily, as well as, two other wonderful children, I truly believe that offering this type of recognition to pharmacists across the United States is absolutely imperative. The primary reason being, it would definitely help ensure the safe and effective use of medications on our nation's smallest of patients. Most importantly, it would help significantly reduce the number of overall medication errors and subsequent deaths like my beautiful two year old daughter Emily's that occur every year with our children, neonates, and adolescents. With that being said, I also believe there exists a very strong demand for this specialty, especially when you take into account the sheer number of children's hospitals across the country who are really beginning to make patient safety and quality of care a number one priority at their facilities.

If you have any questions or concerns regarding this extremely important issue, or if you would like to speak with me directly, please do not hesitate to call me directly at 440-289-8662.

Very best regards,

Chris

Christopher S. Jerry
President & CEO
The Emily Jerry Foundation



Christopher S. Jerry

President & CEO

chris@emilyjerryfoundation.org

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emilyjerryfoundation.org

September 14, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, DC 20037

Dear Mr. Ellis,

I am writing this letter in strong support of the petition to the Board of Pharmaceutical Specialties (BPS) to recognize Pediatric Pharmacy Practice as a specialty.

As a pediatric pharmacist for over 20 years and an Executive Director of Pharmacy at a Children's Hospital for the past seven years, I can attest that Pediatric Pharmacy Practice is a very specialized field, where the delivery of patient care services to ensure the safe and effective use of medications for all pediatric patients, from neonates through adolescents, is critically dependent on specialized training and skills sets of pharmacists. At CHOC Children's Hospital, through participation in interdisciplinary medical rounds and other activities, our clinical pharmacist specialists actively manage medication use of patients in the following areas:

- Neonatal Intensive Care Unit (NICU)
- Pediatric Intensive Care Unit (PICU)
- Cardiovascular Intensive Care Unit (CVICU)
- Oncology Unit
- Bone Marrow Transplant Unit

In addition, our specialists manage the Antimicrobial Stewardship Program, are actively involved in the care of patients on ketogenic diet, the Parenteral Nutrition Team and the Mobile Asthma Care Unit (Breathmobile). They are also essential members of the Institutional Review Board and important contributors to clinical research involving medications within the institution.

The extensive involvement of pharmacists in all aspects surrounding medication use in pediatric patients requires that these individuals have specialty level training and qualifications. For this reason, almost 80% of pharmacists employed at CHOC Children's have completed a PGY1 residency. In addition, clinicians participating in clinical activities are required to have years of practice experience, undergone extensive months-long training at our institution or completed a PGY2 residency in Pediatrics. Currently, no BPS certification examination will help delineate the skills of pediatric specialists since the examination contains minimal questions relating to the care of pediatric patient. Once Pediatrics Pharmacy Practice becomes a specialty, we will require that all clinical pharmacist specialists participating in clinical activities or collaborative practice

agreements obtain pediatric specialty certification. This will mean that approximately more than 50% of our pharmacists will become Board Certified in Pediatrics.

The need for pediatric pharmacists has grown exponentially throughout the last decade. During my tenure here at CHOC Children's Hospital, the number of inpatient pharmacists has grown 113% from 12.5 full time equivalent (FTE) (or 15 pharmacists) seven years ago to 26.65 FTE (or 29 pharmacists) today. This number is expected to reach 31.35 FTE (or 34 pharmacists) by July 2013. The same growth is experienced by most other stand-alone children's hospital around the country. In addition, as a specialty, Pediatric Pharmacy Practice has just begun to venture out to the ambulatory care setting. There will be additional demands for pediatric pharmacist specialists to expand to the ambulatory care setting as we move forward with the health care reform, as well as the accountable care organizations (ACO) and medical home models. Therefore, the demand for specialty pediatrics services will continue to grow, as will the need for Board Certified Pediatric Specialists.

I am in full support of the mission of BPS to improve patient care through recognition and promotion of specialized training, knowledge and skills in pharmacy and specialty board certification of pharmacists. With the above outlined rationale, I urge BPS to strongly consider the cohort petition efforts of the American Society of Health-System Pharmacists (ASHP), American College of Clinical Pharmacy (ACCP) and Pediatric Pharmacy Advocacy Group (PPAG) to recognize Pediatric Pharmacy Practice as a specialty, in order to highlight the unique qualifications of this subset of pharmacists that have distinguished themselves in the care of pediatric patients by gaining specialized knowledge, skills and abilities and creating a unique practice beyond the scope of pharmacy practice defined by licensure examination. Please feel free to contact me if I can be of further help in the petition process.

Sincerely yours,



Rita K. Jew, Pharm.D., FASHP
Executive Director, Pharmacy and Clinical Nutrition Services
CHOC Children's Hospital

29 August 2012

William M. Ellis, BSP Pharm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, D.C. 20037

Dear Mr. Ellis,

I am honored and privileged to provide this enthusiastic letter of support on behalf of the petition to recognize Pediatric Pharmacy Practice as a specialty of the profession of Pharmacy.

By way of introduction, I have practiced clinically as a specialist in the field of pediatric pharmacotherapy since completing my residency at the Cincinnati Children's Hospital Medical Center in 1979. Throughout my academic career, the clinical practice facet of my position remains the most rewarding and important thing that I do. Thus, my perspective and recommendation emanate from a "first-hand" experience of being one of over 4000 professionals in the U.S. who collectively, represent the discipline of Pediatric Pharmacy Practice.

In both inpatient and outpatient pediatric medical settings, highly skilled, expertly trained clinical pharmacists serve the pharmaceutical needs of infants, children and adolescents. Their contributions range from direct patient care to the conduct of research which translates discoveries into effective therapeutic decisions which directly impact the lives of patients and their families. The ever changing physical and psychosocial makeup of pediatric patients requires that pharmacists who serve them have a highly specialized body of knowledge that is vastly different from those of their colleagues who provide care to adults. In the inpatient setting of a children's hospital, I have observed that the translators of Translational Medicine are most often the clinical pharmacists, given their unique education and knowledge base which enables them to bridge science (e.g., pharmacogenomics, pharmacokinetics) to therapeutics of the diseases and conditions which in many instances, are unique to pediatric patients. In the clinical research setting, trained pediatric pharmacy practitioners are vital contributors, often serving as clinician scientist investigators who possess a unique knowledge base and skill set as compared to other health care professionals involved in the research process.

In closing, a specialist is defined as "a practitioner whose practice is limited to a particular class of patients or of diseases or of a technique (as surgery) and who is qualified by advanced training and certification by a specialty examining board to so limit his or her practice". The current state pediatric pharmacy practice in the United States provides

Gregory L. Kearns, PharmD, PhD
Marion Merrell Dow/Missouri Chair
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Professor, Pediatrics and Pharmacology
Associate Chairman, Department of
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Robin Rusconi, JD
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Kelly Mason, PhD
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Daisy Dai, PhD
Senior Biostatistician
Email: hdai@cmh.edu
Phone: (816) 701-5233
Fax: (816) 701-5246

irrefutable evidence that this group of individuals indeed represents a specialty. Accordingly, I provide my highest recommendation that the Board of Pharmaceutical Specialties grant approval to this particular petition; an act which will have profound importance for pediatric pharmacy practitioners and most importantly, the children who they dedicate their professional careers to.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregory L. Kearns". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Gregory L. Kearns, B.S.(Pharm.), Pharm.D., Ph.D.
Marion Merrell Dow / Missouri Chair in Pediatric Medical Research
Professor of Pediatrics and Pharmacology, University of Missouri – Kansas City
Clinical Professor of Pediatrics, University of Kansas School of Medicine
Chief Scientific Officer and Chairman, Research Development and Clinical Trials
Associate Chairman, Department of Pediatrics
Co-Principal Investigator, Pediatric Trial Network

September 24, 2012

William M. Ellis, BSP Pharm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, D.C. 20037

Dear Mr. Ellis,

I have been asked to write a letter of support for the petition to recognize Pediatric Pharmacy Practice as a specialty of the profession of Pharmacy.

My whole-hearted support of this specialty is based on my work as a medication safety specialist for the Institute for Safe Medication Practices (ISMP). I retired from ISMP at the end of May this year, but spent the last almost 18 years working as an outside consultant and then as a full time employee. My area of expertise was that of pediatric and neonatal medication safety. As part of that position, I was part of the consult team that regularly assessed medication safety in pediatric hospitals around the country. In addition, I participated in medication safety collaboratives with the Vermont Oxford Network, Child Health Corporation of America (CHCA) and The National Association of Children's Hospitals and Related Institutions (NACHRI).

As part of our consults we evaluated the pediatric pharmacy clinical expertise available within both free-standing pediatric hospitals and those pediatric units that were part of primarily adult facilities. In many cases we were surprised to see a lack of pediatric pharmacy expertise. This might mean the lack of expertise in general or the lack of expertise on off-shifts such as evening, nights, weekends and holidays. It is very common in adult facilities that adult oriented pharmacists are responsible for reviewing orders and preparing medications for pediatric and neonatal patients. In some cases it has been years since they had an orientation to pediatric and neonatal pharmacology.

If a Pediatric Pharmacy Practice specialty were available, it could give organizations like ISMP an option to recommend to hospitals that there be at least one person on staff board certified in pediatrics and in the case of larger institutions perhaps a recommendation that a specialist be available on each shift, or on call, to support the pharmacy, nursing and medical staff. These specialists could be responsible for initial, as well as on-going orientation, for pharmacy staff. They could also be responsible for keeping up with the literature to assure the hospital remains aware of changes in pediatric and neonatal pharmacology. The availability of this expertise would improve the level of care for one of our most high risk patient populations.

Considering my experience in pediatric pharmaceutical care, I would offer my highest recommendation that the Board of Pharmaceutical Specialties grant approval to this particular petition. A specialty in pediatrics will have a profound effect on the quality and safety of care delivered to our children.

Sincerely,

Stuart Levine, PharmD

Retired member of the Institute for Safe Medication Practices consulting staff

College of Medicine – Jacksonville
Department of Emergency Medicine

655 West 8th Street
Jacksonville, FL 32209-6511
904-244-5044 Phone
904-244-4508 Fax

September 11, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Avenue, NW
Washington, DC 20037

Dear Mr. Ellis,

I am honored to be asked to write a letter of support to the Board of Pharmacy Specialties on behalf of the petition to recognize Pediatric Pharmacy Practice as a specialty of the profession of Pharmacy.

Facets of my background highlight the intersection of a series of needs that were uniquely met by field of Pediatric Pharmacy and specifically by the organization known as the Pediatric Pharmacy Advocacy Group (PPAG).

First, I was a member of the first American Heart Association Pediatric Resuscitation committee. We were charged with creating the first Pediatric Advanced Life Support (PALS) course which included decisions regarding the dosing of medications for the critically ill child.

Secondly, I have been Medical Director for the Broselow tape since its inception and also what is known as Artemis; the complete web based pediatric acute care medication safety dosing system used in more than 250 hospitals nationwide.

Finally, I am co-founder of the Difficult Airway Course Emergency and have been solely responsible for pediatric content of that course including the dosing of medications used in the management of life threatening airway emergencies.

In all three areas there was a need for recommendations for specific doses of critical medications, including the specific area, rarely ever resolved or even addressed by organizational consensus, the transition from pediatric to adult doses. The significance of these decisions cannot be underestimated as in these instances the dosing guidelines generated were published and widely disseminated both nationally and internationally and have formed the standard upon which much of pediatric acute medicine is practiced today.

The final decisions reached in all these areas required the distillation of published literature and consensus expert opinion and represented a unique body of knowledge which did not exist before and which permitted clinicians to meet the unique needs of the critically ill child.

I am pleased and privileged to be in the unique position to testify to the importance of this area of expertise as someone who sought answers where none existed before to create standards where none existed before, and as someone who, as a practicing emergency physician has also witnessed firsthand the fruits of these labors measured in real lives saved.

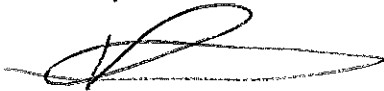
College of Medicine – *Jacksonville*
Department of Emergency Medicine

655 West 8th Street
Jacksonville, FL 32209-6511
904-244-5044 Phone
904-244-4508 Fax

Pediatric Pharmacy indeed addresses an area which is not addressed by other disciplines, namely the unique medication dosing issues of children whose metabolism differs depending on age and whose doses must be individualized, all of which must be reflected in recommended dosing guidelines.

I hope this letter gives a little insight into the importance of Pediatric Pharmacy as reflected in these examples from my own personal experience. Please feel free to contact me if further elucidation would be helpful.

Sincerely,



Robert Luten, MD
Professor
Department of Emergency Medicine, Division of Pediatric Emergency Medicine
The University of Florida- Shands Jacksonville Medical Center

September 12, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave, NW
Washington, DC 20037

Dear Bill:

It is a pleasure for me to write a letter concerning the demand for pediatric pharmacist specialists.

Attached is a brief biography about my pharmacy career for readers of this letter that may not be familiar with my background and experiences which have shaped my opinion on the need and demand for pharmacy specialties and, in particular, the need and demand for pediatric pharmacy to be recognized as a pharmacy specialty by the Board of Pharmacy Specialties.

I reviewed available pharmacy manpower data before preparing this letter. Unfortunately, I cannot find any definitive studies or forecasts related to the demand for pediatric pharmacy generalists or pediatric pharmacy specialists. Multiple factors will drive the demand for pediatric pharmacy specialists up in the future. The same trends that are driving the demand for clinical pharmacy specialists overall nationwide will drive up the demand for pediatric pharmacy specialists. These trends include the following:

- Increased recognition by government, accrediting bodies, hospitals and ambulatory care settings including community pharmacies of the need for pharmacists to provide medication therapy, management to improve the effectiveness and safety of drug therapy in all patient care settings.
- Increased recognition of drug therapy related risks of specialized patient populations (e.g., oncology, children, critical care, emergency, transplant, cardiovascular, infectious disease),
- Increased growth of interdisciplinary acute and ambulatory health care teams to improve the treatment of specialized patient care populations,
 - Increased consensus among physician and nursing leaders in hospitals and healthcare systems that specialized pharmacists are required as essential members of interdisciplinary teams (e.g., Neonatal Intensive Care and Pediatric Intensive Care patient care interdisciplinary teams),
 - Increased utilization of pharmacists to provide medication therapy management in ambulatory and community settings (e.g., in the case of pediatrics, patients with sickle cell, HIV, asthma, transplant, oncology and other diseases have been shown to benefit from managed medication therapy by pediatric pharmacists),

- Increased numbers of professional organizations or accrediting bodies that recognize pharmacists as essential members of interdisciplinary teams (e.g., Society of Critical Care Medicine manpower guidelines, NICU accrediting requirements for pharmacists to be on NICU teams), and;
- Growth in the number of pediatric pharmacy residency programs and pediatric pharmacy residents (now 38 PGY2 Pediatric Pharmacy Practice programs) will produce more qualified pediatric pharmacy specialists and demand for pediatric pharmacy specialists will increase as employers recognize that more qualified pharmacists are available for acute and ambulatory/community pediatric positions.

These general trends as well as those specific to pediatrics will continue to increase the demand for pharmacy specialists in most of the existing pharmacy specialties and emergency pharmacy specialty fields (e.g., critical care, geriatrics, pediatrics).

The need and demand for pediatric pharmacy specialists is amplified by two factors. One, Doctor of Pharmacy graduates have minimal knowledge, skills and abilities related to pediatric drug therapy management. Secondly, medication errors and adverse drug events are more likely to cause patient harm in pediatric patients as noted by a paper published by Fortescue and others entitled “Prioritizing strategies for preventing medication errors and adverse drug events in pediatric inpatients” (*Pediatrics* 2003 April, 111 (4 Pt 1): 722-9). The authors of this paper state that medication errors in pediatric inpatients occur at similar rates as in adults but have three times the potential to cause harm. The high risk of significant medication errors in pediatric patients including wrong drug choice, wrong dose, drug interactions, etc. has led pediatric hospitals and organized ambulatory care settings to recruit pharmacists who have pediatric pharmacy practice experience or pediatric residency training at the PGY1 and/or PGY2 levels. The high risk of harm will continue to drive the demand for pediatric pharmacy specialists. In addition, advances in pharmacotherapy will require pediatric pharmacy specialists with more advanced practice skills than today.

Job descriptions for pediatric pharmacy positions frequently require or prefer that candidates have either prior pediatric practice experience or pediatric residency training at the PGY1 or PGY2 levels. In the future, Board Certification of Pediatric Pharmacy Specialists will be utilized as an additional criterion beyond residency training and/or experience to identify pharmacists qualified for pediatric pharmacy positions.

Growth in the membership of the Pediatric Pharmacy Advocacy Group (PPAG) is an indicator of the number of pharmacists who are practicing as pediatric pharmacists. This growth reflects the increase demand for pediatric pharmacists. The increasing number of papers published in *The Journal of Pediatric Pharmacology and Therapeutics*, the official journal of PPAG, also reflects the growth in the number of pharmacists practicing as pediatric pharmacy specialists which is also linked to demand.

Based upon my experience in serving as a lead surveyor for residency programs in children’s hospitals and hospitals with high risk pediatric patient populations (e.g., Pediatric Intensive Care Units (PICU), Neonatal Intensive Care Units (NICU), oncology, transplant, and general and other specialized pediatric patient care units or clinics), I can say with confidence that Chief Executive Officers, Chief Medical Officers and Directors of Pharmacy in these institutions recognize the high risks of drug therapy in pediatric patient populations. For this reason, it is uncommon to find a hospital with a PICU, NICU or

other specialized units that does not have pharmacists as members of specialized pediatric teams managing the care of these patient populations.

In summary, to improve pediatric drug therapy management our nation needs more pharmacists with the knowledge, skills and abilities necessary to provide pediatric medication *therapy management*. The demand for pediatric pharmacy specialists will continue to grow based upon the above described trends in pharmacy specialization. In closing, I urge the Board of Pharmacy Specialties to approve the petition to recognized pediatric pharmacy practice as a pharmacy specialty. Recognition of pediatric pharmacy as a specialty will benefit pharmacy and more importantly pediatric patients and their families throughout the nation.

Sincerely

William A. Miller, PharmD, FASHP, FCCP
Professor Emeritus, University of Iowa,
Lead Residency Surveyor, ASHP, and,
Chairman, Pharmacotherapy Board of Directors
304 Bounty Lane
Charleston, SC 29412
614-657-2373
william-a-miller@uiowa.edu

William A. Miller

Biographical Sketch

William A. Miller is a Professor Emeritus of Clinical and Administrative Pharmacy, College of Pharmacy, University of Iowa. He has held positions as a director of pharmacy (City Memphis Hospital in Memphis, Tennessee and Medical University of South Carolina Medical Center, Charleston, South Carolina), academic chairman (College of Pharmacy, University of Tennessee Center for the Health Sciences, Memphis, Tennessee; College of Pharmacy, Medical University of South Carolina, Charleston, South Carolina; and College of Pharmacy, University of Iowa, Iowa City, IA), teacher and as student and resident preceptor. He is the author of over one hundred publications. His research interests consist of evaluative and outcome studies dealing with pharmaceutical education and pharmacy practice.

He is a Past-President of the American Association of Colleges of Pharmacy and the American College of Clinical Pharmacy. He served on the ASHP Commission on Credentialing for a six-year period and was chair for two-years. He currently serves as a lead surveyor for the accreditation of residency programs by the American Society of Health-System Pharmacists. As President-Elect of the Iowa Society of Health-System Pharmacists he helped merge the Iowa Pharmacists Association and the Society into a new organization, the Iowa Pharmacy Association. He is the current Chairman and President of the Board of Directors for the journal, *Pharmacotherapy*.

August 6, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, DC 20037

Dear Mr. Ellis,

I am pleased to lend my personal, strong support for recognition of pediatric pharmacy practice as a specialty by the Board of Pharmacy Specialties (BPS).

As a practicing Neonatologist and a Program Officer at the Institute of Medicine, I am privileged to work daily with physicians, nurses, pharmacists, and other health professionals who are striving to improve the triple aim—better care for patients, better health for populations, and lower costs of health care—in institutions and communities around the US. My personal experiences in health care and health policy have demonstrated to me that achieving the triple aim hinges on high-quality teamwork in which health professionals work together with patients and families. Essential to implementing high-performing teams throughout health care is the top-notch preparation and demonstrated capability of each individual team member. The team is only as strong as its weakest link. And, quite frankly, despite extensive training in pharmacology, physicians are often not well enough equipped to handle the increasingly complex pharmacotherapy needs of their patients. This can be particularly true in Pediatrics where drugs are often used off-label, and the data are complex and ever-changing. Clinical pharmacists deeply skilled and experienced in pediatric pharmacy are invaluable members of the pediatric team and truly impact our ability to help achieve the triple aim for US children.

Ensuring rigor in the training and certification of pharmacists on the pediatric team is essential. Pharmacists who satisfy the requirements for the proposed pediatric pharmacy practice specialty will help guarantee the quality and safety of patients and will be valuable resources to individuals and organizations working to improve the value of drug therapy and the quality of health care. I am confident that clinicians and institutions alike will seek out pediatric pharmacy specialists who have documented expertise and demonstrated skill in working with others health professionals, patients, and families to promote quality, safety, and value.

As the country moves toward achieving the triple aim, I hope BPS will take this opportunity to ensure that children are not left behind by recognizing pediatric pharmacy practice as a recognized specialty in pharmacy practice.

Sincerely,



Isabelle Von Kohorn, MD PhD

Appendix C-1

Pediatric Pharmacist Survey

Survey of Pediatric Pharmacists Interested in Board Certification

Dear Pediatric Pharmacist:

Thank you for taking the time to provide background information to assist in the consideration of a proposed specialty certification of pharmacists who have distinguished themselves in the care of pediatric patients by gaining specialized knowledge, skills, and abilities.

The American College of Clinical Pharmacy (ACCP), the American Pharmacists Association (APhA), the American Society of Health-System Pharmacists (ASHP), and the Pediatric Pharmacy Advocacy Group (PPAG) have partnered to develop and submit a petition to the Board of Pharmacy Specialties (BPS) to recognize pediatric pharmacy practice as a specialty. **For purposes of this petition, the definition of pediatric pharmacy practice is:**

Pediatric pharmacy practice specializes in the delivery of patient care services by pharmacists that ensures the safe and effective use of medications for all children from neonates through adolescents. The practice includes direct patient care for children, often provided through interprofessional health care teams, as well as advocacy and education for children and their families, wellness and health promotion, and activities that advance knowledge and skills in pediatric pharmacy.

Please complete this 5-10 minute survey by **Friday, August 27, 2012** that will provide the petitioning organizations with supplemental data to support the petition to BPS. Your individual responses will be kept confidential. Collectively, all pharmacist responses will be compiled to further document the unique elements of this specialty and provide support for this specialty in a petition to the Board of Pharmacy Specialties.

At the end of the survey, you will have an opportunity to enter information to add your signature to the petition. If questions arise, contact jskelton@silverpennies.com. Thank you for your time and assistance in this effort.

Marcia L. Buck, PharmD, FCCP, FPPAG; Representing the American College of Clinical Pharmacy

Lea S. Eiland, PharmD, BCPS, FASHP; Representing the American Society of Health-System Pharmacists

Peter N. Johnson, PharmD, BCPS; Representing the Pediatric Pharmacy Advocacy Group

Chasity M. Shelton, PharmD, BCPS, BCNSP; Representing the American Pharmacists Association

Practicing Pediatric Pharmacists

* Indicates response required

* **How many years have you been a licensed pharmacist?**

- < 5 years
- 5-9 years
- 10-14 years
- 15-19 years
- > 20 years

* **How many years have you been in pediatric pharmacy practice?**

- < 5 years
- 5-9 years
- 10-14 years
- 15-19 years
- > 20 years

* **On average, how many HOURS per week do you practice in your pediatric practice site?**

- Full-time: 40 or more hours per week
- 31 - 39 hours per week
- 25 - 30 hours per week
- 21 - 24 hours per week
- 15 - 20 hours per week
- 10 - 14 hours per week
- 1 - 9 hours per week

I do not practice in pediatric pharmacy

I do not practice in pediatric pharmacy

* Do you believe that you currently practice in the area of pediatric specialization as defined by the Task Group?

- Yes
- No

* If yes, in an average week, what PERCENTAGE of your time do you estimate is devoted exclusively to providing direct patient care and services according to this definition?

- 90% - 100%
- 80% - 89%
- 70% - 79%
- 60% - 69%
- 50% - 59%
- 40% - 49%
- 30% - 39%
- 20% - 29%
- 10% - 19%
- 1% - 9%

* Please check all types of residencies/fellowships completed.

- PGY1 Pharmacy Practice Residency
- PGY2 Pediatric Residency
- Other PGY2 Residency
- Fellowship
- No residency or fellowship
- Other (please specify)

* If the petition to recognize pediatric pharmacy practice as a specialty is approved, how likely would you be to pursue this specialty recognition within the next 5 years?

- Highly likely
- Likely
- Somewhat likely
- Unlikely
- Highly unlikely

* Are you directly responsible for hiring pediatric pharmacists within your organization?

- Yes
- No

Pediatric Pharmacist Employers

What is the total number of FTEs allocated to serving pediatric patients within your organization?

What percentage of these pharmacists do you believe are currently practicing in the area of specialization as defined above?

What percentage of these pharmacists practicing in the area of specialization are currently required to have advanced clinical training (e.g., residency training)?

What percentage of these pediatric pharmacist positions currently require BPS specialty certification or other earned credentials?

How many pediatric pharmacist positions within your institution are currently vacant/unfilled?

Please rank, in preferred order, the current desired level of training for pharmacists practicing in

your pediatric pharmacy. 1 = most desired; 6 = least desired

- PGY-1 Residency – Pharmacy Practice
- PGY-1 Residency with pediatric emphasis
- PGY-2 Residency – Pediatric
- PGY-2 Residency – Other
- Employer–provided training program
- None required or desired

If BPS recognizes pediatric pharmacy as a specialty, what is the likelihood that you would require this new specialty credential for newly hired pharmacists within your institution?

- Highly likely
- Likely
- Somewhat likely
- Unlikely
- Highly unlikely

If BPS recognizes pediatric pharmacy as a specialty, what is the likelihood that you would require this new specialty credential for currently employed pharmacists within your institution?

- Highly likely
- Likely
- Somewhat likely
- Unlikely
- Highly unlikely

Which of the following ranges best describes your organization's anticipated growth in the number of pediatric pharmacy specialists (as described above) over the next 5 years?

- Projected decrease
- 0%–5%
- 5%–10%
- 10%–20%
- >20%

How many positions for pediatric pharmacy specialists (as defined above) has your organization recruited over the past 3 years, from July 1, 2009 to June 30, 2012?

What percentage of these positions were filled?

How many positions for pediatric pharmacy specialists (as defined below) do you estimate you will hire from July 1, 2012 through June 30, 2015?

Please add any additional comments that would help us understand the demand for specialists in pediatric practice within your organization.

OPTIONAL: If you would like to support this recognition effort by signing onto the petition to BPS, please add your signature in support of this proposed specialty by completing the following information:

First Name **Last Name**

Credentials

Title

Place of Employment <input type="text"/>	
Work Street Address <input type="text"/>	
City <input type="text"/>	State <input type="text"/>
Zip Code <input type="text"/>	Work Phone Number <input type="text"/>
Work Email Address <input type="text"/>	
* Indicates Response Required	

Submit

Pediatric pharmacy practice specializes in the delivery of patient care services by pharmacists that ensures the safe and effective use of medications for all children from neonates through adolescents. The practice includes direct patient care for children, often provided through interprofessional health care teams, as well as advocacy and education for children and their families, wellness and health promotion, and activities that advance knowledge and skills in pediatric pharmacy.

Appendix D-1

Report of the Role Delineation Study of Pediatric Pharmacy

Report of the Role Delineation Study of Pediatric Pharmacy

Prepared for



**Board of Pharmacy Specialties
2215 Constitution Avenue, NW
Washington, DC 20037-2985**

Prepared by



**Professional Examination Service
Department of Research and Advisory Services
475 Riverside Drive
New York, NY 10115**

April 2012

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Introduction

In 2011, the Board of Pharmacy Specialties (BPS) contracted with Professional Examination Service (PES) to conduct a role delineation study (RDS) of pediatric pharmacy practice. This area of pharmacy practice had been identified as a potential new BPS specialty certification. In an RDS, the domains of practice and associated tasks are defined for the professional role under consideration, and the knowledge bases required to perform the defined tasks of the specialty are articulated.

The primary purpose of the study reported herein was to define the role of the pediatric pharmacist, in the format used to define existing BPS specialties. In particular, the RDS was conducted in order to delineate the tasks performed by the pharmacists specializing in pediatrics within broad domains of practice, and to identify the specialized (i.e., beyond licensure) knowledge bases needed to perform the delineated tasks.

If pediatric pharmacy were to become a specialty examination, the RDS also provides a valid basis on which examinations can be developed. According to standards established by the testing industry, the mechanism for establishing the content to be assessed in a certification examination is the conduct of a RDS of the profession. Conduct of RDSs is required in order to meet the certification program accreditation requirements of the American National Standards Institute (ANSI). The overall process of role delineation is described in the 1999 revision of the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, and the National Council on Measurement in Education) and in the *PES Guidelines for the Development, Use, and Evaluation of Licensure and Certification Programs* (1995).

The RDS of pediatric pharmacists was undertaken in two phases: (1) development of the role delineation by subject-matter experts, and (2) conduct of a survey to validate the description of specialty practice and develop the hypothetical examination content outline.

Methodology

Phase 1 – Development of the Description of Specialty Practice

Appointment of the Role Delineation Task Force

To assemble a diverse nominee pool from which to assemble the role delineation task force and appoint subject-matter experts to participate in other aspects of the study, BPS put out a call for nominations in May 2011.

An online questionnaire was created to capture information about volunteers needed to fill various roles in the RDS process. In addition to identifying the activities for which the nominee was willing to participate, BPS collected professional background information about each nominee, including percentage of time spent in the specialty of pediatric pharmacy, work setting, and years of experience. For additional description of the online data collection instrument and the activities for which nominees could volunteer, see Appendix 1.

BPS received 158 nominations, and reviewed the CVs of all nominees prior to the selection of the task force.

In selecting the members of the role delineation task force, BPS took into consideration critical demographic and professional background variables to be represented in the group. The task force was comprised of 11 subject-matter experts representing a range of practice settings and years of experience.

Pre-Meeting Data Collection Activity

Prior to the first meeting of the task force, PES conducted a data collection activity with the task force members. In order to begin the process of delineating pediatric-specific tasks and knowledge statements, PES created a brief web-based form to collect initial data regarding potential content for the pediatric pharmacy specialty role delineation. Task force members were asked to describe specific tasks performed by a pharmacist specializing in pediatrics as well as the specialized knowledge that a pharmacist practicing in pediatrics must have in order to be effective.

PES provided the task force members with a resource manual describing role delineation terminology and procedures. Task force members were instructed to review the resource manual prior to completing the data collection activity. Additional guidance was also provided throughout the online data collection form. See Appendix 2 for screen captures of this data collection form.

PES reviewed and synthesized the results of the pre-meeting data collection activity for use at the first meeting of the task force. The domains, tasks, and knowledge statements produced during the pre-meeting data collection activity served as a starting point for the development of the pediatric pharmacy role delineation.

Meeting 1 of the Task Force

In order to define the tasks and knowledge specific to the practice of pediatric pharmacy, the role delineation task force met in Washington, DC in August 2011 for a 2-day meeting. See Appendix 3 for a list of meeting attendees.

At the meeting, PES facilitated a discussion regarding the most useful structure for the delineation, and the process for developing the tasks and knowledge to be included in the pediatric pharmacy role delineation. The task force adopted a four domain organizing structure for the delineation. The domains were *Patient Management*, *Practice Management*, *Information Management and Education*, and *Public Health and Patient Advocacy*. Tasks performed and knowledge necessary for competent practice within each of these four domains were developed over the course of the meeting.

Immediately following this meeting, the role delineation was sent to all task force members for critical review. Task force members were asked to (1) provide solutions for any outstanding issues, (2) ensure that all tasks and knowledge required for effective practice were included in

the delineation, (3) confirm that each statement was delineated as accurately and concisely as possible, and (4) ensure that each knowledge statement could be matched to at least one task statement and that a complete set of required knowledge had been identified for each task statement. Task force members then met for a series of virtual meetings in order to reconcile the comments and prepare a revised draft of the role delineation. This document was then disseminated to additional pediatric pharmacists for review and comment.

Conduct of Independent Review

To support and supplement the work of the task force, an independent review procedure was implemented. Independent review is a process by which persons not involved in the initial development of the role delineation are given the opportunity to review the work in progress. This review ensures that a fresh perspective is brought to bear on the ongoing work of the task force.

A total of 14 participants were selected from the pool of nominees assembled at the outset of the study. Selections were made so as to represent a range of areas of practice settings and experience. Reviewers were asked to evaluate the delineation for comprehensiveness, redundancy, clarity, consistency, and sequence. Appendix 4 contains a copy of the detailed instructions provided for performing the review.

A reminder e-mail was sent to reviewers prior to the submission deadline in order to encourage participation. A total of 12 independent reviewers responded, for an 86% return rate, which is an above-average response rate for this type of activity.

All reviewer comments were documented for the task force and reviewed during a series of task force WebEx conference calls.

Meeting 2 of the Task Force

Meeting 2 of the task force was scheduled as a series of two virtual meetings. One week prior to the first of these meetings, PES sent the members of the task force the results of the independent review of the pediatric role delineation.

Task force members, after thoughtful discussion, were able to make decisions regarding all suggested edits to the tasks and knowledge statements, and finalized the delineation of practice in preparation for a validation survey of pharmacists practicing in the pediatric specialty. The role delineation finalized during meeting 2 of the task force consisted of 4 domains, 32 tasks, and 60 knowledge statements. The number of tasks and knowledge statements in each domain is displayed in Table 1.

Table 1
Structure of Pediatric Pharmacy Role Delineation

	Task Statements	Knowledge Statements
Domain 1: Patient Management 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.	12	32
Domain 2: Practice Management Tasks related to advancing pediatric pharmacy practice; and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.	8	9
Domain 3: Information Management and Education Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of healthcare providers, trainees, patients and caregivers.	6	10
Domain 4: Public Health and Patient Advocacy Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population healthcare policy.	6	9
Total	32	60

Phase 2 – Conduct of Survey to Validate the Delineation of Practice

Development of Survey Instrument

The pediatric pharmacy role delineation was validated through implementation of a web-based survey of pharmacists practicing in the specialty. The delineation of practice was assessed by using quantitative and qualitative data collection procedures. From a quantitative standpoint, rating scales were designed to measure the *frequency* of use and *importance* of the tasks; the *percentage of time* spent in each domain and the *importance* of each domain; and how *important* the knowledge is to providing effective care to pediatric patients, as well as the *frequency of use* of the knowledge. From a qualitative standpoint, open-ended questions were developed to assess any tasks or knowledge missing from the delineation.

The specific rating scales used in the survey follow.

Tasks

Frequency How frequently did you perform the task during the past 12 months?

1=Never, 2=Quarterly or less, 3=Monthly, 4=Weekly, 5=Daily

Importance How important is the task to providing effective care to pediatric patients?

1=Not important, 2=Minimally important, 3=Moderately important, or 4=Very important

Domains

% of Time Of the time you spent in pediatric pharmacy during the past year, what percentage did you spend performing the tasks in each domain?

Importance How important is the domain to providing effective care to pediatric patients?

1=Not important, 2=Minimally important, 3=Moderately important, 4=Highly important

Knowledge

Frequency How frequently did you use the knowledge during the past 12 months?

1=Never, 2=Quarterly or less, 3=Monthly, 4=Weekly, 5=Daily

Importance How important is the knowledge to providing effective care to pediatric patients?

1=Not important, 2=Minimally important, 3=Moderately important, or 4=Very important

Screen captures of the validation survey can be found in Appendix 5.

Conduct of Survey Pilot Test

After the role delineation was incorporated into the online survey instrument, a pilot test was conducted. The purpose of the pilot test was to ensure that all content and technical aspects of the survey instrument were of the highest quality and that the survey was as clear and user-friendly as possible.

An additional 10 volunteers who had volunteered or been nominated to participate at the outset of the study but had not yet participated as task force members or independent reviewers were asked to participate in the pilot test of the survey. All task force members were also asked to participate. Therefore, a total of 21 pilot testers were sent invitations and personalized, password-protected links to the beta test version of the survey. Pilot testers were asked to provide feedback regarding clarity of instructions, utility of rating scales, technical difficulties, and time to complete, as well as make any additional suggestions or comments to improve the survey experience. For a copy of the invitation sent to pilot testers, see Appendix 6 **Appendix 6**.

Feedback was received from 10 participants for a return rate of about 67% — an above average response rate for this type of activity. PES reviewed the results of the pilot test and, based on the pilot feedback, made minor adjustments to the survey in advance of the large-scale administration.

Sampling Plan and Dissemination of Survey

BPS obtained the Pediatric Pharmacy survey sample from the following sources: APhA, PPAG, ASHP, and ACCP. After eliminating duplicates from across the sources, the final sample was comprised of 1552 pharmacists identified as pediatric pharmacy specialists.

In collaboration with BPS, PES developed survey invitation letters and reminders to be sent to the sample of specialty pharmacists selected for the survey. These e-mail communications were designed to inform potential participants of the purpose of the validation survey and to encourage them to respond.

Invitations to participate in the survey were disseminated in January 2012. Each invitation e-mail included an embedded, customized link containing a unique password to the survey. The use of the password permitted recipients to start and stop the survey without loss of data; that is, the survey could be completed only one time, but across multiple sessions.

In order to encourage participation, a reminder was sent to all non-respondents one week after the initial invitation, and a final e-mail communication was sent one week prior to the deadline. Copies of all e-mail communications with the sample can be found in Appendix 7.

As incentive to participate, all survey participants could elect to be entered into a prize drawing to win one of four \$50 Amazon.com gift cards.

Results of the Survey of Pediatric Pharmacy Practice

Return Rate

A total of 1552 survey invitations were disseminated, and of these 77 could not be delivered due to invalid email addresses, leaving a valid sample size of 1475. As seen in Table 2, a total of 463 pharmacists completed the survey for a return rate of about 31%. This is an excellent return rate for not yet established credentialing programs.

Table 2
Survey Return Rate

Number of Invitations	Unable to Deliver	Valid Sample Size	Number of Responses	Return Rate
1552	77	1475	463	31.4%

Professional Background and Demographic Information

The following section provides background and demographic information regarding the pediatric pharmacists who responded to the survey.

As seen in Table 3, respondents were highly engaged in the specialty of pediatric pharmacy with an average of 87% of their work time spent providing pharmacy services to pediatric patients.

Table 3
What percentage of your overall work time do you spend providing pharmacy services for pediatric patients?

Mean	Median	Minimum	Maximum	Mode	SD
87%	100%	1%	100%	100%	(22.9)

Table 4 shows the percentage of work time spent providing pharmacy services to pediatric patients in another way. This presentation expands upon Table 3. Here we see that only 3 respondents (6%) spent 10% or less of their time, 16 respondents (3.5%) spent 11-25% of their time, 47 respondents (10.2%) spent 26-50% of their time, 30 respondents (6.5%) spent 51-75% of their time, and 367 respondents (79.3%) spent 76-100% of their time providing pharmacy services for pediatric patients.

Table 4
Percentage of work time providing pharmacy services for pediatric patients

0%		1-10%		11-25%		26-50%		51-75%		76-100%	
N	%	N	%	N	%	N	%	N	%	N	%
0	0%	3	.6%	16	3.5%	47	10.2%	30	6.5%	367	79.3%

Of the time spent providing pharmacy services to pediatric patients, an average of 54% was spent providing direct patient care (Table 5).

Table 5
Of this time, what percent is spent providing *direct* patient care?

Mean	Median	Minimum	Maximum	Mode	SD
54%	50%	0%	100%	50%	(30.4)

Survey respondents had an average of 12 years of experience as a licensed pharmacist with the least being 1 year and most 51 years (Table 6). There was a good distribution of respondents across the spectrum of years of experience from 1 to more than 20 years as a licensed pharmacist (Table 7).

Table 6
How many years have you worked as a licensed pharmacist?

Mean	Median	Minimum	Maximum	Mode	SD
12	10	1	51	4	(9.1)

Table 7
Years as a licensed pharmacist

< 1 year		1-5 years		6-10 years		11 - 20 years		More than 20 years	
N	%	N	%	N	%	N	%	N	%
0	0%	146	31.7%	111	24.1%	120	26.0%	84	18.2%

Tables 8 and 9 show the results for years working in the pediatric pharmacy specialty. Respondents had an average of 9 years, with 40% of respondents having 1-5 years of experience, 27% having 6-10 years of experience, 25% having 11-20 years of experience, and about 8% having more than 20 years of experience in the specialty.

Table 8
How many years (since licensure) have you worked with pediatric patients?

Mean	Median	Minimum	Maximum	Mode	SD
9	7	1	34	4	(7.1)

Table 9
Years in the pediatric specialty since licensure?

< 1 year		1-5 years		6-10 years		11 - 20 years		More than 20 years	
N	%	N	%	N	%	N	%	N	%
0	0%	184	40.0%	124	27.0%	116	25.2%	36	7.8%

Table 10 shows the setting in which respondents provided the majority of their patient care. The settings that were most represented in this survey were freestanding pediatric hospital (about 44%), adult hospital with children's hospital within it (33%), and adult hospital with pediatric wing/services (18%). No other setting was represented by more than 10% of survey respondents.

Table 10
In what setting does the *majority* of your practice take place?

	N	%
Adult hospital with pediatric wing/services	81	17.6%
Adult hospital with children's hospital within it	153	33.2%
Pediatric hospital freestanding	202	43.8%
Pediatric ambulatory care clinic - freestanding	5	1.1%
Home care	2	.4%
Other (Please specify.)	18	3.9%
Total	461	100%

Table 11 shows that over 50% of respondents were practicing in the role of clinical specialist. Of those respondents selecting *other*, the most frequent write-in response was *Pediatric Pharmacy Resident* (14).

Table 11
Which of the following most closely describes your primary role?

	N	%
Director of pharmacy	13	2.8%
Clinical manager	23	5.0%
Operational manager	6	1.3%
Clinical specialist	233	50.5%
Generalist pharmacist/decentralized pharmacist	63	13.7%
Staff pharmacist	43	9.3%
Academia	36	7.8%
Researcher	1	.2%
Medication safety officer	3	.7%
Other (Please specify.)	40	8.7%
Total	461	100%

Table 12 illustrates the average percentage of time respondents spent providing care to patients within each of five specified pediatric age ranges and with adults.

Table 12
What percentage of your patients falls into each of the following age ranges?

	Mean	SD
Pre-term neonates (Neonate born at <38 weeks gestational age)	19.6%	(21.6)
Full-term neonates (Neonate born at 38-42 weeks [average 40 weeks] gestational age)	13.0%	(10.4)
Infants (1 month [>28 days] to 1 year of age)	17.9%	(9.2)
Children (1-12 years of age)	29.1%	(16.3)
Adolescents (13-18 years of age)	17.8%	(11.0)
Adults (>18 years of age)	7.7%	(13.9)

Table 13 shows the highest pharmacy-related degree earned. About 84% of respondents earned a Pharm D. degree.

Table 13
What is the highest pharmacy-related degree you have earned?

	N	%
Bachelor's degree	49	10.9%
Master's degree	16	3.6%
Pharm.D.	376	83.6%
Ph.D.	4	.9%
Other (Please specify.)	5	1.1%
Total	450	100%

Table 14 illustrates which residency program(s) and/or fellowships respondents had completed. Thirty percent of respondents indicated they did not complete a residency. About 50% indicated they completed a PGY1 residency and another 30% completed a PGY2 Pediatric Residency. Twenty-five of the respondents who selected *other* indicated that they completed a PGY1 pediatric residency.

Table 14
Which of the following have you completed? (Select all that apply.)

	N	%
PGY1 Residency	229	50.4%
PGY2 Pediatric Residency	134	29.5%
PGY2 Residency (not in pediatrics)	9	2.0%
Pediatric Research Fellowship	16	3.5%
No residency	136	30.0%
Other (Please specify.)	60	13.2%

*Multiple responses permitted – percentages may not total 100%

As seen in Table 15, most respondents (66%) did not hold any BPS specialty certifications, and about 28% held the pharmacotherapy specialty certification.

Table 15
What BPS specialty certifications do you hold? (Select all that apply.)

	N	%
Ambulatory Care Pharmacy	0	0%
Nuclear Pharmacy	0	0%
Nutrition Support Pharmacy	8	1.9%
Oncology	11	2.6%
Psychiatric Pharmacy	6	1.4%
Pharmacotherapy	119	27.7%
Added Qualification in Cardiology	4	.9%
Added Qualification in Infectious Diseases	1	.2%
None	285	66.3%

*Multiple responses permitted – percentages may not total 100%

Ratings for Domains

This section presents the results of the ratings made for percentage of work time spent performing tasks in each domain, and the importance of each domain.

Two sets of subgroup analyses were performed to explore how consistent the ratings were for respondents (1) spending differing percentages of time providing pharmacy services to pediatric patients and (2) with different levels of experience in the specialty. Subgroup analyses for domain ratings appear in Appendix 8. Differences in mean percentage of time ratings of 5% or more are illustrated through the use of **bolding**.

Percentage of Pediatric Work Time per Domain

The mean percentages of time participants spent in each domain are presented in Table 16. Respondents spent the most time in *Patient Management* (56%) and the least time in *Public*

Health and Advocacy (4%). The standard deviations around each mean indicate that there was some individual variation in the time spent by respondents in each of the four domains.

Table 16
Of the time you spent in pediatric pharmacy during the past year, what percentage did you spend performing the tasks in each domain?

	N	Mean	SD
Domain 1: Patient Management – 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.	463	56%	(21.0)
Domain 2: Practice Management – Tasks related to advancing pediatric pharmacy practice; and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.	463	20%	(15.9)
Domain 3: Information Management and Education – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of healthcare providers, trainees, patients and caregivers.	463	19%	(12.5)
Domain 4: Public Health and Advocacy – Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population healthcare policy.	463	4%	(4.4)

Table 17 presents the percentage of respondents spending 0%, 1 -25%, 26-50%, 51-75% and more than 75% of their work time in each domain. From this presentation of the results, we can see that Domain 1 is the only domain wherein more than 5% of respondents reported spending over 50% of their work time – 16% of respondents spent over 75% of their work time in Domain 1 alone.

Table 17
Percentage of work time per domain

	0%		1-25%		26-50%		51-75%		76-100%	
	N	%	N	%	N	%	N	%	N	%
Domain 1: Patient Management	0	.0%	56	12.1%	150	32.4%	181	39.1%	76	16.4%
Domain 2: Practice Management	12	2.6%	343	74.1%	88	19.0%	14	3.0%	6	1.3%
Domain 3: Information Management and Education	5	1.1%	369	79.7%	81	17.5%	4	.9%	4	.9%
Domain 4: Public Health and Advocacy	130	28.1%	333	71.9%	0	.0%	0	.0%	0	.0%

Domain Importance Ratings

Results related to the importance ratings for domains are shown in Table 18. The results are displayed in two ways. First, the percentage of respondents selecting *Not important*, *Minimally important*, *Moderately important*, or *Highly important* for each domain are displayed. Second, under the Total column, mean values were generated for by assigning numerical values to each for response option as follows: 1 = Not important, 2 = Minimally important, 3 = Moderately important, and 4 = Highly important.

Table 18
How important is the domain for providing effective care to pediatric patients?

	Not	Min	Mod	High	Total		
	%	%	%	%	N	M	SD
Domain 1: Patient Management	.2%	.4%	1.3%	98.1%	463	4.0	(.2)
Domain 2: Practice Management	.4%	1.9%	26.3%	71.3%	463	3.7	(.5)
Domain 3: Information Management and Education	.4%	3.2%	36.3%	60.0%	463	3.6	(.6)
Domain 4: Public Health and Advocacy	2.8%	21.2%	46.2%	29.8%	463	3.0	(.8)

Overall, the mean domain importance ratings were very high. A total of 98% of respondents selected highly important for Domain 1, and the mean rating for this domain was 4.0 on a 4-point scale. The second highest importance rating was 3.7 for Domain 2, with about 71% of respondents selecting highly important. The lowest rating was for Domain 4 (3.0 indicating moderately important). There were no differences in subgroup ratings in the mean importance ratings for domains that were greater than half a scale point (0.5).

Ratings for Tasks

This section presents the results related to the frequency of performance and importance ratings made for the task statements.

Subgroup analyses were also performed at the task level to explore how consistent the ratings were for respondents spending differing percentages of time providing pharmacy services to pediatric patients and for respondents with different levels of experience in the specialty. Subgroup analyses for task ratings appear in Appendix 9. Differences of greater than 0.5 are highlighted through the use of **bolding**.

Task Frequency Ratings

The percentage of respondents selecting each response option with respect to frequency of task performance is shown in Table 19, along with the mean, standard deviation, and number of respondents. The means were calculated after assigning numerical values to each response option as follows: 1=Never, 2=Quarterly or less, 3=Monthly, 4=Weekly, 5=Daily.

Of the 12 task statements in Domain 1, 8 received mean frequency ratings above 3.5, 1 received a mean frequency rating of 3.0, and 3 received a mean frequency rating below 3.0. For the 8 tasks included in Domain 2, 3 received a mean frequency rating between 3.0 and 3.5, and the other 5 had mean ratings below 3.0. Of the 6 statements included in Domain 3, 2 received a mean frequency ratings above 3.5, 2 received a mean frequency rating between 3.0 and 3.5, and 2 received a mean frequency rating below 3.0. Finally, all 6 statements in Domain 4 received mean frequency ratings below 3.0.

The five tasks performed least frequently were:

- 1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]). (Mean rating = 1.4)
- 2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population. (Mean rating = 2.0)
- 4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents. (Mean rating = 2.0)
- 4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients. (Mean rating = 2.1)
- 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). (Mean rating = 1.9)

Table 19
Task Frequency Ratings

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
Domain 1: Patient Management								
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.	.9%	2.2%	1.7%	9.1%	86.1%	460	4.8	.7
1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.	.4%	1.1%	1.1%	9.8%	87.6%	460	4.8	.5
1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	45.1%	20.1%	8.3%	13.1%	13.3%	457	2.3	1.5
1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	82.7%	7.9%	2.4%	3.1%	3.9%	457	1.4	1.0
1.5 Analyze and interpret collected patient information.	.4%	1.3%	1.3%	7.4%	89.6%	460	4.8	.5
1.6 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.	.7%	1.5%	1.5%	10.5%	85.8%	459	4.8	.6
1.7 Establish therapeutic goals with healthcare team and patient/parents/caregivers.	1.5%	4.4%	2.8%	19.4%	71.9%	459	4.6	.9
1.8 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.	1.8%	4.6%	2.8%	14.7%	76.1%	457	4.6	.9

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
1.9 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.	1.3%	3.7%	4.6%	16.2%	74.1%	456	4.6	.8
1.10 Participate in the management of pediatric emergencies.	11.4%	27.7%	28.8%	17.9%	14.2%	458	3.0	1.2
1.11 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.	4.8%	7.0%	10.5%	27.1%	50.7%	458	4.1	1.1
1.12 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.	29.8%	21.6%	18.7%	18.5%	11.3%	459	2.6	1.4
Domain 2: Practice Management								
2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.	4.3%	22.8%	26.9%	24.1%	21.9%	461	3.4	1.2
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).	12.1%	36.0%	24.9%	15.8%	11.1%	461	2.8	1.2
2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.	11.8%	30.5%	37.5%	12.9%	7.4%	459	2.7	1.1
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.	7.2%	35.5%	34.9%	11.3%	11.1%	459	2.8	1.1

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
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]).	14.4%	34.9%	27.9%	13.3%	9.4%	458	2.7	1.2
2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.	4.6%	29.5%	27.5%	18.6%	19.9%	458	3.2	1.2
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	39.1%	38.2%	14.4%	5.0%	3.3%	458	2.0	1.0
2.8 Justify and document the clinical and financial value of pediatric pharmacy services:	18.3%	27.6%	13.0%	12.2%	28.9%	460	3.1	1.5
Domain 3: Information Management and Education								
3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.	.7%	16.9%	26.7%	23.9%	31.9%	461	3.7	1.1
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.	2.4%	20.0%	22.3%	21.5%	33.8%	461	3.6	1.2
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.	7.2%	19.5%	21.3%	33.0%	19.1%	461	3.4	1.2
3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).	14.8%	52.0%	22.2%	7.0%	4.1%	460	2.3	1.0

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.	5.0%	18.3%	22.6%	38.5%	15.7%	460	3.4	1.1
3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).	18.9%	26.3%	19.8%	16.5%	18.5%	460	2.9	1.4
Domain 4: Public Health and Patient Advocacy								
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	30.7%	48.8%	11.9%	3.5%	5.2%	463	2.0	1.0
4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.	31.6%	47.2%	11.0%	4.5%	5.6%	462	2.1	1.1
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).	33.2%	53.1%	10.4%	1.7%	1.5%	461	1.9	.8
4.4 Participate in professional organizations related to pharmacy and pediatric practice.	3.0%	45.9%	33.9%	11.1%	6.1%	460	2.7	.9
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	33.3%	29.9%	16.5%	11.9%	8.4%	462	2.3	1.3
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	27.8%	39.1%	16.7%	4.6%	11.7%	460	2.3	1.3

How frequently did you perform the task during the past 12 months? 1=Never, 2=Quarterly or less, 3=Monthly, 4=Weekly, 5=Daily

Task Importance Ratings

The percentage of respondents selecting each response option with respect to importance to providing effective care to pediatric patients is shown in Table 20 along with the mean, standard deviation, and number of respondents. The means were calculated after assigning numerical values to each response option as follows: 1 = Not important, 2 = Minimally important, 3 = Moderately important, and 4 = Very important.

Twenty tasks received mean importance ratings above 3.5, 10 received mean importance ratings between 3.1 and 3.5, and 2 received mean importance ratings below 3.0. These latter two tasks were:

- 1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management. (Mean rating = 2.7)
- 1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]). (Mean rating = 2.5)

Table 20
Task Importance Ratings

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
Domain 1: Patient Management							
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.	.0%	.7%	2.4%	96.9%	459	4.0	.2
1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.	.0%	.2%	3.5%	96.3%	457	4.0	.2
1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	11.0%	33.5%	27.1%	28.4%	454	2.7	1.0
1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	22.3%	28.7%	22.7%	26.3%	449	2.5	1.1
1.5 Analyze and interpret collected patient information.	.0%	.2%	4.6%	95.2%	456	3.9	.2
1.6 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.	.0%	.2%	5.9%	93.8%	455	3.9	.3
1.7 Establish therapeutic goals with healthcare team and patient/parents/caregivers.	.0%	.4%	8.6%	91.0%	454	3.9	.3

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
1.8 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.	.2%	.2%	5.3%	94.3%	453	3.9	.3
1.9 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.	.0%	.2%	7.7%	92.0%	452	3.9	.3
1.10 Participate in the management of pediatric emergencies.	1.1%	6.0%	22.3%	70.6%	452	3.6	.6
1.11 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.	.4%	3.3%	15.6%	80.7%	456	3.8	.5
1.12 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.	7.5%	21.1%	33.0%	38.3%	454	3.0	.9
Domain 2: Practice Management							
2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.	.2%	.9%	18.3%	80.6%	459	3.8	.4
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).	.9%	4.6%	29.9%	64.6%	458	3.6	.6
2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.	.2%	4.8%	26.9%	68.1%	458	3.6	.6
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.	.0%	2.6%	22.6%	74.8%	456	3.7	.5
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]).	.4%	3.3%	31.0%	65.3%	455	3.6	.6
2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.	.0%	2.4%	24.6%	73.0%	455	3.7	.5
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	2.4%	16.5%	39.3%	41.8%	455	3.2	.8
2.8 Justify and document the clinical and financial value of pediatric pharmacy services:	2.4%	12.0%	32.8%	52.7%	457	3.4	.8
Domain 3: Information Management and Education							
3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.	.2%	2.6%	25.9%	71.3%	456	3.7	.5

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
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.	.0%	2.2%	27.4%	70.4%	456	3.7	.5
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.	.0%	1.3%	18.9%	79.7%	454	3.8	.4
3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).	.9%	14.7%	40.4%	44.0%	455	3.3	.7
3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.	.9%	6.8%	34.6%	57.7%	454	3.5	.7
3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).	1.5%	9.7%	36.0%	52.7%	455	3.4	.7
Domain 4: Public Health and Patient Advocacy							
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	1.3%	13.8%	44.2%	40.7%	457	3.2	.7
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%	8.1%	37.2%	54.2%	454	3.5	.7
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).	.9%	9.9%	41.8%	47.5%	455	3.4	.7
4.4 Participate in professional organizations related to pharmacy and pediatric practice.	.9%	10.4%	44.9%	43.8%	452	3.3	.7
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	.9%	12.3%	38.5%	48.2%	454	3.3	.7
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	2.0%	9.7%	37.1%	51.2%	455	3.4	.7

How important is the task for providing effective care to pediatric patients?

1=Not important, 2=Minimally important, 3=Moderately important, or 4=Highly important

Missing Tasks

After rating all of the tasks, participants were asked to indicate any additional tasks they perform as a pediatric pharmacy specialist that may have been omitted from the survey. There were 40 write-in responses to this question. Prior to a task force meeting to review the survey results, these verbatim suggested additions were sent to members of the task force for review. Task force members were asked to determine whether any suggestions represented concepts truly missing from the task list. Write-in responses were deemed to be either more general or more specific instances of statements already contained in the delineation, content not suitable for testing, or outside the scope of specialty practice. Thus, the delineation of tasks was validated as comprehensive.

Task Validation Decisions

The task force met virtually to review the validation evidence collected in the role delineation survey. Task force members were asked to consider if the ratings for the tasks were sufficiently high to suggest that they be included in the final, validated description of pediatric specialty practice. During the meeting, the task force reviewed all results of the survey, and discussed in detail those task statements that did not receive clear validation evidence. These were defined as instances where 30% or more of the respondents reported never performing the task, and/or the mean frequency rating fell below a 2.5. There was sufficient validation evidence to support inclusion of 24 of the 32 task statements in the description of pediatric specialty practice. The remaining 8 tasks were discussed in greater detail. These tasks were Task 1.13, Task 1.14, Task 2.7, Task 4.1, Task 4.2, Task 4.3, Task 4.5, and Task 4.6. The validation discussion regarding these 8 tasks was informed by the frequency ratings, importance ratings, considerations regarding the nature of the tasks, and the subgroup ratings. Table 21 documents the validation decisions for these 8 tasks and the rationale for the decisions.

Table 21
Task Validation Decisions and Rationale

Task	Validation Decision (Retain or Remove)	Rationale for Validation Decision, if Retained
1.13 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	Remove	
1.14 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	Remove	
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	Retain	Retained based on moderate mean importance rating of 3.2 and the nature of the task – by its nature, this task would typically be performed quarterly or less, and therefore have a low mean frequency rating.
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	Retain	Task retained based on mean importance rating of 3.2.
4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.	Retain	Task retained based on mean importance rating of 3.5.
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).	Retain	Task retained based on mean importance rating of 3.4.
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	Retain	Task retained based on mean importance rating of 3.3.
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	Retain	Task retained based on mean importance rating of 3.4.

Ratings for Knowledge

This section presents the results of the ratings for the knowledge statements. Participants rated the knowledge statements on frequency of use and importance of the knowledge to providing effective care to pediatric patients.

Knowledge Frequency Ratings

The percentage of respondents selecting each response option with respect to frequency of use of knowledge is shown in Table 22, along with the mean, standard deviation, and number of respondents. The means were calculated after assigning numerical values to each response option as follows: 1=Never, 2=Quarterly or less, 3=Monthly, 4=Weekly, 5=Daily.

Of the 32 knowledge statements in Domain 1, 21 received mean frequency ratings above 3.5, 6 received mean frequency ratings between 3.0 and 3.5, and 5 received mean frequency ratings below 3.0. For the 9 knowledge statements included in Domain 2, 7 tasks received mean frequency ratings above 3.5, and the other 2 had mean ratings below 3.0. Of the 10 knowledge statements included in Domain 3, 3 received mean frequency ratings above 3.5, 3 received mean frequency ratings between 3.0 and 3.5, and 4 received mean frequency ratings below 3.0. Finally, all 9 knowledge statements included in Domain 4 received mean frequency ratings below 3.0.

The five knowledge bases used least frequently were:

- k1.3 Legal considerations for dependent and emancipated patients (Mean rating = 1.9)
- k3.7 Regulatory/IRB/human subjects safety requirements and concerns for conducting research in the pediatric population (Mean rating = 2.4)
- k4.3 Emergency preparedness resources for pediatric patients (Mean rating = 2.3)
- k4.4 Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics) (Mean rating = 2.4)
- 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) (Mean rating = 2.1)

Table 22
Knowledge Frequency Ratings

	Never	Quarterly or less	Monthly	Weekly	Daily	N	Total	
	%	%	%	%	%		Mean	SD
Domain 1: Patient Management								
Knowledge of:								
k1.1 Normal growth and development of the pediatric population	1.1%	5.4%	6.7%	25.6%	61.2%	461	4.4	.9
k1.2 Age-appropriate interviewing techniques for patients, parents, and caregivers	10.4%	24.5%	15.6%	31.9%	17.6%	461	3.2	1.3
k1.3 Legal considerations for dependent and emancipated patients	36.5%	38.9%	12.0%	9.4%	3.3%	458	2.0	1.1
k1.4 Essential components of a medical history including maternal and birth history and childhood immunization status, if appropriate	3.3%	9.2%	8.7%	22.9%	56.0%	459	4.2	1.1
k1.5 Essential components of a social history, including day care attendance, siblings, smoke exposure, home environment	6.3%	15.3%	12.4%	31.4%	34.5%	458	3.7	1.3
k1.6 Pathophysiology, epidemiology, risk factors, diagnosis, prevention, and evidence-based treatment of common diseases and conditions in pediatric patients	.9%	1.1%	3.5%	12.2%	82.4%	459	4.7	.7
k1.7 Equations to calculate body surface area, creatinine clearance, fluid requirements, and ideal body weight from birth to adult	.2%	2.2%	5.4%	17.4%	74.7%	459	4.6	.7
k1.8 Age-specific physical assessment techniques	30.3%	27.3%	15.1%	16.6%	10.7%	458	2.5	1.4
k1.9 Pediatric populations for which standard calculated methods of assessment of renal impairment are not reliable	5.2%	10.7%	14.6%	29.8%	39.7%	459	3.9	1.2
k1.10 Urine output calculation for body weight and appropriate output per age	7.4%	8.5%	8.7%	19.2%	56.2%	459	4.1	1.3
k1.11 Methods for assessment of hepatic function in pediatric populations	5.9%	16.6%	19.5%	31.1%	26.9%	457	3.6	1.2

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k1.12 Normal laboratory values and vital signs from birth to adult	.0%	2.2%	3.3%	14.2%	80.3%	458	4.7	.6
k1.13 Age-associated differences in pathophysiology and clinical manifestations of disease across patient populations	1.3%	2.6%	6.4%	28.9%	60.7%	456	4.5	.8
k1.14 Age-specific pharmacokinetic differences in neonates, infants, children, and adolescents:	.7%	2.4%	3.7%	16.2%	77.1%	458	4.7	.7
k1.15 Age-specific pharmacodynamic differences in neonates, infants, children, and adolescents:	.9%	2.0%	5.7%	18.6%	72.8%	456	4.6	.8
k1.16 Pharmacogenomic considerations in pediatric patients	16.8%	31.7%	25.5%	17.5%	8.5%	458	2.7	1.2
k1.17 Appropriate use of off-label medications to treat pediatric patients	.9%	4.6%	9.6%	29.0%	55.9%	458	4.3	.9
k1.18 Pediatric-specific drug interactions (e.g., ceftriaxone and calcium-containing products in the neonate, calcium and phosphorous in parenteral nutrition)	.2%	2.6%	8.6%	28.1%	60.5%	456	4.5	.8
k1.19 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)	5.9%	23.0%	21.9%	24.1%	25.0%	456	3.4	1.2
k1.20 Influence of medications on the production of breast milk	12.7%	31.7%	24.3%	19.3%	12.0%	457	2.9	1.2
k1.21 Excretion of medications and other substances in breast milk	4.3%	34.3%	26.2%	26.5%	8.7%	461	3.0	1.1
k1.22 Appropriate dosing based on age and body size (e.g., body surface area, post-menstrual age, gestational age, dosing weight)	.2%	.7%	2.0%	7.9%	89.3%	457	4.9	.5

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k1.23 Medication dosing in extracorporeal membrane oxygenation (ECMO) and in renal replacement therapy (e.g., continuous renal replacement therapy [CRRT], PD, HD)	23.0%	26.5%	26.1%	13.5%	10.9%	460	2.6	1.3
k1.24 Medication dose adjustment in pediatric patients with renal and hepatic impairment	2.2%	7.4%	16.4%	32.4%	41.6%	457	4.0	1.0
k1.25 Essential components of medication reconciliation in pediatric patients (e.g., concentration, dose in mg, palatability)	2.0%	5.5%	10.3%	22.3%	60.0%	457	4.3	1.0
k1.26 Pediatric-specific adverse effects (e.g., liver failure with valproate, tetracycline and tooth discoloration):	2.2%	8.1%	19.7%	34.1%	35.9%	457	3.9	1.0
k1.27 Differences in laboratory sampling for pediatric patients (e.g., blood volume; method, frequency and timing of sampling)	12.0%	17.2%	18.0%	27.2%	25.7%	460	3.4	1.3
k1.28 Differences in the management of pediatric emergencies (e.g., respiratory distress, neonatal seizures, cardiopulmonary arrest)	8.1%	21.1%	23.7%	27.0%	20.0%	459	3.3	1.2
k1.29 Nutritional and fluid requirements for infants and children for normal growth and disease	2.6%	5.2%	8.9%	24.0%	59.3%	459	4.3	1.0
k1.30 Childhood immunization schedules	1.1%	9.4%	28.3%	34.6%	26.6%	459	3.8	1.0
k1.31 Factors affecting adherence to the treatment regimen	2.6%	12.2%	21.6%	31.2%	32.3%	458	3.8	1.1
k1.32 Specialty needs of pediatric patients requiring referral to other providers (e.g., infant with signs of dehydration, patient needs compounded oral formulation)	10.0%	14.8%	22.7%	27.7%	24.8%	459	3.4	1.3
Domain 2: Practice Management								
Knowledge of:								

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k2.1 Medication safety considerations (e.g., Institute for Safe Medication Practices [ISMP] and Joint Commission recommendations, Food and Drug Administration [FDA] alerts)	.9%	8.5%	28.8%	33.1%	28.8%	459	3.8	1.0
k2.2 Position statements, white papers, and national guidelines as an aid to the development of health-system policies and procedures	7.8%	31.1%	30.4%	22.4%	8.3%	460	2.9	1.1
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])	5.7%	18.7%	27.0%	22.0%	26.6%	459	3.5	1.2
k2.4 Routes of administration (e.g., intraosseous, oral/enteral, parenteral, IM, transdermal, intranasal, intraventricular)	.2%	6.1%	10.8%	22.3%	60.5%	461	4.4	.9
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)	2.0%	7.4%	19.8%	31.5%	39.3%	460	4.0	1.0
k2.6 Medication administration technology (e.g., infusion pumps, subcutaneous needle devices, intranasal administration devices, aerosols)	3.3%	14.2%	21.4%	31.0%	30.1%	458	3.7	1.1
k2.7 Appropriate references to support the preparation of pediatric formulations (e.g., IV dilutions, extemporaneously compounded preparations)	1.3%	4.6%	15.9%	28.4%	49.8%	458	4.2	1.0
k2.8 Considerations when selecting pediatric-appropriate dosage formulations	.7%	2.0%	9.1%	23.4%	64.9%	461	4.5	.8
k2.9 Metrics for evaluating quality of pediatric pharmacy services (e.g., patient/parent/caregiver satisfaction, length of stay, readmission, medication errors)	17.0%	31.6%	25.9%	14.2%	11.3%	459	2.7	1.2

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
Domain 3: Information Management and Education								
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	3.1%	12.5%	26.9%	28.4%	29.1%	457	3.7	1.1
k3.2 Age-appropriate patient education principles and methods	7.4%	22.5%	22.5%	29.0%	18.6%	458	3.3	1.2
k3.3 Health literacy and cultural considerations in educating patients/parents/caregivers:	9.7%	27.0%	26.6%	26.2%	10.5%	455	3.0	1.2
k3.4 Tools, methods and counseling techniques to increase adherence to the treatment regimen :	10.1%	24.9%	25.6%	26.0%	13.4%	454	3.1	1.2
k3.5 Research design, methodology, and statistical analysis:	16.2%	35.1%	26.5%	15.8%	6.4%	456	2.6	1.1
k3.6 Clinical application and limitations of published data and reports	2.4%	9.8%	27.3%	37.8%	22.7%	458	3.7	1.0
k3.7 Regulatory/IRB/human subjects safety requirements and concerns for conducting research in the pediatric population	14.8%	47.3%	24.4%	8.3%	5.2%	459	2.4	1.0
k3.8 Medical literature publication and review process	14.0%	38.6%	23.1%	15.1%	9.2%	458	2.7	1.2
k3.9 Opportunities for disseminating pediatric knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)	10.3%	47.3%	30.2%	7.0%	5.3%	457	2.5	1.0
k3.10 Appropriate pediatric-specific references	1.5%	4.4%	9.9%	17.9%	66.2%	453	4.4	.9
Domain 4: Public Health and Patient Advocacy								
Knowledge of:								
k4.1 Healthcare disparities in pediatric patients	19.5%	32.3%	22.6%	17.8%	7.8%	461	2.6	1.2
k4.2 Access to care disparities in pediatric patients	22.6%	35.0%	21.3%	15.2%	5.9%	460	2.5	1.2
k4.3 Emergency preparedness resources for pediatric patients	21.0%	45.0%	20.5%	7.6%	5.9%	458	2.3	1.1

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k4.4 Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics)	21.7%	40.8%	22.1%	9.6%	5.7%	456	2.4	1.1
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)	27.7%	48.7%	14.8%	5.9%	2.8%	458	2.1	1.0
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)	19.0%	35.6%	22.1%	17.0%	6.3%	458	2.6	1.2
k4.7 Professional organizations and their roles and resources related to advocacy	8.8%	36.4%	39.7%	11.2%	3.9%	456	2.7	.9
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)	18.1%	40.0%	24.9%	9.2%	7.9%	458	2.5	1.1
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)	22.3%	37.1%	18.0%	10.2%	12.4%	461	2.5	1.3

Knowledge Importance Ratings

The percentage of respondents selecting each response option with respect to knowledge importance is shown in Table 23 along with the mean, standard deviation, and number of respondents. The means were calculated after assigning numerical values to each response option as follows: 1 = Not important, 2 = Minimally important, 3 = Moderately important, and 4 = Very important.

There were only four knowledge statements that received a mean importance rating below 3.0 (moderately important). These were:

- k1.3 Legal considerations for dependent and emancipated patients (Mean rating = 2.6)
- k1.8 Age-specific physical assessment techniques (Mean rating = 2.7)
- k4.1 Healthcare disparities in pediatric patients (Mean rating = 2.9)
- k4.2 Access to care disparities in pediatric patients (Mean rating = 2.9)

Of the other 56 knowledge statements, 24 received mean importance ratings between 3.0 and 3.5, and 32 received mean importance ratings above 3.5 on the 4-point scale.

Table 23
Knowledge Importance Ratings

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
Domain 1: Patient Management							
Knowledge of:							
k1.1 Normal growth and development of the pediatric population	.2%	3.5%	25.7%	70.7%	460	3.7	.6
k1.2 Age-appropriate interviewing techniques for patients, parents, and caregivers	1.1%	10.3%	41.4%	47.3%	457	3.3	.7
k1.3 Legal considerations for dependent and emancipated patients	7.7%	40.5%	35.4%	16.4%	457	2.6	.8
k1.4 Essential components of a medical history including maternal and birth history and childhood immunization status, if appropriate	.2%	6.1%	28.2%	65.5%	458	3.6	.6
k1.5 Essential components of a social history, including day care attendance, siblings, smoke exposure, home environment	.7%	13.5%	43.4%	42.4%	458	3.3	.7
k1.6 Pathophysiology, epidemiology, risk factors, diagnosis, prevention, and evidence-based treatment of common diseases and conditions in pediatric patients	.0%	.4%	6.6%	93.0%	457	3.9	.3
k1.7 Equations to calculate body surface area, creatinine clearance, fluid requirements, and ideal body weight from birth to adult	.0%	1.7%	9.4%	88.9%	458	3.9	.4
k1.8 Age-specific physical assessment techniques	7.3%	36.7%	29.9%	26.2%	455	2.7	.9
k1.9 Pediatric populations for which standard calculated methods of assessment of renal impairment are not reliable	.7%	6.1%	27.6%	65.6%	456	3.6	.6

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
k1.10 Urine output calculation for body weight and appropriate output per age	.2%	7.0%	22.9%	69.9%	458	3.6	.6
k1.11 Methods for assessment of hepatic function in pediatric populations	.2%	8.1%	37.8%	53.8%	455	3.5	.7
k1.12 Normal laboratory values and vital signs from birth to adult	.2%	1.1%	13.8%	84.8%	455	3.8	.4
k1.13 Age-associated differences in pathophysiology and clinical manifestations of disease across patient populations	.0%	1.8%	18.5%	79.8%	455	3.8	.5
k1.14 Age-specific pharmacokinetic differences in neonates, infants, children, and adolescents:	.0%	.2%	8.6%	91.2%	454	3.9	.3
k1.15 Age-specific pharmacodynamic differences in neonates, infants, children, and adolescents:	.0%	1.1%	12.1%	86.8%	455	3.9	.4
k1.16 Pharmacogenomic considerations in pediatric patients	2.6%	22.1%	42.5%	32.7%	456	3.1	.8
k1.17 Appropriate use of off-label medications to treat pediatric patients	.0%	2.0%	24.8%	73.2%	455	3.7	.5
k1.18 Pediatric-specific drug interactions (e.g., ceftriaxone and calcium-containing products in the neonate, calcium and phosphorous in parenteral nutrition)	.0%	.4%	16.0%	83.6%	456	3.8	.4
k1.19 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)	.2%	6.6%	28.4%	64.8%	454	3.6	.6
k1.20 Influence of medications on the production of breast milk	1.3%	19.7%	34.0%	45.0%	456	3.2	.8
k1.21 Excretion of medications and other substances in breast milk	.2%	11.6%	41.3%	46.9%	458	3.3	.7
k1.22 Appropriate dosing based on age and body size (e.g., body surface area, post-menstrual age, gestational age, dosing weight)	.0%	.4%	6.4%	93.2%	455	3.9	.3
k1.23 Medication dosing in extracorporeal membrane oxygenation (ECMO) and in renal replacement therapy (e.g., continuous renal replacement therapy [CRRT], PD, HD)	.9%	6.8%	29.2%	63.1%	455	3.5	.7
k1.24 Medication dose adjustment in pediatric patients with renal and hepatic impairment	.0%	.7%	15.8%	83.6%	456	3.8	.4
k1.25 Essential components of medication reconciliation in pediatric patients (e.g., concentration, dose in mg, palatability)	.0%	2.6%	22.1%	75.3%	453	3.7	.5
k1.26 Pediatric-specific adverse effects (e.g., liver failure with valproate, tetracycline and tooth discoloration):	.2%	1.1%	23.2%	75.4%	456	3.7	.5
k1.27 Differences in laboratory sampling for pediatric patients (e.g., blood volume; method, frequency and timing of sampling)	1.8%	21.2%	38.1%	38.9%	452	3.1	.8
k1.28 Differences in the management of pediatric emergencies (e.g., respiratory distress, neonatal seizures, cardiopulmonary arrest)	.2%	4.0%	25.9%	69.9%	452	3.7	.6
k1.29 Nutritional and fluid requirements for infants and children for normal growth and disease	.2%	4.6%	19.8%	75.4%	455	3.7	.6
k1.30 Childhood immunization schedules	.0%	4.4%	35.3%	60.3%	451	3.6	.6
k1.31 Factors affecting adherence to the treatment regimen	.4%	7.1%	36.8%	55.7%	451	3.5	.6
k1.32 Specialty needs of pediatric patients requiring referral to other providers (e.g., infant with signs of dehydration, patient needs compounded oral formulation)	.9%	14.8%	35.9%	48.5%	454	3.3	.8

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
Domain 2: Practice Management							
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)	.2%	7.6%	34.5%	57.6%	458	3.5	.6
k2.2 Position statements, white papers, and national guidelines as an aid to the development of health-system policies and procedures	.7%	17.9%	40.9%	40.5%	457	3.2	.8
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])	.2%	5.0%	33.8%	60.9%	458	3.6	.6
k2.4 Routes of administration (e.g., intraosseous, oral/enteral, parenteral, IM, transdermal, intranasal, intraventricular)	.0%	3.3%	26.2%	70.5%	454	3.7	.5
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)	.0%	5.2%	33.4%	61.4%	458	3.6	.6
k2.6 Medication administration technology (e.g., infusion pumps, subcutaneous needle devices, intranasal administration devices, aerosols)	.2%	9.6%	36.5%	53.6%	457	3.4	.7
k2.7 Appropriate references to support the preparation of pediatric formulations (e.g., IV dilutions, extemporaneously compounded preparations)	.0%	2.6%	23.6%	73.8%	454	3.7	.5
k2.8 Considerations when selecting pediatric-appropriate dosage formulations	.0%	2.0%	20.1%	77.9%	452	3.8	.5
k2.9 Metrics for evaluating quality of pediatric pharmacy services (e.g., patient/parent/caregiver satisfaction, length of stay, readmission, medication errors)	3.3%	16.7%	45.1%	34.9%	455	3.1	.8
Domain 3: Information Management and Education							
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	.7%	6.2%	39.5%	53.6%	453	3.5	.6
k3.2 Age-appropriate patient education principles and methods	.9%	7.7%	41.3%	50.1%	455	3.4	.7
k3.3 Health literacy and cultural considerations in educating patients/parents/caregivers:	.7%	15.6%	42.7%	41.0%	454	3.2	.7
k3.4 Tools, methods and counseling techniques to increase adherence to the treatment regimen :	.2%	12.8%	42.6%	44.4%	453	3.3	.7
k3.5 Research design, methodology, and statistical analysis:	2.4%	22.7%	46.6%	28.3%	453	3.0	.8
k3.6 Clinical application and limitations of published data and reports	.2%	6.2%	41.1%	52.5%	453	3.5	.6
k3.7 Regulatory/IRB/human subjects safety requirements and concerns for conducting research in the pediatric population	4.0%	20.3%	44.4%	31.3%	453	3.0	.8
k3.8 Medical literature publication and review process	4.0%	21.6%	43.0%	31.3%	453	3.0	.8

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
k3.9 Opportunities for disseminating pediatric knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)	2.0%	21.5%	41.3%	35.2%	455	3.1	.8
k3.10 Appropriate pediatric-specific references	.2%	3.3%	15.5%	80.9%	451	3.8	.5
Domain 4: Public Health and Patient Advocacy							
Knowledge of:							
k4.1 Healthcare disparities in pediatric patients	4.4%	27.3%	43.5%	24.8%	451	2.9	.8
k4.2 Access to care disparities in pediatric patients	4.7%	29.9%	40.6%	24.8%	451	2.9	.8
k4.3 Emergency preparedness resources for pediatric patients	2.7%	24.3%	40.3%	32.7%	449	3.0	.8
k4.4 Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics)	3.1%	21.4%	44.1%	31.4%	449	3.0	.8
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)	3.8%	24.1%	44.2%	27.9%	452	3.0	.8
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)	3.8%	20.1%	43.0%	33.1%	453	3.1	.8
k4.7 Professional organizations and their roles and resources related to advocacy	3.8%	21.3%	44.2%	30.7%	450	3.0	.8
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)	2.2%	16.0%	43.0%	38.8%	451	3.2	.8
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)	4.7%	16.6%	35.0%	43.7%	451	3.2	.9

Missing Knowledge

After participants rated the knowledge statements, they were asked to indicate any additional knowledge they use as a pediatric pharmacy specialist that may have been omitted from the survey. There were only 5 write-in responses to this question. These verbatim suggested additions were reviewed by the task force, and the knowledge list was deemed to be comprehensive.

Knowledge Validation Decisions

Task force members were also asked to consider if the ratings for the knowledge statements were sufficiently high to suggest that they be included in the final, validated description of pediatric specialty practice. During the web-based meeting to review the survey results, the task force discussed those knowledge statements that did not receive clear validation evidence; that is, those instances where 30% or more of the respondents reported *never* using the knowledge and/or the mean frequency rating fell below a 2.5. There was sufficient validation evidence to support inclusion of 54 of the 60 knowledge statements in the description of pediatric specialty practice. The remaining 6 knowledge statements were discussed in greater detail. These knowledge statements were k1.3, k1.8, k1.19, k3.7, k4.3, k4.4, and k4.5. The validation discussion was informed by the frequency ratings, importance ratings, considerations regarding the nature of the knowledge, and the relationship between the knowledge and task statements. Table 24 captures the validation decisions and rationale for each of these 16 knowledge statements. For the final version of the updated and validated description of pediatric pharmacy practice, see Appendix 10.

Table 24
Knowledge Validation Decisions and Rationale

Knowledge Statement	Validation Decision (Retain or Remove)	Rationale for Validation Decision, if Retained
k1.3 Legal considerations for dependent and emancipated patients	Remove	
k1.8 Age-specific physical assessment techniques	Remove	
k3.7 Regulatory/IRB/human subjects safety requirements and concerns for conducting research in the pediatric population	Retain	Retained based on the regulatory nature of the knowledge and moderate mean importance rating of 3.0.
k4.3 Emergency preparedness resources for pediatric patients	Retain	Task 4.5 for which this knowledge is needed was retained; therefore knowledge statement must also be retained.
k4.4 Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics)	Retain	Task 4.3 for which this knowledge is needed was retained; therefore knowledge statement must also be retained.
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)	Retain	Task 4.1 for which this knowledge is needed was retained; therefore knowledge statement must also be retained.

Development of Examination Specifications

Development of Domain Weights

PES calculated hypothetical specifications for a potential new certification examination in pediatric pharmacy.

While there are many variations in methodology, there are two main methods of developing examination specifications from validation survey ratings. The first is the “top-down” approach. In this approach, weights representing percentages of an examination devoted to each domain are calculated using respondents’ domain-level *Percentage of Work Time* and *Importance* ratings. The second approach is the “bottom-up” approach. This approach involves calculating weights using the respondents’ task *Frequency* and *Importance* ratings, and summing those weights within each domain. In the “top-down” approach, the weights are based on the ratings for domains. In the “bottom-up” approach, the weights are based on the ratings for tasks.

PES used the “top-down” method to develop the weights for the domains. This approach is preferred over the “bottom-up” approach when domains contain different numbers of tasks (Spray & Huang, 2000), as is the case in the current delineation.

PES calculated the domain weights as follows:

First, domain sums (D) were derived using the formula:

$$D_i = \sum_{k=1}^n (P_k * I_k)$$

where

i = a single domain

k = a single respondent

n = the number of respondents

P = a respondent’s *Percentage of time* rating for a domain

I = a respondent’s *Importance* rating for a domain

Domain weights (DWs) were calculated by dividing each domain sum by the sum of all domain sums ($\sum D$):

$$DW_i = D_i / \sum_{i=1}^4 D$$

Hypothetical examination specifications are presented for the total sample, and for those respondents spending less (< 50%) or more (\geq 50%) time providing pharmacy services to pediatric patients (Table 25).

Table 25
Hypothetical Test Specifications

	Total Sample	< 50% specialty work time	≥ 50% specialty work time
Domain 1: Patient Management	58%	51%	58%
Domain 2: Practice Management	20%	19%	20%
Domain 3: Information Management and Education	18%	26%	18%
Domain 4: Public Health and Advocacy	4%	4%	4%

Recommended Examination Specifications

After examining the hypothetical, empirically-derived test specifications, the task force deemed the percentages derived from the total survey respondent group to be the best representation of specialty practice. After discussion of testability of concepts included in each of the four domains of practice, a small adjustment was made to the recommended test specifications. Two percentage points were moved from the *Public Health and Advocacy* domain to the *Patient Management* domain. This adjustment was made based on the known difficulty in creating multiple choice test questions on the topic of advocacy for existing BPS specialties content. Thus, the recommended examination specifications for a potential new specialty certification found in Table 26 reflect this slight adjustment to the empirically derived test specifications.

Table 26
Final Recommendations for Examination Specifications

	% of Exam
Domain 1: Patient Management	60%
Domain 2: Practice Management	20%
Domain 3: Information Management and Education	18%
Domain 4: Public Health and Advocacy	2%
Total	100%

Summary and Recommendations

The conduct of the role delineation study of pediatric pharmacy specialists yielded a structured description of specialty practice in terms of major domains and tasks, as well as the specialized knowledge base that supports task performance.

The results of this study provide the validity foundation for future credentialing initiatives. Should BPS decide to develop a new specialty certification in pediatric pharmacy, PES recommends that:

- examination items be developed to assess the specialty knowledge and tasks contained in Appendix 10,
- items be classified in terms of domain, task, and specialty knowledge base assessed by the item, and
- examinations be constructed to match the percentage weight examination specifications recommended by the task force.

By following this guidance, BPS will create a chain of validity evidence that that ties examination content to the role delineation study. By so doing, BPS will meet best practice recommendations and accreditation requirements for credentialing programs.

References

- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
- ISO/IEC 17024 International Organization for Standards (IOS) and International Electrotechnical Commission (IEC) (2003). *Conformity assessment - General requirements for bodies operating certification of persons*. Geneva: ISO.
- National Organization for Competency Assurance (2002). National Commission for Certifying Agencies Standards for the Accreditation of Certification Programs. Washington, DC: NOCA.
- Professional Examination Service (1995). *PES Guidelines for the development, use, and evaluation of licensure and certification programs*. New York, NY: PES.
- Spray, J.A. & Huang, C. (2000). Obtaining test blueprint weights from job analysis surveys. *Journal of Educational Measurement*, *37*, 187-201.

Appendix 1
SME Nomination Form

* 1. Name of Nominator

* 2. Nominator's e-mail

* 3. Name of Nominee

* 4. Nominee's Job Title

* 5. Nominee's Employer

* 6. Employer's Address

* 7. Employer's City, State, Zip

* 8. Nominee's Work Phone

* 9. Nominee's e-mail address

* 10. Select the box next to each activity in which the nominee is willing to participate. Self-nominations are welcome. In addition to supplying the information below, please send a copy of the nominee's resume or CV to info@bpsweb.org, and include the phrase *Pediatric Pharmacy* in the subject line.

(Please note that nomination does not guarantee participation. Participants in each activity will be selected to achieve the best balance of professional background and experience.)

Task Force Member: (May 2011 to March 2012)

Serve on committee that creates domains, tasks, and knowledge statements comprising the pediatric pharmacy delineation of practice. Attend a face-to-face meeting in Washington, DC on August 2 - 3, 2011. Participate in a pre-meeting data collection activity and a post-meeting homework assignment. Participate in virtual meetings from August 2011 to March 2012 to refine and finalize the delineation of pediatric pharmacy specialty practice.

Independent Review: (August/September 2011)

Participate in a 1-hour email review of the domains, tasks, and knowledge statements comprising the pediatric pharmacy delineation of practice.

Survey Pilot Test: (November 2011)

Participate in a 1-hour critical review of an e-survey of pediatric pharmacy practice.

***11. In what setting does the MAJORITY of the nominee's practice take place?**

- Children's Specialty Hospital
- University Affiliated Hospital
- Community Hospital, For Profit
- Community Hospital, Not-For-Profit
- Federal Hospital/Institution
- Academic Institution
- Ambulatory Care
- Cancer Center
- Chain Community Pharmacy
- Drug Information Center
- Home Health Care
- Independent Community Pharmacy
- Managed Health Care
- Pharmaceutical Industry
- Physician's Office
- University Affiliated Hospital
- Other (Please specify.)

***12. What is the focus of the nominee's pediatric pharmacy practice?**

- Ambulatory Care
- General Peds
- Neonatal Pharmacy
- Critical Care
- Hematology/Oncology
- Nutrition/GI
- Administration
- Other (please specify)

***14. What was the nominee's ENTRY LEVEL pharmacy-related degree?**

- Bachelor's degree
- Pharm.D.
- Other
- Other (Please specify.)

***15. What is the HIGHEST pharmacy-related degree the nominee has earned?**

- Bachelor's degree
- Master's degree
- Pharm.D.
- Ph.D.
- Other (Please specify.)

***16. How many years has the nominee worked as a licensed pharmacist?**

***17. How many years has the nominee worked in pediatric pharmacy?**

***18. What BPS specialty certifications does the nominee hold? (Check all that apply)**

- Nuclear Pharmacy Nutrition Support Pharmacy Oncology Pharmacotherapy Psychiatric Pharmacy None

Next >>

Appendix 2
Pre-meeting Data Collection Activity Screen Captures

BPS Pediatric Pharmacy Data Collection Activity

To make our work more efficient at our in-person meeting, we are asking you each to contribute your initial thoughts regarding the format and content of the Pediatric Pharmacy role delineation. Please provide your answers to these questions no later than **Monday, July 18, 2011**, so that we may review and compile the results into a summary report in advance of our August 1-2 meeting.

Please use the Resource Manual provided on pages 3 - 8 of the Task Force pre-meeting memo to help you effectively respond to the questions below.

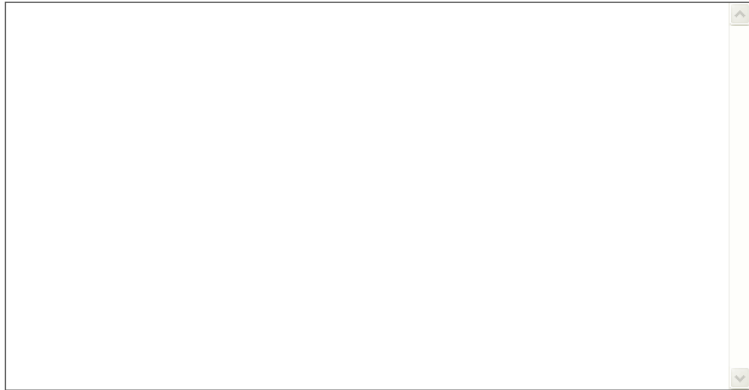
Name:

Domains are the major areas that make up practice in a profession. Domains are mutually exclusive and encompass all work activities performed across all work settings in which practitioners may be located.

What major categories of practice might serve as a possible domain structure describing the role of the pediatric pharmacist? See page 5 of the pre-meeting mailing for examples of domain structures for other BPS specialty certification areas.

Tasks are discrete work elements within each domain, and represent actions taken or activities performed in the domain of practice. Tasks describe distinct, observable, and specific practice-related activities.

What specific tasks are performed by a pharmacist specializing in pediatrics that are NOT performed by a non-specialist? For more information on delineating task statements, see pages 6 - 7 of the pre-meeting mailing.



Knowledge is factual or procedural information which, when applied, makes successful performance of a task possible (i.e., what a practitioner needs to know).

What specialized knowledge must a pharmacist specializing in pediatrics have in order to be effective? Be as specific as possible. See pages 7 - 8 of the pre-meeting mailing for additional information on delineating knowledge areas.

Please provide any additional information here that you feel would be important for BPS to consider when creating the pediatric specialty certification program.

Submit your responses

Appendix 3
Pediatric Pharmacy Task Force
Meeting #1 Attendees

BOARD OF PHARMACY SPECIALTIES

**Pediatric Pharmacy Role Delineation Study
Task Force Meeting 1
August 2 – 3, 2011**

Washington, DC

ATTENDEES

Task Force Members

Sabrina Boehme
Michelle Caruso
Elizabeth Farrington
Cyrine Haidar
Jennifer Hamner
Kristin Klein
Robert Kuhn
Sean O'Neill
Kathy Pham
Stephanie Phelps
Michael Reed

Board of Pharmacy Specialties

William Ellis, Executive Director
Jacquelyn Kelly Marshall, Associate Director for Certification

Professional Examination Service

Patricia Muenzen, Director of Research Programs
Jacqueline Siano, Research Director

Appendix 4
Instructions for Independent Review

Pediatric Pharmacy

Thank you again for taking the time to participate in this important independent review of the description of the specialty practice of Pediatric Pharmacy. This review is an important step in the role delineation study (RDS) process. The purpose of an RDS is to analyze the knowledge and unique tasks that comprise a proposed specialty. The results of this role delineation study will be incorporated into the official petition to BPS to recognize Pediatric Pharmacy as a specialty.

RDS Task Force meetings have been conducted to develop an initial description of the proposed pharmacy specialty area. The description consists of domains of practice and specific tasks performed by Pediatric pharmacists, as well as the specialized knowledge base required to perform the tasks. We are now circulating the work product to subject matter experts (SMEs), like yourself, for further review.

A draft role delineation document is attached for your review. Please review this document for completeness and clarity, and make your suggestions (additions, deletions, new wording, etc.) directly in the document. The tracking feature has been enabled.

The tasks and knowledge in the role delineation are organized into four domains: Patient Management, Practice Management, Information Management and Education, Public Health and Advocacy. Please think about the following when you review the outline:

- Have all required tasks and knowledge bases *specific to specialty practice* been included?
- Are there redundancies?
- Is each statement delineated as accurately and concisely as possible? Have examples been provided if necessary?

Once we have collected your comments, the RDS Task Force will meet via a series of virtual meetings to finalize the delineation based on your feedback. Subsequently, a survey will be developed and sent to a large sample of Pediatric pharmacists who will be asked to rate the tasks and the knowledge for validation purposes.

Please email your edited copies **WITH THE TRACKING LEFT ON** (to show your changes) to jsiano@proexam.org by **Wednesday October 5, 2011**.

Thank you very much.

Appendix 5
Survey Screen Captures



Save and exit

Responses for all previous pages will be saved.

What percentage of your overall work time do you spend providing pharmacy services for pediatric patients?

 %

Of this time, what percent is spent providing *direct* patient care?

 %

Next

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Progress Meter 6%



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Structure of Survey

In this survey, you will be rating tasks performed by Pediatric Pharmacy Specialists and the specialized knowledge needed in order to perform these tasks.

Tasks and knowledge are grouped together within four broad domains of practice:

- Domain 1: Patient Management
- Domain 2: Practice Management
- Domain 3: Information Management and Education
- Domain 4: Public Health and Patient Advocacy

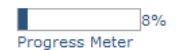
The survey is organized into the following four sections:

1. Task Ratings - In this section, you will rate tasks performed by Pediatric Pharmacy Specialists on two rating scales.
2. Domain Ratings - In this section, you will rate each of the four domains.
3. Knowledge Ratings- In this section, you will rate knowledge used by Pediatric Pharmacy Specialists on two rating scales.
4. Demographic Questionnaire - In this section, you will answer questions about your professional background.

Next

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Section 1 — Tasks

For each task, please make the following two ratings:

Frequency How frequently did you perform the task during the past 12 months?
Never, Quarterly or less, Monthly, Weekly, Daily

Importance How important is the task to providing effective care to pediatric patients?
Not important, Minimally important, Moderately important, or Highly important

When you rate **Frequency**, think about how frequently **you personally** performed the task in the past 12 months. When you rate **Importance**, think about the contribution of the task to providing effective care to pediatric patients, whether or not you personally performed the task.

	How frequently did you perform the task in the past 12 months?					How important is the task to providing effective care to pediatric patients?			
	Never	Quarterly or less	Monthly	Weekly	Daily	Not	Min	Mod	Very
Domain 1: Patient Management									
For the Pediatric Patient:									
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.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtain relevant clinical and laboratory data and results of diagnostic procedures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Save and exit

Responses for all previous pages will be saved.

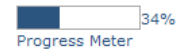
If any tasks you perform as a pediatric pharmacy specialist were not included in this survey, please describe them here.

[Click here to view the task list.](#)

Next

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Save and exit

Responses for all previous pages will be saved.

Section 2 — Domain Ratings

Please make the following overall ratings for each of the four domains of specialty practice:

% of Time Of the time you spent in pediatric pharmacy during the past year, what percentage did you spend performing the tasks in each domain?
Overall percentages must total 100%.

Importance How important is the domain for providing effective care to pediatric patients?
Not important, Minimally important, Moderately important, or Highly important

[Click here to view the tasks included in each domain.](#)

	% of Time	Importance			
		Not	Min	Mod	High
Domain 1: Patient Management – 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.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Domain 2: Practice Management – Tasks related to advancing pediatric pharmacy practice; and recommending, designing, implementing, and monitoring systems and policies to optimize the care of pediatric patients.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Domain 3: Information Management and Education – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to pediatric pharmacy, and the education of healthcare providers, trainees, patients and caregivers.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Domain 4: Public Health and Patient Advocacy – Tasks related to providing preventive health services, public health information, and advocacy for the pediatric patient population.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sum	<input type="text"/> %				



Save and exit

Responses for all previous pages will be saved.

Section 3 — Knowledge Ratings

For each knowledge area, please make the following two ratings:

Frequency How frequently did you use the knowledge during the past 12 months?
Never, Quarterly or less, Monthly, Weekly, Daily

Importance How important is the knowledge to providing effective care to pediatric patients?
Not important, Minimally important, Moderately important, or Highly important

When you rate **Frequency**, think about how frequently *you personally* used the knowledge in the past 12 months. When you rate **Importance**, think about the contribution of the knowledge area to providing effective care to pediatric patients, in general.

	How frequently did you use the knowledge during the past 12 months?					How important is the knowledge to providing effective care to pediatric patients?				
	Never	Quarterly or less	Monthly	Weekly	Daily	Not	Min	Mod	High	
Domain 1: Patient Management										
Knowledge of:										
Normal growth and development of the pediatric population	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Age-appropriate interviewing techniques for patients, parents, and caregivers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Legal considerations for dependent and emancipated patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Essential components of a medical history including maternal and birth history and childhood immunization status, if appropriate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Essential components of a social history, including day care attendance, siblings, smoke exposure, home environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	How frequently did you use the knowledge					How important is the knowledge to providing effective care				



Save and exit

Responses for all previous pages will be saved.

If any knowledge you use as a pediatric pharmacy specialist was not included in this survey, please describe it here.

[Click here to view the knowledge list.](#)

Next

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Section 4 — Demographic Questionnaire

How many years have you worked as a licensed pharmacist?

 Years

How many years (since licensure) have you worked with pediatric patients?

 Years

In what setting does the majority of your practice take place? (Select one best answer.)

- Adult hospital with pediatric wing/services
- Adult hospital with children's hospital within it
- Pediatric hospital freestanding
- Pediatric ambulatory care clinic - freestanding
- Home care
- Other (Please specify.)

Which of the following most closely describes your primary role? (Select one best answer.)

- Director of pharmacy
- Clinical manager
- Operational manager
- Clinical specialist
- Generalist pharmacist/decentralized pharmacist
- Staff pharmacist
- Academia
- Researcher
- Medication safety officer
- Other (Please specify.)

What percentage of your patients falls into each of the following age ranges?
(Estimate the percentage of your patients in each age range. Your percentages should total 100%.)

Which of the following most closely describes your primary role? (Select one best answer.)

- Director of pharmacy
- Clinical manager
- Operational manager
- Clinical specialist
- Generalist pharmacist/decentralized pharmacist
- Staff pharmacist
- Academia
- Researcher
- Medication safety officer
- Other (Please specify.)

What percentage of your patients falls into each of the following age ranges?
(Estimate the percentage of your patients in each age range. Your percentages should total 100%.)

Age Range	% of Your Patients
Pre-term neonates (Neonate born at <38 weeks gestational age)	<input type="text"/>
Full-term neonates (Neonate born at 38-42 weeks [average 40 weeks] gestational age)	<input type="text"/>
Infants (1 month [>28 days] to 1 year of age)	<input type="text"/>
Children (1-12 years of age)	<input type="text"/>
Adolescents (13-18 years of age)	<input type="text"/>
Adults (>18 years of age)	<input type="text"/>
Sum	<input type="text" value="0"/>

What is the highest pharmacy-related degree you have earned?

- Bachelor's degree
- Master's degree
- Pharm.D.
- Ph.D.
- Other (Please specify.)

Which of the following have you completed? (Select all that apply.)

- PGY1 Residency
- PGY2 Pediatric Residency
- PGY2 Residency (not in pediatrics)

Children (1-12 years of age)	<input type="text"/>
Adolescents (13-18 years of age)	<input type="text"/>
Adults (>18 years of age)	<input type="text"/>
Sum	0

What is the highest pharmacy-related degree you have earned?

- Bachelor's degree
- Master's degree
- Pharm.D.
- Ph.D.
- Other (Please specify.)

Which of the following have you completed? (Select all that apply.)

- PGY1 Residency
- PGY2 Pediatric Residency
- PGY2 Residency (not in pediatrics)
- Pediatric Research Fellowship
- No residency
- Other (Please specify.)

What BPS specialty certifications or added qualifications do you hold? (Select all that apply.)

- Ambulatory Care Pharmacy
- Nuclear Pharmacy
- Nutrition Support Pharmacy
- Oncology
- Psychiatric Pharmacy
- Pharmacotherapy
- Added Qualification in Cardiology
- Added Qualification in Infectious Diseases
- None





Save and exit

Responses for all previous pages will be saved.

To show our appreciation for your time and effort, your name will be entered into a random drawing for one of four \$50 Amazon.com gift cards.

Enter your information below to be entered in the drawing.

Enter in the Boxes Below	
Full Name	<input type="text"/>
Email Address	<input type="text"/>

*The information provided here will not be used for any other purpose other than this drawing.

Next

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100% Progress Meter

Appendix 6
Pilot Test Invitation

Dear <<First>>:

The role delineation for the proposed new specialty of Pediatric Pharmacy has been developed and reviewed by several subject-matter experts currently practicing in the Pediatric Pharmacy specialty. The role delineation, including specialized tasks and knowledge areas, has been translated into a web-based Survey of Pediatric Pharmacy Practice.

We now need you to participate in a pilot test of this online survey in advance of the survey's administration to a large sample of pharmacists practicing in this specialty.

You will be asked to respond to the following questions throughout the survey:

1. Did you experience any difficulties using the ratings scales?
2. Are the questions in the demographic and background questionnaire clear and accurate?
3. Were the directions for taking the survey clear?
4. Did you experience any technical difficulties?
5. How many minutes did it take you to complete the survey?
6. Please provide additional suggestions or comments to improve the survey experience.

To access the survey, copy and paste the entire link below into your browser:

<<URL>>

If you are unable to complete the entire survey in one sitting, you may exit and return later using the above URL.

We ask you to complete the pilot test of the survey no later than November 28, 2011.

If you experience any difficulties while pilot testing the survey, please contact me at BPSPediatric@proexam.org.

Thank you in advance for taking the time to perform this critical review.

Jacqueline Siano
Research Director
Professional Examination Service
475 Riverside Drive
New York, NY 10115

Appendix 7
Survey Invitation and Reminder

Dear <<First>>:

The Board of Pharmacy Specialties (BPS) is currently conducting a study to analyze the knowledge and unique tasks that comprise the proposed new specialty of Pediatric Pharmacy. The results of this study will be incorporated into the official petition to BPS to recognize Pediatric Pharmacy as a specialty.

If you are currently practicing in the specialty of pediatric pharmacy, we are asking you to complete an online role delineation survey. We anticipate the survey taking about 25 minutes to complete. Your responses to the survey questions will be entirely confidential and only aggregated results will be reported.

We understand how valuable your time is. To show our appreciation, after you complete the survey you will be entered into a random drawing for one of four \$50 Amazon.com gift cards.

The link below will take you to the survey:

<<URL>>

If you are unable to complete the entire survey in one sitting, you may exit and return later using the above URL.

Thank you in advance for contributing to the advancement of the Pediatric Pharmacy specialty in this way.

Board of Pharmacy Specialties
Pediatric Pharmacy Task Force

Dear <<First>>:

This is a reminder that if you are currently practicing in the specialty of pediatric pharmacy, we are asking you to complete an online role delineation survey.

The Board of Pharmacy Specialties (BPS) is currently conducting a study to analyze the knowledge and unique tasks that comprise the proposed new specialty of Pediatric Pharmacy. The results of this study will be incorporated into the official petition to BPS to recognize Pediatric Pharmacy as a specialty.

We anticipate the survey taking about 25 minutes to complete. Your responses to the survey questions will be entirely confidential and only aggregated results will be reported.

We understand how valuable your time is. To show our appreciation, after you complete the survey you will be entered into a random drawing for one of four \$50 Amazon.com gift cards.

The link below will take you to the survey:

<<URL>>

If you are unable to complete the entire survey in one sitting, you may exit and return later using the above URL.

Please complete this survey by January 25, 2012.

Thank you in advance for contributing to the advancement of the Pediatric Pharmacy specialty in this way.

Board of Pharmacy Specialties
Pediatric Pharmacy Task Force

Appendix 8
Subgroup Analysis for Domain Ratings

Percentage of Time Ratings for Domains by Subgroups

**Domain Percentage of Time Ratings by
Percentage of Time Providing Pharmacy Services for Pediatric Patients**

	< 50% Pediatric Time		≥ 50% Pediatric Time	
	M	SD	M	SD
Domain 1: Patient Management	49.5%	24.8	56.5%	20.6
Domain 2: Practice Management	19.5%	19.1	20.4%	15.6
Domain 3: Education and Information Management	26.9%	22.0	18.8%	11.1
Domain 4: Public Health and Advocacy	4.1%	4.4	4.4%	4.4

**Domain Percentage of Time Ratings by
Years of Experience Working with Pediatric Patients**

	1-5 yrs		6-10 yrs		11-20 yrs		20+ yrs	
	M	SD	M	SD	M	SD	M	SD
Domain 1: Patient Management	59.8%	18.8	55.5%	20.1	49.8%	23.1	56.6%	24.3
Domain 2: Practice Management	18.3%	14.2	20.0%	14.1	24.4%	18.4	19.1%	19.1
Domain 3: Education and Information Management	18.1%	11.1	20.3%	12.8	20.7%	13.6	19.5%	14.2
Domain 4: Public Health and Advocacy	3.9%	4.2	4.2%	4.3	5.1%	4.8	4.8%	4.5

Importance Ratings for Domains by Subgroups

**Domain Importance Ratings by
Percentage of Time Providing Pharmacy Services for Pediatric Patients**

	< 50% Pediatric Time		≥ 50% Pediatric Time	
	M	SD	M	SD
	Domain 1: Patient Management	3.9	.4	4.0
Domain 2: Practice Management	3.6	.7	3.7	.5
Domain 3: Education and Information Management	3.6	.5	3.6	.6
Domain 4: Public Health and Advocacy	3.1	.8	3.0	.8

**Domain Importance by
Years of Experience Working with Pediatric Patients**

	1-5 yrs		6-10 yrs		11-20 yrs		20+ yrs	
	M	SD	M	SD	M	SD	M	SD
Domain 1: Patient Management	4.0	.1	3.9	.3	4.0	.2	4.0	.2
Domain 2: Practice Management	3.7	.5	3.6	.6	3.7	.5	3.7	.5
Domain 3: Education and Information Management	3.6	.6	3.5	.7	3.5	.5	3.6	.5
Domain 4: Public Health and Advocacy	3.1	.8	2.8	.8	3.0	.7	3.2	.7

Appendix 9
Subgroup Analysis for Task Ratings

**Task Frequency Ratings by
Percentage of Time Providing Pharmacy Services for Pediatric Patients**

	< 50% Pediatric Time	≥ 50% Pediatric Time
	M	M
Domain 1: Patient Management		
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.	4.4	4.8
1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.	4.5	4.9
1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	2.1	2.3
1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	1.5	1.4
1.5 Analyze and interpret collected patient information.	4.5	4.9
1.6 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.	4.3	4.8
1.7 Establish therapeutic goals with healthcare team and patient/parents/caregivers.	3.9	4.6
1.8 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.	3.8	4.7
1.9 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.	3.9	4.6
1.10 Participate in the management of pediatric emergencies.	2.1	3.0
1.11 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.	3.3	4.2
1.12 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.	2.2	2.6
Domain 2: Practice Management		

	< 50% Pediatric Time	≥ 50% Pediatric Time
	M	M
2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.	2.9	3.4
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).	2.4	2.8
2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.	2.3	2.8
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.	2.4	2.9
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]).	2.3	2.7
2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.	2.6	3.2
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	1.5	2.0
2.8 Justify and document the clinical and financial value of pediatric pharmacy services:	2.4	3.1
Domain 3: Information Management and Education		
3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.	3.5	3.7
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.	3.4	3.7
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.	3.1	3.4
3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).	2.5	2.3
3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.	3.0	3.5
3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).	2.8	2.9

	< 50% Pediatric Time	≥ 50% Pediatric Time
	M	M
Domain 4: Public Health and Patient Advocacy		
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	1.9	2.0
4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.	2.0	2.1
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).	1.6	1.9
4.4 Participate in professional organizations related to pharmacy and pediatric practice.	2.7	2.7
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	1.7	2.4
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	2.1	2.4

**Task Frequency Ratings by
Years of Experience Working with Pediatric Patients**

	1-5 yrs	6-10 yrs	11-20 yrs	20+ yrs
	M	M	M	M
Domain 1: Patient Management				
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.	4.9	4.7	4.7	4.6
1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.	4.9	4.9	4.8	4.8
1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	2.2	2.4	2.2	2.5
1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	1.3	1.4	1.4	1.5
1.5 Analyze and interpret collected patient information.	4.9	4.8	4.8	4.9
1.6 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.	4.8	4.8	4.7	4.7
1.7 Establish therapeutic goals with healthcare team and patient/parents/caregivers.	4.6	4.6	4.5	4.4
1.8 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.	4.6	4.7	4.5	4.4
1.9 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.	4.6	4.6	4.5	4.5
1.10 Participate in the management of pediatric emergencies.	3.1	3.0	2.7	3.0
1.11 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.	4.3	4.1	3.9	4.0
1.12 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.	2.8	2.5	2.3	2.5

Domain 2: Practice Management				
2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.	3.3	3.3	3.5	3.4
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).	2.6	2.8	3.0	2.9
2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.	2.7	2.7	2.9	2.7
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.	2.8	2.8	2.9	3.1
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	2.6	2.8	2.9
2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.	3.2	3.1	3.3	3.3
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	1.9	1.9	2.1	2.1
2.8 Justify and document the clinical and financial value of pediatric pharmacy services:	3.2	3.0	3.0	2.9
Domain 3: Information Management and Education				
3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.	3.5	3.8	3.8	4.0
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.	3.7	3.6	3.6	3.6
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	3.4	3.2	3.7
3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).	2.3	2.3	2.3	2.7

3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.	3.5	3.4	3.3	3.6
3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).	2.7	3.0	3.0	3.0
Domain 4: Public Health and Patient Advocacy				
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	1.9	2.0	2.1	2.2
4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.	2.0	2.0	2.1	2.3
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).	1.8	1.9	1.9	1.7
4.4 Participate in professional organizations related to pharmacy and pediatric practice.	2.7	2.7	2.7	2.7
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	2.3	2.2	2.4	2.5
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	2.2	2.2	2.5	2.8

**Task Importance Ratings by
Percentage of Time Providing Pharmacy Services for Pediatric Patients**

	< 50% Pediatric Time	≥ 50% Pediatric Time
	M	M
Domain 1: Patient Management		
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.	4.0	4.0
1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.	3.9	4.0
1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	2.9	2.7
1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	3.1	2.5
1.5 Analyze and interpret collected patient information.	3.9	4.0
1.6 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.	3.9	3.9
1.7 Establish therapeutic goals with healthcare team and patient/parents/caregivers.	3.9	3.9
1.8 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.	3.8	3.9
1.9 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.	3.9	3.9
1.10 Participate in the management of pediatric emergencies.	3.5	3.6
1.11 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.	3.9	3.8
1.12 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.	3.2	3.0
Domain 2: Practice Management		

	< 50% Pediatric Time	≥ 50% Pediatric Time
	M	M
2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.	3.8	3.8
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).	3.5	3.6
2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.	3.5	3.6
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.	3.6	3.7
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]).	3.8	3.6
2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.	3.7	3.7
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	2.9	3.2
2.8 Justify and document the clinical and financial value of pediatric pharmacy services:	3.4	3.4
Domain 3: Information Management and Education		
3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.	3.6	3.7
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.	3.6	3.7
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.	3.9	3.8
3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).	3.3	3.3
3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.	3.4	3.5
3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).	3.4	3.4

	< 50% Pediatric Time	≥ 50% Pediatric Time
	M	M
Domain 4: Public Health and Patient Advocacy		
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	3.4	3.2
4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.	3.4	3.5
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).	3.4	3.4
4.4 Participate in professional organizations related to pharmacy and pediatric practice.	3.4	3.3
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	3.4	3.3
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	3.3	3.4

**Task Importance Ratings by
Years of Experience Working with Pediatric Patients**

	1-5 yrs	6-10 yrs	11-20 yrs	20+ yrs
	M	M	M	M
Domain 1: Patient Management				
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.	4.0	3.9	4.0	4.0
1.2 Obtain relevant clinical and laboratory data and results of diagnostic procedures.	4.0	4.0	4.0	4.0
1.3 Perform pertinent physical assessments to evaluate patient condition and guide patient medication management.	2.8	2.8	2.6	2.8
1.4 Perform point of care testing (e.g., blood glucose, international normalized ratio [INR]).	2.6	2.4	2.6	2.5
1.5 Analyze and interpret collected patient information.	4.0	4.0	3.9	4.0
1.6 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.	3.9	4.0	3.9	4.0
1.7 Establish therapeutic goals with healthcare team and patient/parents/caregivers.	3.9	3.9	3.9	3.9
1.8 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.	3.9	3.9	3.9	4.0
1.9 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.	4.0	3.9	3.9	4.0
1.10 Participate in the management of pediatric emergencies.	3.7	3.6	3.6	3.6
1.11 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.	3.8	3.7	3.8	3.9
1.12 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.	3.1	2.9	3.0	2.9

Domain 2: Practice Management				
2.1 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.	3.8	3.8	3.8	3.8
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).	3.6	3.5	3.6	3.7
2.3 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.	3.6	3.6	3.7	3.7
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.	3.7	3.6	3.7	3.8
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]).	3.6	3.6	3.6	3.8
2.6 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.	3.8	3.6	3.7	3.7
2.7 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.	3.2	3.1	3.1	3.4
2.8 Justify and document the clinical and financial value of pediatric pharmacy services:	3.5	3.3	3.3	3.5
Domain 3: Information Management and Education				
3.1 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.	3.7	3.7	3.6	3.6
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.	3.7	3.7	3.6	3.6
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.	3.8	3.8	3.7	3.8
3.4 Contribute to the pediatric body of knowledge (e.g., participate in research, deliver presentations, participate as peer reviewer, publish).	3.4	3.2	3.1	3.3

3.5 Retrieve and interpret biomedical literature with regard to study methodology, statistical analysis, study results and applicability to pediatric pharmacy practice.	3.6	3.4	3.4	3.7
3.6 Develop and maintain a pediatric-specific medical reference library (electronic or print).	3.5	3.4	3.3	3.4
Domain 4: Public Health and Patient Advocacy				
4.1 Advocate for public health initiatives to promote health, safety, and wellness in infants, children and adolescents.	3.3	3.1	3.2	3.3
4.2 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.	3.5	3.4	3.5	3.6
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).	3.4	3.3	3.3	3.3
4.4 Participate in professional organizations related to pharmacy and pediatric practice.	3.4	3.3	3.2	3.4
4.5 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.	3.4	3.3	3.3	3.4
4.6 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).	3.4	3.2	3.3	3.6

Appendix 10
Final Pediatric Pharmacy Role Delineation

Domain 1: Patient Management

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:

1.15 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.

1.16 Obtain relevant clinical and laboratory data and results of diagnostic procedures.

1.17 Analyze and interpret collected patient information.

1.18 Identify and prioritize current or potential patient-specific medical, medication, and nutrition related problems.

1.19 Establish therapeutic goals with healthcare team and patient/parents/caregivers.

1.20 Design, recommend and/or implement an age-appropriate therapeutic regimen with healthcare team and patient/parents/caregivers.

1.21 Design and implement a plan to monitor the safety and efficacy of a therapeutic regimen, and adjust as necessary.

1.22 Participate in the management of pediatric emergencies.

1.23 Reconcile medications as necessary across the continuum of care including on admission, transfer, discharge, and during outpatient encounters.

1.24 Identify and refer patients with needs beyond the scope of the pediatric pharmacy specialist to an appropriate alternative level of care.

Knowledge of:

- k1.33 Normal growth and development of the pediatric population
- k1.34 Age-appropriate interviewing techniques for patients, parents, and caregivers
- k1.35 Essential components of a medical history including maternal and birth history and childhood immunization status, if appropriate
- k1.36 Essential components of a social history, including day care attendance, siblings, smoke exposure, home environment
- k1.37 Pathophysiology, epidemiology, risk factors, diagnosis, prevention, and evidence-based treatment of common diseases and conditions in pediatric patients
- k1.38 Equations to calculate body surface area, creatinine clearance, fluid requirements, and ideal body weight from birth to adult
- k1.39 Pediatric populations for which standard calculated methods of assessment of renal impairment are not reliable
- k1.40 Urine output calculation for body weight and appropriate output per age
- k1.41 Methods for assessment of hepatic function in pediatric populations
- k1.42 Normal laboratory values and vital signs from birth to adult
- k1.43 Age-associated differences in pathophysiology and clinical manifestations of disease across patient populations
- k1.44 Age-specific pharmacokinetic differences in neonates, infants, children, and adolescents:
- k1.45 Age-specific pharmacodynamic differences in neonates, infants, children, and adolescents:
- k1.46 Pharmacogenomic considerations in pediatric patients
- k1.47 Appropriate use of off-label medications to treat pediatric patients
- k1.48 Pediatric-specific drug interactions (e.g., ceftriaxone and calcium-containing products in the neonate, calcium and phosphorous in parenteral nutrition)
- k1.49 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)
- k1.50 Influence of medications on the production of breast milk
- k1.51 Excretion of medications and other substances in breast milk
- k1.52 Appropriate dosing based on age and body size (e.g., body surface area, post-menstrual age, gestational age, dosing weight)
- k1.53 Medication dosing in extracorporeal membrane oxygenation (ECMO) and in renal replacement therapy (e.g., continuous renal replacement therapy [CRRT], PD, HD)
- k1.54 Medication dose adjustment in pediatric patients with renal and hepatic impairment
- k1.55 Essential components of medication reconciliation in pediatric patients (e.g., concentration, dose in mg, palatability)

k1.56 Pediatric-specific adverse effects (e.g., liver failure with valproate, tetracycline and tooth discoloration):

k1.57 Differences in laboratory sampling for pediatric patients (e.g., blood volume; method, frequency and timing of sampling)

k1.58 Differences in the management of pediatric emergencies (e.g., respiratory distress, neonatal seizures, cardiopulmonary arrest)

k1.59 Nutritional and fluid requirements for infants and children for normal growth and disease

k1.60 Childhood immunization schedules

k1.61 Factors affecting adherence to the treatment regimen

k1.62 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

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

2.9 Develop and implement systems to assure appropriate drug delivery (e.g., extemporaneous compounding, standardized concentrations) for pediatric patients.

2.10 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).

2.11 Develop and maintain a preferred formulary for pediatric patients and ensure appropriate pediatric dosing is incorporated in all formulary monographs.

2.12 Adopt, adapt or develop evidence-based practice guidelines and protocols for the management of pediatric patients in accordance with health-system policies and procedures.

2.13 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]).

2.14 Perform continuous quality improvement activities aimed at enhancing safety and effectiveness of medication use.

2.15 Develop policies and direct the medication use process for investigational drugs (including compassionate use agents) in the pediatric population.

2.16 Justify and document the clinical and financial value of pediatric pharmacy services.

Knowledge of:

k2.10 Medication safety considerations (e.g., Institute for Safe Medication Practices [ISMP] and Joint Commission recommendations, Food and Drug Administration [FDA] alerts)

k2.11 Position statements, white papers, and national guidelines as an aid to the development of health-system policies and procedures

k2.12 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])

k2.13 Routes of administration (e.g., intraosseous, oral/enteral, parenteral, IM, transdermal, intranasal, intraventricular)

k2.14 Impact of medication administration techniques on drug delivery in pediatric patients (e.g., inhalers, dead space in IV tubing, overfill, j-tip device)

k2.15 Medication administration technology (e.g., infusion pumps, subcutaneous needle devices, intranasal administration devices, aerosols)

k2.16 Appropriate references to support the preparation of pediatric formulations (e.g., IV dilutions, extemporaneously compounded preparations)

k2.17 Considerations when selecting pediatric-appropriate dosage formulations

k2.18 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

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

3.7 Provide pediatric pharmacy-specific education and training for pharmacists, pharmacy technicians, pharmacy fellows, pharmacy residents, or student pharmacists.

3.8 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.

3.9 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.

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

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

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

Knowledge of:

k3.11 Principles and methods of educating pharmacy staff, fellows, residents, student pharmacists and/or other healthcare professionals regarding pediatric health-related issues

k3.12 Age-appropriate patient education principles and methods

k3.13 Health literacy and cultural considerations in educating patients/parents/caregivers:

k3.14 Tools, methods and counseling techniques to increase adherence to the treatment regimen :

k3.15 Research design, methodology, and statistical analysis:

k3.16 Clinical application and limitations of published data and reports

k3.17 Regulatory/IRB/human subjects safety requirements and concerns for conducting research in the pediatric population

k3.18 Medical literature publication and review process

k3.19 Opportunities for disseminating pediatric knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)

k3.20 Appropriate pediatric-specific references

Domain 4: Public Health and Patient Advocacy

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

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

- 4.8 Advocate for the availability of age-appropriate formulations, safety and efficacy studies in the pediatric population, and product labeling in pediatric patients.
- 4.9 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).
- 4.10 Participate in professional organizations related to pharmacy and pediatric practice.
- 4.11 Facilitate access to care and treatment for pediatric patients in times of financial need, disaster, drug shortage, or public health threat.
- 4.12 Promote the role of the pediatric pharmacy specialist to stakeholders (e.g., healthcare system administrators, legislators, patients/parents/caregivers).

Knowledge of:

- k4.10 Healthcare disparities in pediatric patients
- k4.11 Access to care disparities in pediatric patients
- k4.12 Emergency preparedness resources for pediatric patients
- k4.13 Public health resources for pediatric patients (e.g., childhood immunizations, sexually transmitted disease [STD] treatment, free health clinics)
- k4.14 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)
- k4.15 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)
- k4.16 Professional organizations and their roles and resources related to advocacy
- k4.17 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)
- k4.18 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)

Appendix D-2

NAPLEX Blueprint



NABP
NATIONAL ASSOCIATION OF
BOARDS OF PHARMACY

NAPLEX Blueprint

As a direct result of a national analysis conducted by NABP, a new NAPLEX blueprint went into effect March 1, 2010. The analysis consisted of an evaluation of current pharmacy practice outcomes and an expert review of the current NAPLEX blueprint content. An analysis such as this is customarily performed on a regular basis to ensure that the blueprint, which guides the content of the NAPLEX, is current with the knowledge and skills necessary to safely and effectively practice entry-level pharmacy.

One of the more noteworthy changes to the blueprint included the addition of pharmacoeconomics to three competency statements to appropriately reflect its incorporation into the practice of pharmacy today with respect to patient care outcomes. The blueprint was validated through a survey of practicing pharmacists across the United States and Canada. Analysis of the survey resulted in changes to the percentage of examination questions allotted to two of the three major content areas of the blueprint.

New Passing Standard

The final step of the NAPLEX blueprint review involved convening a panel of subject matter experts and practicing pharmacists from across the country to participate in a standard-setting study. Throughout the study, the panel focused on the level of knowledge and performance related to pharmacy practice that is expected of a pharmacist in order to protect the health and welfare of the public. This type of study helps to ensure that the performance standard is valid and appropriate for contemporary practice standards.

The NAPLEX Competency Statements

The NAPLEX Competency Statements provide a blueprint of the topics covered on the examination. They offer important information about the knowledge, judgment, and skills you are expected to demonstrate as an entry-level pharmacist. A strong understanding of the Competency Statements will aid in your preparation to take the examination.

Area 1 Assess Pharmacotherapy to Assure Safe and Effective Therapeutic Outcomes (Approximately 56% of Test)

- *1.1.0 Identify, interpret, and evaluate patient information to determine the presence of a disease or medical condition, assess the need for treatment and/or referral, and identify patient-specific factors that affect health, pharmacotherapy, and/or disease management.*
- **1.1.1** Identify and assess patient information including medication, laboratory, and disease state histories.

- **1.1.2** Identify patient specific assessment and diagnostic methods, instruments, and techniques and interpret their results.
- **1.1.3** Identify and define the etiology, terminology, signs, and symptoms associated with diseases and medical conditions and their causes and determine if medical referral is necessary.
- **1.1.4** Identify and evaluate patient genetic, and biosocial factors, and concurrent drug therapy, relevant to the maintenance of wellness and the prevention or treatment of a disease or medical condition.
- **1.2.0** *Evaluate information about pharmacoeconomic factors, dosing regimen, dosage forms, delivery systems and routes of administration to identify and select optimal pharmacotherapeutic agents, for patients*
- **1.2.1** Identify specific uses and indications for drug products and recommend drugs of choice for specific diseases or medical conditions.
- **1.2.2** Identify the chemical/pharmacologic classes of therapeutic agents and describe their known or postulated sites and mechanisms of action.
- **1.2.3** Evaluate drug therapy for the presence of pharmacotherapeutic duplications and interactions with other drugs, food, and diagnostic tests.
- **1.2.4** Identify and evaluate potential contraindications and provide information about warnings and precautions associated with a drug product's active and inactive ingredients.
- **1.2.5** Identify physicochemical properties of drug substances that affect their solubility, pharmacodynamic and pharmacokinetic properties, pharmacologic actions, and stability.
- **1.2.6** Evaluate and interpret pharmacodynamic and pharmacokinetic principles to calculate and determine appropriate drug dosing regimens.
- **1.2.7** Identify appropriate routes of administration, dosage forms, and pharmaceutical characteristics of drug dosage forms and delivery systems, to assure bioavailability and enhance therapeutic efficacy.
- **1.3.0** *Evaluate and manage drug regimens by monitoring and assessing the patient and/or patient information, collaborating with other health care professionals, and providing patient education to enhance safe, effective, and economic patient outcomes.*
- **1.3.1** Identify pharmacotherapeutic outcomes and endpoints.
- **1.3.2** Evaluate patient signs and symptoms, and the findings of monitoring tests and procedures to determine the safety and effectiveness of pharmacotherapy. Recommend needed followup evaluations or tests when appropriate.
- **1.3.3** Identify, describe, and provide information regarding the mechanism of adverse reactions, allergies, side effects, iatrogenic, and drug-induced illness, including their management and prevention.
- **1.3.4** Identify, prevent, and address methods to remedy medication non-adherence, misuse, or abuse.
- **1.3.5** Evaluate current drug regimens and recommend pharmacotherapeutic alternatives or modifications.

Area 2 Assess Safe and Accurate Preparation and Dispensing of Medications (Approximately 33% of Test)

- **2.1.0** *Demonstrate the ability to perform calculations required to compound, dispense, and administer medication.*
- **2.1.1** Calculate the quantity of medication to be compounded or dispensed; reduce and enlarge formulation quantities and calculate the quantity or ingredients needed to compound the proper amount of the preparation.
- **2.1.2** Calculate nutritional needs and the caloric content of nutrient sources.
- **2.1.3** Calculate the rate of drug administration.
- **2.1.4** Calculate or convert drug concentrations, ratio strengths, and/or extent of ionization.
- **2.2.0** *Demonstrate the ability to select and dispense medications in a manner that promotes safe and effective use.*
- **2.2.1** Identify drug products by their generic, brand, and/or common names.
- **2.2.2** Identify whether a particular drug dosage strength or dosage form is commercially available and whether it is available on a nonprescription basis.
- **2.2.3** Identify commercially available drug products by their characteristic physical attributes.

- **2.2.4** Assess pharmacokinetic parameters and quality assurance data to determine equivalence among manufactured drug products, and identify products for which documented evidence of inequivalence exists.
- **2.2.5** Identify and provide information regarding appropriate packaging, storage, handling, administration, and disposal of medications.
- **2.2.6** Identify and provide information regarding the appropriate use of equipment and apparatus required to administer medications.
- **2.3.0** *Demonstrate the knowledge to prepare and compound extemporaneous preparations and sterile products.*
- **2.3.1** Identify techniques, procedures, and equipment related to drug preparation, compounding, and quality assurance.
- **2.3.2** Identify the important physicochemical properties of a preparation's active and inactive ingredients.
- **2.3.3** Identify the mechanism of and evidence for the incompatibility or degradation of a product or preparation and methods for achieving its stability.

Area 3 Assess, Recommend, and Provide Health care Information that Promotes Public Health (Approximately 11% of Test)

- **3.1.0** *Identify, evaluate, and apply information to promote optimal health care.*
- **3.1.1** Identify the typical content of specific sources of drug and health information for both health care providers and consumers, and recommend appropriate resources to address questions or needs.
- **3.1.2** Evaluate the suitability, accuracy, and reliability of clinical and pharmacoeconomic data by analyzing experimental design, statistical tests, interpreting results, and formulating conclusions.
- **3.2.0** *Recommend and provide information to educate the public and healthcare professionals regarding medical conditions, wellness, dietary supplements, and medical devices.*
- **3.2.1** Recommend and provide health care information regarding the prevention and treatment of diseases and medical conditions, including emergency patient care and vaccinations.
- **3.2.2** Recommend and provide health care information regarding nutrition, lifestyle, and other non-drug measures that promote health or prevent the progression of a disease or medical condition.
- **3.2.3** Recommend and provide information regarding the documented uses, adverse effects, and toxicities of dietary supplements.
- **3.2.4** Recommend and provide information regarding the selection, use, and care of medical/surgical appliances and devices, self-care products, and durable medical equipment, as well as products and techniques for self-monitoring of health status and medical conditions.

Appendix F-1

ASHP Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Pediatrics



**Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2)
Pharmacy Residencies in Pediatrics**

Prepared in collaboration with the Pediatric Pharmacy Advocacy Group

Overview of PGY2 Pharmacy Residencies in Pediatrics

The PGY2 pharmacy residency in pediatrics is designed to transition PGY1 residency graduates from generalist practice to specialized practice focused on the care of pediatric patients. Residency graduates are equipped to participate as integral members of interdisciplinary teams caring for pediatric patients, assuming responsibility for pharmaceutical care. These residents acquire the capacity to deliver evidence-based care to pediatric patients within the limitations presented by the shortage of research in the use of medications in this patient population. They are able to prepare or supervise the preparation of the unique formulations required by pediatric patients as those patients' needs change according to their stage of growth and development.

Pediatric pharmacy residency graduates will serve health care organizations successfully as the ultimate resource for information about medications used in the care of children and for decision-making affecting the care of these patients. This includes leadership in decision-making related to the use or modification of guidelines for the care of individual patients and for participation in organizational planning for, implementation of, and maintenance of technology and automation systems.

Exiting residents have been trained to assume responsibility for identifying and implementing opportunities to improve the medication-use system in pediatric practice areas. Groomed for practice leadership, pediatric pharmacy residency graduates can be expected to continue their pursuit of expertise in practice; to possess advanced skills to identify the pharmacotherapy and medication-use training needs of other health care professionals caring for pediatric patients; to deliver effective training to those health care professionals; and to contribute to public health efforts for health improvement, wellness, and disease prevention.

Explanation of the Contents of This Document:

Each of the document's objectives has been classified according to educational taxonomy (cognitive, affective, or psychomotor) and level of learning. An explanation of the taxonomies is available elsewhere.¹

The order in which the required educational outcomes are presented in this document does not suggest relative importance of the outcome, amount of time that should be devoted to teaching the outcome, or sequence for teaching.

The educational outcomes, goals, and objectives are divided into those that are required and those that are elective. The required outcomes, including all of the goals and objectives falling under them, must be included in the design of all programs. The elective outcomes are provided for those programs that wish to add to the required outcomes. Programs selecting an elective outcome are not required to include all of the goals and objectives falling under that outcome. In addition to the potential elective outcomes contained in this document, programs are free to create their own elective outcomes with associated goals and objectives. Other sources of elective outcomes may include elective educational outcomes in the list provided for PGY1 pharmacy residencies and educational outcomes for training in other PGY2 areas. Each of the goals falling under the program's selection of program outcomes (required and elective) must be evaluated at least once during the resident's year.

Educational Outcomes (Outcome): Educational outcomes are statements of broad categories of the residency graduates' capabilities.

Educational Goals (Goal): Educational goals listed under each educational outcome are broad sweeping statements of abilities.

Educational Objectives (OBJ): Resident achievement of educational goals is determined by assessment of the resident's ability to perform the associated educational objectives below each educational goal.

Instructional Objectives (IO): Instructional objectives are the result of a learning analysis of each of the educational objectives. They are offered as a resource for preceptors encountering difficulty in helping residents achieve a particular educational objective. The instructional objectives falling below the educational objectives suggest knowledge and skills required for successful performance of the educational objective that the resident may not possess upon entering the residency year. Instructional objectives are teaching tools only. They are not required in any way nor are they meant to be evaluated.

¹ Nimmo, CM. Developing training materials and programs: creating educational objectives and assessing their attainment. In: Nimmo CM, Guerrero R, Greene SA, Taylor JT, eds. Staff development for pharmacy practice. Bethesda, MD: ASHP; 2000.

Required Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Pediatrics

Outcome R1: Demonstrate leadership and practice management skills in the pediatric patient care setting.

Goal R1.1 Exhibit the ongoing development of essential personal skills of a pediatric pharmacy practice leader.

OBJ R1.1.1 (Characterization) Practice self-managed continuing professional development with the goal of improving the quality of one's own performance through self-assessment and change.

IO State criteria for judging one's performance of tasks that are critical in one's own practice.

IO Explain the role of participation in pediatric and pharmacy professional organization meetings in the ongoing development of expertise in pediatric pharmacy.

IO Explain the importance of staying current with pertinent pediatric literature.

OBJ R1.1.2 (Characterization) Demonstrate commitment to the professional practice of pediatric pharmacy through active participation in the activities of local, state, and/or national pediatric and pharmacy professional organizations.

IO Assess the relevance of membership or participation in various professional organizations associated with pediatric pharmacy practice.

IO Explain the importance of contributing to the work of pediatric professional organizations in advancing the visibility of the pharmacist's role in the care of pediatric patients.

OBJ R1.1.3 (Synthesis) Devise an effective plan for balancing professional and personal life.

IO Explain the importance of balancing professional and personal life.

IO Explain potential negative consequences of failure to achieve balance in professional and personal life.

IO Explain various approaches advocated for achieving balance in one's life.

OBJ R1.1.4 (Characterization) Display integrity in professional relationships and actions.

IO Explain ethical dilemmas that may confront the pediatric pharmacist.

IO Explain the system of ethical reasoning employed in arriving at a particular ethical decision.

IO Explain ethical principles embodied in the American Pharmacists Association Code of Ethics for Pharmacists.

IO Explain the implications of the Belmont Report² for ethical decision-making in pediatric pharmacy.

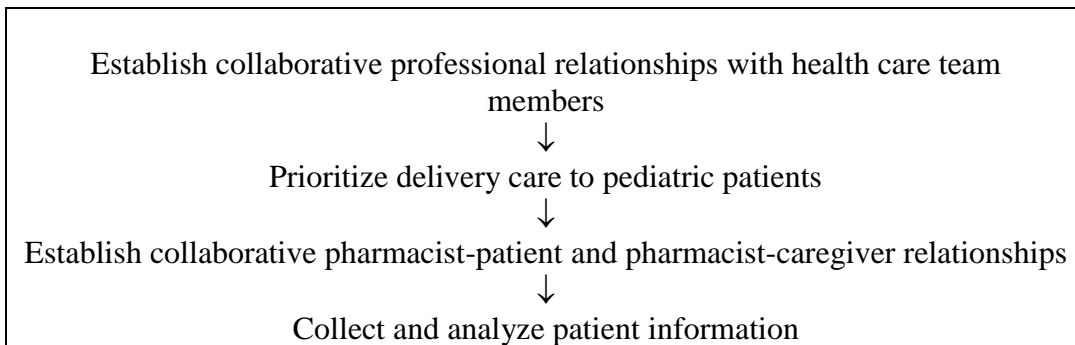
² The Belmont Report.: Ethical Principles for the Protection of Human Subjects of Research. Report from the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (resource on the World Wide Web). URL: <http://ohsr.od.nih.gov/guidelines/guidelines.html>. Office of Human Subjects Research, National Institutes of Health. 1979 April 18, Available from Internet. Accessed 2007April 2.

- OBJ R1.1.5 (Application) Comply with the requirements of the organization's policy in all interactions with the pharmaceutical industry.
 - IO Explain the potential conflicts inherent in the objectives of one's health care organization and the objectives of a pharmaceutical industry representative.*
- OBJ R1.1.6 (Synthesis) Initiate and maintain a systematic approach to documenting professional activities and accomplishments.
- Goal R1.2 Contribute to the leadership and management activities within the pediatric pharmacy practice area.
 - OBJ R1.2.1 (Application) Use effective negotiation skills to resolve conflicts.
 - OBJ R1.2.2 (Synthesis) Use group participation skills when leading or working as a member of a formal or informal work group.
 - IO Explain methods for achieving consensus.*
 - IO Explain how to create an agenda for a meeting.*
 - IO Explain methods for assuring participation by all members of a group.*
 - IO Explain methods for effective group leadership.*
- Goal R1.3 Exercise pediatric pharmacy practice leadership.
 - OBJ R1.3.1 (Characterization) Demonstrate a commitment to advocacy for the optimal care of pediatric patients through the assertive and persuasive presentation of patient care issues to members of the health care team, the patient, and/or the patient's representative(s).
 - OBJ R1.3.2 (Characterization) Display initiative in preventing, identifying, and resolving pharmacy-related pediatric patient care problems.
 - OBJ R1.3.3 (Comprehension) Explain the nature of mentoring in pharmacy, its potential connection with achievement, and the importance of being willing to serve as a mentor to appropriate individuals.
 - OBJ R1.3.4 (Comprehension) Explain the general processes of establishing and maintaining a pediatric pharmacy residency program.
 - OBJ R1.3.5 (Comprehension) Explain the benefits, to the practitioner and the profession, of contributing to the pediatric pharmacy literature.
- Goal R1.4 Communicate effectively.
 - OBJ R1.4.1 (Analysis) Use an understanding of effectiveness, efficiency, customary practice and the recipient's preferences to determine the appropriate type of, and medium and organization for, communication.
 - IO Accurately identify the primary theme or purpose of one's written or oral communication.*
 - IO Accurately determine what information will provide credible background to support or justify the primary theme of one's written or oral communication.*
 - IO Properly sequence ideas in written and oral communication.*
 - IO Accurately determine the depth of communication appropriate to one's audience.*
 - IO Accurately determine words and terms that are appropriate to one's audience.*
 - IO Accurately determine one's audience's needs.*

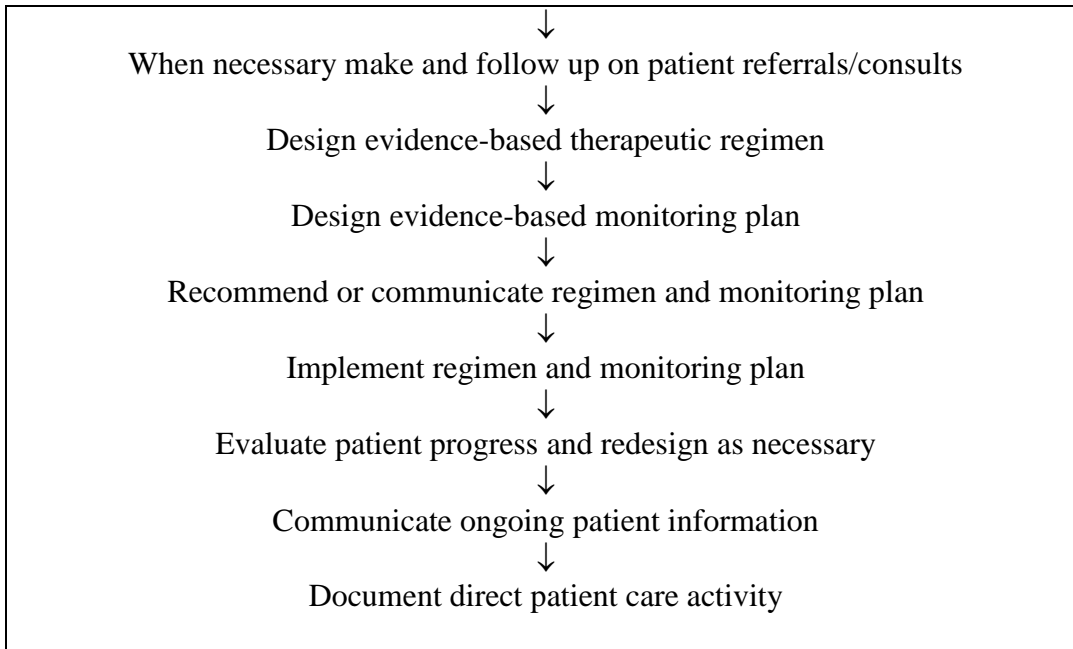
- IO Accurately identify the length of communication that is appropriate to the situation.
- IO Explain the importance of assessing the listener's understanding of the message conveyed.
- IO Explain techniques for persuasive communications.
- OBJ R1.4.2 (Complex Overt Response) Speak clearly, distinctly, and with correct grammar in the primary language of the practice site.
- OBJ R1.4.3 (Application) Use listening skills effectively in performing job functions.
 - IO Explain the use of body language in listening to others.
 - IO Explain verbal techniques that can be used to enhance listening to others.
- OBJ R1.4.4 (Application) Use correct grammar, punctuation, spelling, style, and formatting conventions in preparing all written communications.

Outcome R2: Optimize the care of inpatient and outpatient pediatric patients by providing evidence-based³, patient-centered medication therapy as an integral part of an interdisciplinary team.

(A residency in pediatric pharmacy is dependent upon the availability of a broad range of patient categories and professional practice experience. Therefore, core experiences in direct patient care must occur with both pediatric inpatients and outpatients. However, the outpatient learning experience may be conducted in the same clinic through the year even if it is focused on a specialty area or a narrow spectrum of disease states, such as pediatric endocrinology or pediatric asthma.)



³ Evidence-based medicine -- the integration of best research evidence, clinical expertise, and patient values in making decisions about the care of individual patients (Institute of medicine, 2001; Straus and Sackett, 1998). *Best research evidence* includes evidence that can be quantified, such as that from randomized controlled trials, laboratory experiments, clinical trials, epidemiological research, and outcomes research and evidence derived from the practice knowledge of experts, including inductive reasoning (Guyatt et al., Higgs et al., 2001). *Clinical expertise* is derived from the knowledge and experience developed over time from practice, including inductive reasoning. *Patient values and circumstances* are the unique preferences, concerns, expectations, financial resources, and social supports that are brought by each patient to a clinical encounter. (Institute of Medicine. Health professions education: a bridge to quality. Washington, DC: The National Academies Press; 2001.)



Goal R2.1 Establish collaborative professional relationships with members of the inpatient and outpatient pediatric interdisciplinary teams.

OBJ R2.1.1 (Synthesis) Implement a strategy that effectively establishes cooperative, collaborative, and communicative working relationships with members of the pediatric interdisciplinary team.

IO Explain the training and expected areas of expertise of the members of the pediatric interdisciplinary team with which one works.

IO For each of the professions with which one interacts on the pediatric interdisciplinary team, explain the profession's view of its role and responsibilities and their expectations of the pharmacist's role in collaborations on patient-centered care.

IO Explain the professional dynamics of the different services that contribute to the care of pediatric patients.

IO Identify the interpersonal dynamics of each member of the pediatric interdisciplinary team.

Goal R2.2 For a caseload of pediatric patients, prioritize the delivery of pharmaceutical care.

OBJ R2.2.1 (Evaluation) Devise a plan for determining the priority for care of pediatric patients if given limited time and multiple patient care responsibilities.

IO Explain factors to consider when determining priority for care among pediatric patients.

Goal R2.3 Establish collaborative pharmacist-patient and pharmacist-caregiver relationships.

OBJ R2.3.1 (Synthesis) Formulate a strategy that effectively establishes a patient-centered pharmacist-patient and a pharmacist-caregiver relationship.

IO Explain unique characteristics of pediatric patients that may influence pharmacist-patient and pharmacist-caregiver relationships.

IO Explain the importance of including in the strategy an explanation to the patient and/or caregiver of the pediatric pharmacist's role in his/her care.

- IO Explain problems associated with emotional attachments between health care professionals and patients.*
- IO Explain the impact of fear, anger, depression, loss, grief and their opposites on the pharmacist's approach to caring for pediatric patients.*
- IO Explain techniques for coping with the emotions generated by the abuse of children.*
- IO Explain the appropriate types of bonds between pharmacists and pediatric patients and their caregivers that can facilitate the pharmacist's capacity to fulfill balanced caring with clinical judgment.*
- IO Explain the view of diverse cultures and religions on the conceptualization of illness, treatment, and of death and dying.*
- IO Explain modifications to communication strategies that can be effective in working with children of varying ages.*
- IO Explain modifications to communication strategies that can be effective in working with the caregivers of pediatric patients.*

Goal R2.4 Collect and analyze patient information.

OBJ R2.4.1 (Analysis) Collect and organize all patient-specific information needed by the pediatric pharmacist to make appropriate evidence-based, patient-centered medication therapy recommendations as part of the pediatric interdisciplinary team. (See Appendix)

- IO Identify the types of patient-specific information the pharmacist requires to anticipate, prevent, detect, and/or resolve medication-related problems and to make appropriate evidence-based, patient-centered medication therapy recommendations for pediatric patients.*
- IO Explain each of the developmental stages of children.*
- IO Explain the normal rates and stages of growth from infancy through adolescence.*
- IO Explain signs and symptoms, epidemiology, risk factors, pathogenesis, natural history of disease, pathophysiology, clinical course, etiology, and treatment of diseases commonly encountered in pediatric patients.*
- IO Explain the mechanism of action, pharmacokinetics, pharmacodynamics, pharmacogenomics, pharmacoeconomics, usual regimen (dose, schedule, dosage form, route, and method of administration), indications, contraindications, interactions, adverse reactions, and therapeutics of medications commonly used to treat pediatric patients.*
- IO Explain age-related differences in pharmacokinetics, pharmacodynamics, usual regimen (dose, schedule, dosage form, route, and method of administration), indications, contraindications, adverse reactions, and therapeutics of medications commonly used to treat pediatric patients.*
- IO Compare and contrast the pharmacokinetics of drugs in adults and in various pediatric populations.*
- IO Explain age-related differences in nutritional needs of pediatric patients.*
- IO Explain methods for meeting the nutritional needs of pediatric patients at each stage of development.*
- IO Explain age-related differences in vital signs and their interpretation.*

- IO Explain modifications to standard procedures for measuring vital signs that may be required for various pediatric populations.*
- IO Explain age-related differences in the interpretation of common laboratory findings.*
- IO Explain common teratogenic effects of drug exposure in utero.*
- IO Explain the relative safety for the infant of the presence of various drugs in breast milk.*

OBJ R2.4.2 (Analysis) Determine the presence of any of the following medication therapy problems in the current medication therapy of a pediatric patient:

1. Medication used with no medical indication
2. Patient has medical conditions for which there is no medication prescribed
3. Medication prescribed inappropriately for a particular medical condition
4. Immunization regimen is incomplete
5. Current medication therapy regimen contains something inappropriate (dose, dosage form, duration, schedule, route of administration, method of administration)
6. There is therapeutic duplication
7. Medication to which the patient is allergic or sensitive to has been prescribed
8. There are adverse drug- or device-related events or potential for such events
9. There are clinically significant drug-drug, drug-disease, drug-food, or drug-laboratory test interactions or potential for such interactions
10. Medical therapy has been interfered with by social, recreational, nonprescription, complementary, or alternative drug use by the patient or others
11. Patient not receiving full benefit of prescribed medication therapy
12. There are problems arising from the financial impact of medication therapy on the patient or caregiver
13. Patient or caregiver lacks understanding of medication therapy
14. Patient or caregiver not adhering to medication regimen

IO Compare expectations of medication adherence and persistence of pediatric patients or their caregivers when patients are treated in the ambulatory versus inpatient environment.

IO Explain the necessity to consider the possibility of transfer of medications to the infant through breast milk.

IO Explain the necessity to consider the possibility of in utero exposure to medications.

IO Explain the importance of meeting age-appropriate nutritional needs.

OBJ R2.4.3 (Analysis) Using an organized collection of patient-specific information, summarize the health care needs of a pediatric patient.

IO Explain economic, social and environmental factors affecting the delivery of health care that should be considered when defining the health care needs of pediatric patients.

IO Explain the legal system for the protection of children and its impact on their health care.

- IO Explain the impact of pediatric patients' growth and development on changes in their health care needs.*
- Goal R2.5 When necessary, make and follow up on referrals/consults for pediatric patients.
- OBJ R2.5.1 (Evaluation) When presented with a pediatric patient with health care needs that cannot be met by the pharmacist, make a referral/consult to the appropriate health care provider based on the patient's acuity and the presenting problem.
- OBJ R2.5.2 (Synthesis) Devise a plan for follow-up for a referral/consult for a pediatric patient.
- Goal R2.6 Design evidence-based therapeutic regimens for pediatric patients.
- OBJ R2.6.1 (Synthesis) Specify therapeutic goals for a pediatric patient, incorporating the principles of evidence-based medicine that integrate patient-specific data, disease and medication-specific information, ethics, and quality-of-life considerations.
- IO Identify the sources of disease management and medication-use guidelines, consensus statements, and evidence-based meta-analyses currently used in pediatric practice.*
- IO Explain quality-of-life issues that may impact the setting of therapeutic goals for pediatric patients.*
- IO Explain ethical issues specific to setting therapeutic goals for pediatric patients.*
- OBJ R2.6.2 (Synthesis) Design a patient-centered regimen that meets the evidence-based therapeutic goals established for a pediatric patient; integrates patient-specific information, disease and drug information, ethical issues and quality-of-life issues; and considers pharmacoeconomic principles.
- IO Explain the challenge to the pediatric pharmacist of designing therapy in the absence of guidelines and supportive literature.*
- IO Explain additional concerns with availability, adherence, persistence, palatability, stability (especially with extemporaneous preparations), storage, cost, and route of administration to be considered when making decisions on medication regimens for pediatric patients treated in the inpatient versus ambulatory care environment.*
- IO Explain factors that affect the delivery of small-volume parenteral drug therapy to pediatric patients.*
- IO Explain how to calculate pediatric medication doses according to body weight, body surface area, or other standard methods preferred by the health care organization.*
- IO Explain how to modify the dosing regimen of a medication in pediatric patients with organ dysfunction.*
- IO Explain unique concerns for designing enteral and parenteral nutritional therapies for pediatric patients versus adults.*
- IO Explain the effect of dialysis on the disposition of medications in pediatric patients.*
- IO Explain the effect of extracorporeal membrane oxygenation on the disposition of medications in pediatric patients.*

- IO Explain the effect of continuous renal replacement therapy on the disposition of medications in pediatric patients.*
- Goal R2.7 Design evidence-based monitoring plans for pediatric patients.
- OBJ R2.7.1 (Synthesis) Design a patient-centered, evidence-based monitoring plan for a therapeutic regimen that effectively evaluates achievement of the therapeutic goals set for a pediatric patient.
- IO State standard monitoring parameters for therapeutic regimens commonly prescribed for pediatric patients.*
- IO Explain the relationship between the normal value ranges for parameters measured in pediatric patients and the influence of a disease state.*
- IO Explain psychosocial issues unique to pediatric patients and/or their caregivers that should be considered when designing a monitoring plan.*
- IO Explain the potential role of the patient's caregiver in the fulfillment of a monitoring plan.*
- Goal R2.8 Recommend or communicate regimens and monitoring plans for pediatric patients.
- OBJ R2.8.1 (Application) Recommend or communicate a patient-centered, evidence-based therapeutic regimen and corresponding monitoring plan to other members of the interdisciplinary team, caregivers, and, when appropriate, the pediatric patient, in a way that is age-appropriate, systematic, logical, accurate, timely, and sensitive.
- IO Explain the kinds of issues that require particular sensitivity when discussing treatment plans with pediatric patients and/or their caregivers.*
- Goal R2.9 Implement regimens and monitoring plans for pediatric patients.
- OBJ R2.9.1 (Application) When appropriate, initiate the patient-centered, evidence-based therapeutic regimen and monitoring plan for a pediatric patient according to the organization's policies and procedures.
- IO Explain the organization's policies and procedures for ordering inpatient and outpatient medications.*
- IO Explain the organization's policies and procedures for ordering tests.*
- OBJ R2.9.2 (Complex Overt Response) When appropriate, exercise skill in the administration or supervision of the administration of a pediatric patient's therapeutic regimen.
- IO Explain different devices used to deliver medications to various pediatric populations.*
- IO Explain unique aspects of administration of oral medications, eye drops, ear drops and suppositories in pediatric patients.*
- IO Explain how to perform intramuscular and subcutaneous injections.*
- IO Explain how to administer an intravenous medication.*
- IO Explain how to do an endotracheal administration of a medication.*
- IO Explain how to administer a medication through inhalation (e.g., nebulization, metered-dose inhalers).*
- IO Explain how to administer a medication through the intraosseous route.*
- IO Explain how to administer a medication through intrathecal, intraventricular, and epidural routes.*

- OBJ R2.9.3 (Application) When necessary, contribute to the work of the team that secures reimbursement for medications used in a regimen for a pediatric patient.
- IO Explain the general framework of patient assistance programs available for pediatric medications.*
 - IO Explain the pharmacist's role (versus other interdisciplinary team members) in securing payer coverage or patient assistance.*
 - IO Explain circumstances in which it may be appropriate to redesign a patient's medication regimen in order to ensure that a patient will have financially viable access to prescribed pediatric medications.*
 - IO Explain various approaches used to adjust medication regimens in order to facilitate patient access to pediatric medications.*
 - IO Explain organizational policies and procedures for securing compassionate use medications needed for an individual patient.*
- OBJ R2.9.4 (Synthesis) Use effective patient education techniques to provide medication-related counseling to a pediatric patient and the patient's caregiver(s).
- IO Explain the concept of readiness-to-learn and its implications for the timing of counseling for pediatric patients and their caregivers.*
 - IO Explain the types of patient and caregiver education required to facilitate self-care.*
 - IO Explain how to tailor patient education so that it is age appropriate.*
 - IO Identify resources for prepared materials designed for the education of pediatric patients and their caregivers.*
 - IO Explain issues unique to the counseling of pediatric patients and their caregivers.*
 - IO Explain differences in issues with adherence and persistence between adult and pediatric patients.*
 - IO Explain lay terms that can successfully be used when counseling pediatric patients and their caregivers regarding complex medication-related issues.*
- Goal R2.10 Evaluate the progress of pediatric patients and redesign regimens and monitoring plans.
- OBJ R2.10.1 (Evaluation) Accurately assess progress toward the therapeutic goal(s) of a pediatric patient.
 - OBJ R2.10.2 (Application) Ensure that accurate and timely medication-specific information regarding a specific pediatric patient reaches those who need it at the appropriate time.
 - OBJ R2.10.3 (Synthesis) Redesign the regimen and monitoring plan of a pediatric patient as necessary based on evaluation of monitoring data and therapeutic outcomes.
- Goal R2.11 Communicate ongoing patient information to facilitate continuity of care.
- OBJ R2.11.1 (Synthesis) Formulate a strategy for continuity of pharmaceutical care across all applicable treatment settings.
 - IO Explain potential problems that may place pediatric patients at risk in various treatment settings (e.g., hospital, clinic, home) or upon change in level of care.*

- IO Explain accrediting organizations' requirements for medication reconciliation across the continuum of care.*
- IO Explain methods for coordinating information between multiple pharmacy and other health care workers serving the needs of pediatric patients that will facilitate the provision of pharmaceutical care.*
- IO Explain methods for assuring continuity of pharmaceutical care across all treatment settings used by a specific patient.*
- IO Explain continuity of care issues that may arise when unique pharmaceutical formulations used in the acute care setting will also be used by the patient in an alternate care setting.*
- OBJ R2.11.2 (Application) When given a pediatric patient who is transitioning from one health care setting to another, communicate pertinent pharmacotherapeutic information to the receiving health care professionals.
- Goal R2.12 Document direct patient care activities appropriately.
 - OBJ R2.12.1 (Analysis) Appropriately select direct patient care activities for pediatric patients for documentation.
 - IO Explain the organization's policies and procedures for identifying activities that must be documented.*
 - OBJ R2.12.2 (Application) Use effective communication practices when documenting a direct patient-care activity for a pediatric patient.
 - IO Explain the organization's policies and procedures for documenting direct patient care activities.*

Outcome R3: Serve as an authoritative resource on the optimal use of medications used to treat pediatric patients.

- Goal R3.1 Establish oneself as an organizational expert for pediatric pharmacy-related information and resources.
 - OBJ R3.1.1 (Synthesis) Implement a successful strategy for earning credibility within the organization to be an authoritative resource on the pharmaceutical care of pediatric patients.
 - IO Identify barriers for the pediatric pharmacist to earning credibility with members of the interdisciplinary pediatric team.*
 - IO Identify barriers for the pediatric pharmacist to earning credibility within the organization.*
- Goal R3.2 Contribute the pediatric pharmacist's perspective to technology and automation systems decisions.
 - OBJ R3.2.1 (Synthesis) When appropriate, contribute to the organization's design of its technology and automation systems.
 - IO Explain the pediatric pharmacist's role in contributing to the design of technology systems (e.g., CPOE, PDAs, software, smart pumps) for the organization.*
 - IO Explain the pediatric pharmacist's role in contributing to decisions regarding automation systems.*
 - OBJ R3.2.2 (Synthesis) When appropriate, contribute to the organization's implementation of its technology and automation systems.

- IO Explain factors to consider when implementing technology and automation systems in the pediatric setting.*
- OBJ R3.2.3 (Synthesis) When appropriate, contribute to the organization's maintenance of its technology and automation systems.
 - IO Explain the importance of ongoing evaluation of the organization's technology and automation systems.*
 - IO Explain the pediatric pharmacist's role in contributing to the maintenance of technology systems for the organization.*
 - IO Explain the pediatric pharmacist's role in contributing to the maintenance of the organization's automation systems.*
- Goal R3.3 Select core biomedical literature resources appropriate for pediatric pharmacy practice.
 - OBJ R3.3.1 (Application) Use knowledge of standard resources to select core primary, secondary, and tertiary biomedical literature resources appropriate for pediatric pharmacy practice.
 - IO State sources of primary, secondary, and tertiary pediatric biomedical literature.*
 - IO Compare the characteristics of each of the available resources.*
- Goal R3.4 Provide concise, applicable, comprehensive, and timely responses to requests for drug information pertaining to the care of pediatric patients.
 - OBJ R3.4.1 (Analysis) Discriminate between the requester's stated drug information question and the appropriate drug information need(s) by investigating the clinical situation and obtaining appropriate additional information.
 - OBJ R3.4.2 (Synthesis) Formulate a systematic, efficient, and thorough procedure for retrieving pediatric drug information.
 - OBJ R3.4.3 (Analysis) Determine from all retrieved biomedical literature the appropriate information to evaluate.
 - OBJ R3.4.4 (Evaluation) Evaluate the usefulness of biomedical literature gathered.
 - IO Explain scarcity of studies and subjects as causes for the frequent necessity to consider the clinical usefulness of less comprehensive studies when evaluating literature for pediatric patients.*
 - OBJ R3.4.5 (Evaluation) Determine whether a study's conclusions are supported by the study results.
 - OBJ R3.4.6 (Synthesis) Formulate responses to a drug information request based on analysis of the literature.
 - OBJ R3.4.7 (Synthesis) Provide appropriate responses to drug information questions that require the pediatric pharmacist to draw upon his or her knowledge base.
 - OBJ R3.4.8 (Evaluation) Assess the effectiveness of drug information recommendations.
 - IO Explain all factors that must be assessed to determine the effectiveness of a response.*
- Goal R3.5 Contribute to publishing periodic newsletters or bulletins for health care providers on timely medication-related matters and medication policies.
 - OBJ R3.5.1 (Synthesis) Write an article for a newsletter or bulletin addressing either a medication or a medication policy affecting pediatric patients.

- Goal R3.6 Assist the organization in achieving compliance with accreditation, legal, regulatory, and safety requirements related to the use of medications used in the care of pediatric patients (e.g., The Joint Commission requirements; ASHP standards, statements, and guidelines; state and federal laws regulating pharmacy practice; OSHA regulations).
- OBJ R3.6.1 (Evaluation) Determine appropriate activities and documentation to meet accreditation, legal, regulatory, and safety requirements in the area of pediatric pharmacy.
- IO Explain the influence of accreditation, legal, regulatory, and safety requirements on pediatric pharmacy practice.*
- Goal R3.7 Contribute to the management of pediatric medical emergencies.
- OBJ 3.7.1 (Synthesis) Exercise skill as a team member in the management of a pediatric medical emergency according to the organization's policies and procedures.
- IO Explain appropriate medication therapy in pediatric medical emergency situations.*
- IO Explain unique considerations when preparing and dispensing medications and calculating doses during a pediatric medical emergency.*
- OBJ R3.7.2 (Complex Overt Response) When administration is allowed by the organization, exercise skill in the administration of emergency medications for a pediatric patient.
- Goal R3.8 Understand the role of the pediatric pharmacist in public health initiatives affecting children.
- OBJ R3.8.1 (Comprehension) Explain the pediatric pharmacist's role in the development of emergency protocols for public health disasters (e.g., natural disaster, bioterrorism, epidemic).
- OBJ R3.8.2 (Comprehension) Explain the role of the pediatric pharmacist in advocacy for vaccination.
- IO Explain the importance of vaccination in the prevention and control of the spread of infectious diseases.*
- IO Explain how to secure credentials for administering vaccinations.*

Outcome R4: Evaluate, manage, and improve the medication-use process in pediatric patient care areas.

- Goal R4.1 Prepare and dispense medications for pediatric patients following existing standards of practice and the organization's policies and procedures.
- OBJ R4.1.1 (Evaluation) Interpret the appropriateness of a pediatric patient's medication order before preparing or permitting the distribution of the first dose.
- OBJ R4.1.2 (Application) Follow the organization's policies and procedures to maintain the accuracy of the patient's medication profile.
- OBJ R4.1.3 (Application) Prepare a pediatric patient's medications following appropriate standards of practice and the organization's policies and procedures.
- IO Explain the necessity for pediatric pharmacists' insistence on safety and quality control for pediatric medications.*
- IO Explain standards of practice for the preparation of pediatric medications.*

- IO Explain standards for evaluating appropriate concentrations, rate, compatibilities, stability, and storage of parenteral solutions prepared for use in the care of pediatric patients.*
 - IO Explain strategies for preparing extemporaneously compounded medications to produce the desired end products for pediatric patients.*
- OBJ R4.1.4 (Application) Dispense medications for a pediatric patient following the organization's policies and procedures.
- Goal R4.2 Contribute to the maintenance of the organization's formulary for medications used in the care of pediatric patients.
 - OBJ R4.2.1 (Evaluation) Make a recommendation for an addition or deletion to the organization's formulary for medications used in the care of pediatric patients based on literature and/or comparative reviews.
 - IO State the elements of a comparative review.*
 - IO State sources to consult in the preparation of a comparative review for medications used in the care of pediatric patients.*
 - IO Explain the importance of including consideration of efficacy, safety, and cost in the preparation of reviews.*
 - OBJ R4.2.2 (Synthesis) Formulate effective strategies for communicating formulary restrictions to providers.
 - IO Explain routes of communication of formulary information in the pediatric setting.*
 - IO Identify instances when formulary changes should be communicated immediately.*
 - OBJ R4.2.3 (Evaluation) When presented with a real or hypothetical drug shortage, identify appropriate alternative medications.
 - IO State resources for identifying medications in short supply.*
 - IO Explain the organization's system for communicating information regarding drug shortages.*
 - IO Explain a strategy for making optimal choices for alternative medications.*
 - OBJ R4.2.4 (Evaluation) When the needs of a particular patient warrant, determine if a non-formulary medication should be considered for therapy.
 - IO Identify the appropriate literature that supports the use of a non-formulary medication in a clinical situation.*
 - IO Explain the organization's system for approving, obtaining, and handling non-formulary medication used by patients.*
- Goal R4.3 Contribute to the review of existing, development of new, and implementation of the organization's policies and procedures affecting the care of pediatric patients.
 - OBJ R4.3.1 (Synthesis) Contribute to the work of an organizational committee or work group concerned with the improvement of medication-use policies and procedures that affect the care of pediatric patients.
- Goal R4.4 Contribute to the review of existing, development of new, and implementation of the organization's evidence-based medication-related guidelines for the care of pediatric patients.
 - OBJ R4.4.1 (Analysis) Identify the need for an evidence-based medication-related guideline for the care of pediatric patients by comparing the applicability of

existing organizational or published guidelines to the needs of your own organization.

IO Explain the impact of the lack of scientific studies evaluating the safety and efficacy of medications in children on the pediatric pharmacist's strategy for providing evidence-based care.

OBJ R4.4.2 (Synthesis) Contribute to the development of a medication-related guideline for the care of pediatric patients based on best available evidence and the characteristics of the local environment and patients.

IO Explain how level of evidence is determined.

OBJ R4.4.3 (Synthesis) Contribute to the formulation of a strategy that will successfully implement a medication-related guideline for the care of pediatric patients.

IO Explain the importance of including pharmacy, nursing, and medical services in the design of an implementation strategy.

OBJ R4.4.4 (Evaluation) Assess the results of implementing a medication-related guideline for the care of pediatric patients.

Goal R4.5 Identify opportunities for improvement of the safety of aspects of the organization's medication-use system affecting pediatric patients.

OBJ R4.5.1 (Analysis) When applicable, contribute to a root cause analysis (RCA) of a medication error occurring in a pediatric patient.

OBJ R4.5.2 (Analysis) When applicable, contribute to a failure mode and effect analysis (FMEA) of a proposed new medication-use process affecting the care of pediatric patients.

OBJ R4.5.3 (Application) Participate in the organization's system for reporting medication errors and adverse drug reactions.

Outcome R5: Demonstrate excellence in the provision of training or educational activities for pediatric health care professionals, health care professionals in training, and the public.

Goal R5.1 Provide effective education and/or training to health care professionals and health care professionals in training.

OBJ R5.1.1 (Synthesis) Use effective educational techniques in the design of an educational/training activity.

IO Identify emerging issues in pediatric pharmacy that would be suitable for interdisciplinary educational sessions.

IO Explain the differences in effective educational strategies when teaching colleagues versus residents versus students versus health professionals in other disciplines.

IO Design instruction that meets the individual learner's needs.

IO Explain the concept of learning styles and its influence on the design of instruction.

IO Write appropriately worded educational objectives.

IO Explain the match between instructional delivery systems (e.g., demonstration, written materials, video) and the specific types of learning each facilitates.

- IO* Design instruction that employs strategies, methods, and techniques congruent with the objectives for education or training.
- IO* Explain effective teaching approaches for the various types of learning (e.g., imparting information, teaching psychomotor skills, inculcation of new attitudes).
- OBJ R5.1.2 (Synthesis) Design an assessment strategy that appropriately measures the specified objectives for education or training and fits the learning situation.
 - IO* Explain appropriate assessment techniques for assessing the learning outcomes of educational or training programs.
- OBJ R5.1.3 (Application) Use skill in the four preceptor roles employed in practice-based teaching (direct instruction, modeling, coaching, and facilitation).
 - IO* Explain the stages of learning that are associated with each of the preceptor roles.
- OBJ R5.1.4 (Application) Use skill in case-based teaching.
 - IO* Explain the importance of identifying the key teaching points for a case before attempting to construct it.
 - IO* Explain factors to consider when deciding the patient data to present in a case.
- OBJ R5.1.5 (Application) Use public speaking skills to speak effectively to a large group.
 - IO* Explain techniques that can be used to enhance audience interest.
 - IO* Explain techniques that can be used to enhance audience understanding of one's topic.
 - IO* Explain speaker habits that distract the audience.
- OBJ R5.1.6 (Application) Use public speaking skills to speak effectively in a small group.
- Goal R5.2 Design and deliver education programs to the public that center on pediatric health improvement, wellness, and disease prevention.
 - OBJ R5.2.1 (Synthesis) Contribute to the design of an educational program for the public that centers on pediatric health improvement, wellness, or disease prevention.
 - IO* Explain appropriate educational topics for pediatric support groups.
 - IO* Explain appropriate educational topics for the general public that center on pediatrics.
 - OBJ R5.2.2 (Synthesis) Use appropriate educational techniques to deliver an educational program to the public that centers on pediatric health improvement, wellness, or disease prevention.

Outcome R6: Conduct pediatric pharmacy research.

- Goal R6.1 Conduct a pediatric pharmacy research project using effective research and project management skills.
 - OBJ R6.1.1 (Synthesis) Identify a topic of significance for a pediatric pharmacy research project.
 - IO* Explain the types of resident projects (e.g., prospective, retrospective, clinical trials) that will meet residency program project requirements and timeframe.

- IO Explain how one determines if a potential project topic is of significance in one's particular practice setting.*
- IO Explain how to conduct an efficient and effective pediatric literature search for the background analysis.*
- IO Explain how to generate a research question(s) to be answered by an investigation.*
- OBJ R6.1.2 (Synthesis) Formulate a feasible design for a pediatric pharmacy research project.
 - IO Explain the elements of a project proposal.*
 - IO Explain how to identify those health care personnel who will be affected by the conduct of the project and strategies for gaining their cooperation.*
 - IO Explain how to determine a timeline with suitable milestones that will result in project completion by an agreed upon date.*
 - IO Explain factors unique to the conduct of research in pediatric patients.*
 - IO Explain the ethics of research on pediatric subjects and the role of the IRB.*
 - IO Explain the difference between consent and assent.*
 - IO Explain various methods for constructing data collection tools.*
- OBJ R6.1.3 (Synthesis) Secure any necessary approvals, including IRB, for a pediatric pharmacy research project.
 - IO Explain how to identify those stakeholders who must approve a particular project.*
 - IO Explain the components that make up a budget for a project.*
 - IO Explain strategies for seeking funding for a research project.*
 - IO Explain the role of the IRB in the approval process.*
- OBJ R6.1.4 (Synthesis) Implement a pediatric pharmacy research project as specified in its design.
 - IO Explain strategies for keeping one's work on a project at a pace that matches with the projected timeline.*
 - IO When given a particular approved residency project, explain methods for organizing and maintaining project materials and documentation of the project's ongoing implementation.*
 - IO Explain methods for data analysis.*
 - IO Explain issues surrounding confidentiality of patient information accessed for a research study.*
- OBJ R6.1.5 (Synthesis) Effectively present the results of a pediatric pharmacy research project.
- OBJ R6.1.6 (Synthesis) Use correct grammar, punctuation, spelling, style, and formatting conventions to prepare a written manuscript describing a pediatric pharmacy research project.
 - IO When given a particular residency project ready for presentation, explain the type of manuscript style appropriate to the project and criteria to be met when using that style.*

<p style="text-align: center;">Elective Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Pediatrics</p>
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Outcome E1: Demonstrate added skills for functioning effectively in the pediatric pharmacy practice environment.

- Goal E1.1 Develop a proposal for a new pediatric pharmacy-related service.
 - OBJ E1.1.1 (Synthesis) Write a proposal for a pediatric pharmacy-related service that meets a perceived need of the health system and its patients.
- Goal E1.2 Contribute to the maintenance of the organization's formulary for medications used in the care of pediatric patients.
 - OBJ E1.2.1 (Evaluation) Make recommendations for drug class decisions affecting the care of pediatric patients based on comparative reviews.
- Goal E1.3 Demonstrate additional skills in the management of pediatric medical emergencies.
 - OBJ E1.3.1 (Synthesis) Acquire pediatric advanced life support (PALS) certification.
- Goal E1.4 Contribute to the presentation and publication of pediatric pharmacy research.
 - OBJ E1.4.1 (Synthesis) Design an effective poster for the presentation of a specific topic.
 - IO Explain the types of content that should be included in a poster.*
 - IO Explain the rules for visual presentation of poster material.*
 - IO Explain resources that can be used to generate poster materials.*
 - OBJ E1.4.2 (Synthesis) Exercise skill in responding to questions occurring during the presentation of a poster.
 - OBJ E1.4.3 (Application) Follow the submission requirements of an appropriate peer-reviewed publication to submit the completed project for publication.
 - OBJ E1.4.4 (Evaluation) Contribute to the peer review of a pediatric pharmacy professional's article submitted for publication or presentation.
 - IO Explain sources of information on the components of a peer review.*

Outcome E2: Conduct outcomes research.

- Goal E2.1 Contribute to pediatric clinical, humanistic and economic outcomes analyses.
 - OBJ E2.1.1 (Evaluation) Contribute to a pediatric prospective clinical, humanistic and/or economic outcomes analysis.
 - IO Explain the principles and methodology of basic pharmacoeconomic analyses.*
 - IO Explain the purpose of a prospective clinical, humanistic or economic outcomes analysis.*
 - IO Explain study designs appropriate for a prospective clinical, humanistic and economic outcomes analysis.*
 - IO Explain the technique and application of modeling.*
 - IO Explain the types of data that must be collected in a prospective clinical, humanistic and economic outcomes analysis.*
 - IO Explain possible reliable sources of data for a clinical, humanistic and economic outcomes analysis.*

- IO Explain methods for analyzing data in a prospective clinical, humanistic and economic outcomes analysis.*
- IO Explain how results of a prospective clinical, humanistic and economic outcomes analysis can be applied to internal business decisions and modifications to a customer's formulary or benefit design.*
- OBJ E2.1.2 (Evaluation) Contribute to a pediatric retrospective clinical, humanistic, and/or economic outcomes analysis.
 - IO Explain the purpose of a retrospective clinical, humanistic or economic outcomes analysis.*
 - IO Explain study designs appropriate for a retrospective clinical, humanistic and economic outcomes analysis.*
 - IO Explain the types of data that must be collected in a retrospective clinical, humanistic and economic outcomes analysis.*
 - IO Explain the content and utilization of reports and audits produced by the pharmacy department.*
 - IO Explain possible reliable sources of data for a retrospective clinical, humanistic and economic outcomes analysis.*
 - IO Explain methods for analyzing data in a retrospective clinical, humanistic and economic outcomes analysis.*
 - IO Explain the impact of limitations of retrospective data on the interpretation of results.*
 - IO Explain how results of a retrospective clinical, humanistic and economic outcomes analysis can be applied to internal business decisions and modifications to a customer's formulary or benefit design.*

Outcome E3: Demonstrate skills required to function in an academic setting.

- Goal E3.1 Understand faculty roles and responsibilities.
 - OBJ E3.1.1 (Comprehension) Explain variations in the expectations of different colleges/schools of pharmacy for teaching, practice, research, and service.
 - IO Discuss how the different missions of public versus private colleges/schools of pharmacy can impact the role of faculty members.*
 - IO Discuss maintaining a balance between teaching, practice, research and service.*
 - IO Discuss the relationships between scholarly activity and teaching, practice, research and service.*
 - OBJ E3.1.2 (Analysis) Explain the role and influence of faculty in the academic environment.
 - IO Explain the responsibilities of faculty in governance structure (e.g. the faculty senate, committee service).*
 - IO Describe the responsibilities of faculty (e.g. curriculum development and committee service) related to teaching, practice, research, and service roles.*
 - OBJ E3.1.3 (Comprehension) Describe the academic environment.
 - IO Describe how the decisions by university and college administration impact the faculty.*

- IO* Discuss outside forces (e.g. change in the profession, funding source, accreditation requirements) that impact administrator and faculty roles.
- OBJ E3.1.4 (Comprehension) Describe the types and ranks of faculty appointments.
 - IO* Explain the various types of appointments (e.g. non-tenure, tenure-track, and tenured faculty).
 - IO* Differentiate among the various ranks of faculty (e.g. instructor, assistant professor, associate professor, full professor).
 - IO* Discuss the role and implications of part-time and adjunct faculty as schools continue to expand and faculty shortages occur.
- OBJ E3.1.5 (Comprehension) Discuss the promotion and/or tenure process for each type of appointment.
 - IO* Identify the types of activities that are considered in the promotion process.
 - IO* Identify the types of activities that are considered for tenure.
- OBJ E3.1.6 (Application) Identify resources available to help develop academic skills.
 - IO* Explain the role of academic-related professional organizations (e.g. AACCP) in faculty professional development.
 - IO* Identify resources to help develop teaching skills and a teaching philosophy.
- OBJ E3.1.7 (Comprehension) Explain the characteristics of a typical affiliation agreement between a college of pharmacy and a practice site (e.g., health system, hospital, clinic, retail pharmacy).
 - IO* Explain how the political environments of either a college or a practice site may affect the other.
- Goal E3.2 Exercise teaching skills essential to pharmacy faculty.
 - OBJ E3.2.1 (Synthesis) Develop an instructional design for a class session, module, or course.
 - IO* Construct a student-centered syllabus.
 - IO* Construct educational objectives for a class session, module, or course that is appropriate to the audience.
 - IO* Identify appropriate instructional strategies for the class session, module, or course to achieve the objectives.
 - IO* Consider assessment tools that measure student achievement of the educational objectives.
 - OBJ E3.2.2 (Synthesis) Prepare and deliver didactic instruction on a topic relevant to the specialized area of pharmacy residency training.
 - IO* Identify educational technology that could be used for a class session, module, or course (e.g., streaming media, course management software, audience response systems).
 - IO* Create instructional materials appropriate for the topic and audience.
 - IO* Identify strategies to deal with difficult learners.
 - IO* Given feedback from teaching evaluations (e.g. student and or peer), devise a plan to incorporate improvements in future instruction.
 - OBJ E3.2.3 (Application) Develop and deliver cases for workshops and/or exercises for laboratory experiences.

- IO Identify the appropriate level of case-based teachings for small group instruction.*
- IO Identify appropriate exercises for laboratory experiences.*
- IO Provide appropriate and timely feedback to improve performance.*
- OBJ E3.2.4 (Application) Serve as a preceptor or co-preceptor utilizing the four roles employed in practice-based teaching (direct instruction, modeling, coaching and facilitation).
 - IO Assess the learner's skill level to determine the appropriate preceptor strategy for providing practice-based teaching.*
 - IO Given performance-based criteria, identify ways to provide constructive feedback to learners.*
 - IO Develop strategies to promote professional behavior.*
 - IO Identify strategies to deal with difficult learners in the practice setting.*
 - IO Given a diverse learner population, identify strategies to interact with all groups with equity and respect.*
- OBJ E3.2.5 (Analysis) Develop a teaching experience for a practice setting (e.g., introductory or advanced pharmacy experience).
 - IO Create educational goals and objectives to be achieved.*
 - IO Develop activities that will allow achievement of identified educational goals and objectives.*
 - IO Identify how and when feedback should be provided.*
 - IO Identify other preceptors for the experience, if appropriate.*
 - IO Determine training that might be needed for the preceptors to deliver student education.*
 - IO Identify potential challenges of precepting and providing patient care services simultaneously.*
- OBJ E3.2.6 (Synthesis) Design an assessment strategy that appropriately measures the specified educational objectives for the class session, module, course, or rotation.
 - IO Identify appropriate techniques for assessing learning outcomes in various educational settings [e.g., written examinations, oral examinations, practical examinations, Objective Structured Clinical Examination (OSCE)].*
 - IO Develop examination questions to assess the knowledge, skills, attitudes and behaviors that are appropriate to the learner's level and topic.*
 - IO Discuss the various methods for administering examination questions (e.g., computerized testing, paper testing).*
- OBJ E3.2.7 (Evaluation) Create a teaching portfolio.
 - IO Define the concept of a teaching portfolio and describe its primary purpose*
 - IO Outline the steps in building a teaching portfolio.*
 - IO Develop a personal teaching philosophy to guide one's teaching efforts and facilitate student learning.*
- OBJ E3.2.8 (Evaluation) Compare and contrast methods to prevent and respond to academic and profession dishonesty.
 - IO Evaluate physical and attitudinal methods to prevent academic dishonesty.*
 - IO Discuss methods of responding to incidents of academic dishonesty.*

- IO Discuss the role of academic honor committees in cases of academic dishonesty.*
 - IO Identify examples and methods to address unprofessional behavior in learners.*
- OBJ E3.2.9 (Comprehension) Explain the relevance of copyright laws to developing teaching materials.
- IO Discuss copyright regulations as related to reproducing materials for teaching purposes.*
 - IO Discuss copyright regulations as related to linking and citing on-line materials.*

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The effective date for implementation of these educational outcomes, goals and objectives is commencing with the entering resident class of 2009.

Appendix

The resident will explain signs and symptoms, epidemiology, risk factors, pathogenesis, natural history of disease, pathophysiology, clinical course, etiology, and treatment of diseases and conditions listed below.

The resident will explain the mechanism of action, pharmacokinetics, pharmacodynamics, pharmacogenomics, pharmacoeconomics, usual regimen (dose, schedule, form, route, and method of administration), indications, contraindications, interactions, adverse reactions, and therapeutics of medications and non-traditional therapies, where relevant, that are applicable to the diseases and conditions listed below.

Cardiovascular

- Arrhythmias
- Congestive heart failure
- Kawasaki disease
- Hemolytic uremic syndrome
- Hypertension
- Rheumatic heart disease
- Shock

Collagen Vascular Disease

- Juvenile rheumatoid arthritis
- Lupus

Endocrine

- Adrenocortical insufficiency
- Diabetes insipidus
- Diabetes mellitus – Type 1 and Type 2
- Growth hormone deficiency
- Inborn errors of metabolism
- Rickets
- SIADH
- Thyroid disease

Fluid and Electrolyte Disorders

- Acid/base disorders
- Dehydration

Gastrointestinal

- Appendicitis
- Chronic diarrhea
- Constipation
- Gastroesophageal reflux
- Hemorrhage

Inflammatory bowel syndrome
Nausea/vomiting
Short bowel syndrome
Ulcers

Hematology

Anemia
DIC
Hemophilia
ITP
Sickle cell disease

Infectious disease

AIDS/HIV
Catheter sepsis
Cellulitis
Conjunctivitis
Croup
Diarrhea
Endocarditis
Epiglottitis
Fever
Fungal infections
Immunocompromised host
Impetigo
Meningitis
Osteomyelitis
Otitis media
Parasitic infections
Pneumonia
Sepsis
Septic arthritis
Sexually transmitted diseases
Shunt infections
Strep throat
Tuberculosis
Urinary tract infection
Viral encephalitis
Respiratory syncytial virus

Liver Disease

Cholestatic jaundice
Hepatitis
Liver failure

Neonatology

- Apnea with bradycardia
- Bronchopulmonary dysplasia
- Congenital heart disease
- Intraventricular hemorrhage
- Necrotizing Enterocolitis
- Hyperglycemia
- Hypoglycemia
- Ophthalmia neonatorum
- Patent ductus arteriosus
- Persistent pulmonary hypertension
- Respiratory distress syndrome
- Retinopathy of prematurity
- Seizures
- Sepsis

Nephrology

- Interstitial nephritis
- Renal failure
- Renal tubular acidosis

Neurology

- Attention deficit disorder
- Febrile convulsions
- Headache
- Head trauma
- Intracranial hypertension
- Seizures
- Status epilepticus

Obstetric problems

- Diabetes

Oncology

- CNS malignancies
- Hemangioma
- Hodgkin's disease
- Leukemia
- Lymphoma
- Neuroblastoma
- Osteosarcoma
- Retinoblastoma
- Rhabdomyosarcoma

Psychosocial

Depression
Enuresis

Pulmonary

Acute respiratory distress syndrome
Asthma
Bronchiolitis
Cystic fibrosis
Near drowning
Status asthmaticus

The resident will be knowledgeable in the following topics as they relate to pediatric patients:

Antibiotic prophylaxis
Anticoagulation
Continuous renal replacement therapy
Drug abuse
Drug dosing in hepatic impairment
Drug dosing in renal impairment
Drugs in breast milk
Drugs in pregnancy
Enteral nutrition
 infant formulas
 nutritional supplements
Immunizations
Induction of labor
Infants of diabetic mothers
Infants of drug abusers
Intrauterine infections
Maintenance fluids
Oncologic emergencies
Oral rehydration
Pain management
Parenteral nutrition (neonates, infants, children)
Pharmacokinetics (general and developmental/age-related differences)
Pre-eclampsia/eclampsia
Premature labor
Premature rupture of membranes
Prenatal care/nutrition
Sedation and analgesia

Appendix F-2

ACCP Guidelines for Clinical Research Fellowship Training Programs

ACCP Guidelines for Clinical Research Fellowship Training Programs

Definition

A research fellowship is a directed, highly individualized, postgraduate training program designed to prepare the participant to function as an independent investigator.

Introduction

The purpose of fellowship training programs is to develop competency and expertise in the scientific research process, including hypothesis generation and development, study design, protocol development, grantsmanship, study coordination, data collection, analysis, and interpretation, technical skills development, presentation of results, and manuscript preparation and publication. A fellowship candidate is expected to possess appropriate practice skills relevant to the knowledge area of the fellowship. Such skills may be obtained through prior practice experience or completion of a residency program.

Under the close direction, instruction and supervision of a qualified investigator-preceptor, the fellow receives a highly individualized learning experience, utilizing the fellow's research interests and knowledge needs as a focus for his/her education and training. Fellowships are typically offered through schools/colleges of pharmacy, academic health centers, the pharmaceutical industry, and/or specialized care institutions. A fellowship graduate should be capable of conducting independent and collaborative research and functioning as principal investigator.

Training Program Requirements

1. A minimum of 3,000 hours of the fellowship training time should be devoted to research-related activities over a minimum period of two years.
2. Administrative institutional support for the preceptor's research program and the fellowship training program.
3. Availability of advanced educational opportunities (e.g., graduate level coursework) in research-related topics. Such coursework may include, but is not limited to, courses in research design and methods, biostatistics, ethical issues, pharmacokinetics, pharmacodynamics, pharmacoeconomics, and others as appropriate to the specific fellow and program.
4. Availability of appropriate facilities (e.g., laboratory and/or clinical) to conduct research.
5. Availability of qualified personnel to teach clinical, laboratory, and/or computer technology-based research skills.
6. Ready access to scientific literature and computer facilities.

Preceptor Qualifications

1. A clinical scientist with an established and on-going record of independent research accomplishments and expertise in the area of specialization related to the fellowship, which may be exemplified by:
 - a. fellowship training, a graduate degree, and/or equivalent experience;
 - b. principal or primary investigator on research grants and/or projects; and
 - c. published research papers in peer-reviewed scientific literature on which the preceptor is the primary or senior author.
2. Active collaborative research relationships with other scientists.

Fellowship Applicant Criteria

1. Masters or doctoral degree in a health science discipline required
2. Residency or equivalent clinical experience preferred.
3. Demonstrated interest in or an aptitude for a career in research.

Fellowship Experiences

Ideally, a research fellow should initiate and complete at least one original research project. However, it is recognized that this may not be possible in every case. Whether through the completion of one project from start to finish or through participation in multiple projects, the fellow should obtain extensive experience in:

1. Development of at least one scientific hypothesis
2. Development of experimental methods to test the developed hypothesis.
3. Preparation of a protocol and submission of the protocol to the appropriate institutional review committee.
4. Grantsmanship, including identification of appropriate funding sources for specific projects and the preparation and submission of a grant for extramural funding consideration.
5. Study design and coordination and data collection.
6. Statistical analysis of data.
7. Data analysis and interpretation
8. Development of clinical, laboratory, and/or computer-based research skills as appropriate to the specific training program
9. Abstract preparation and submission
10. Presentation of research at peer-reviewed scientific meetings
11. Manuscript preparation and submission for publication in peer-reviewed journals.
12. Participation in journal clubs, research workshops, and/or seminar series.
13. Instruction in biomedical science ethics.

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Appendix G-1

Pediatric Pharmacy Bibliography

Pediatric Pharmacy Practice Bibliography

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Appendix G-2

Selected Pediatric Pharmacy Literature

ORIGINAL ARTICLE

A Clinical Pharmacist's Role in Screening for Metabolic Syndrome in a Rural Pediatric Ambulatory Clinic

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Metabolic syndrome is a constellation of metabolic and cardiovascular risk factors including obesity, elevated blood pressure, dyslipidemias, and impaired glucose tolerance. Epidemiological data have shown an increase in metabolic syndrome in childhood presumably due to the epidemic of childhood obesity.¹ Studies have also shown metabolic syndrome in children extending into adulthood.^{2,3} Therefore, identification of metabolic syndrome and its component early in children and before the manifestation of diseases such as diabetes, hyper-

tension, and dyslipidemia is necessary to initiate preventative and treatment strategies. However, in clinical practice, barriers exist in the timely identification and diagnosis of metabolic syndrome in pediatric patients due to lack of a consensus of a definition for metabolic syndrome in this population and pediatrician time constraints. In rural settings, particularly in underserved areas, identification of metabolic syndrome in children may be more deficient due to the unavailability of health care professionals.

Abstract

Purpose: The prevalence of metabolic syndrome in the pediatric population is increasing. Barriers, including the lack of consensus of a definition for metabolic syndrome and time constraints for the pediatrician, may limit the identification and diagnosis of metabolic syndrome in children. The objective of this pilot study was to evaluate the role of a clinical pharmacist (CP) in screening children and adolescents for metabolic syndrome.

Methods: A 3-month, prospective, cross-sectional study aimed at utilizing a CP to identify metabolic syndrome in high-risk children, ages 10-18 years, in a pediatric ambulatory clinic located in a rural community health center was conducted. Upon enrollment a personal and family medical history was obtained, physical examination was reviewed, and a fasting laboratory analysis was performed. The CP evaluated each component of metabolic syndrome to determine if the participant met criteria for diagnosis. The CP provided a summary of the risk factors and treatment recommendations to the pediatrician.

Findings: Twenty-five Mexican American participants (ages 13.7 ± 2.3 years) enrolled and completed the study. One child (4%) met 3 or more criteria required for diagnosis of metabolic syndrome. Of the remaining participants, 7 (28%) met 2 criteria, 9 (36%) met 1 criterion, and 8 (32%) met no criteria for metabolic syndrome. The CP provided treatment recommendations for 68% of the participants.

Conclusion: CPs can have an active role in early identification of specific components of metabolic syndrome in a rural community health center.

Key words community health center, patient assessment, pediatrics, pharmacy, rural.

Table 1 Published Definitions of Metabolic Syndrome in Pediatrics

	Cook ⁴	de Ferranti ⁵	Weiss ⁶	Cruz ⁷
Age (years)	12-19	12-19	4-20	Not specified
Glucose levels (mg/dL)	FG \geq 110	FG \geq 110	IGT*	IGT*
Weight measurement	WC \geq 90th percentile	WC > 75th percentile	BMI (z-score \geq 2.0) percentile	WC \geq 90th percentile
Triglyceride	\geq 110 (mg/dL)	\geq 100 (mg/dL)	\geq 95th percentile	>90th percentile
HDL-C	\leq 40 (mg/dL)	<50 (mg/dL)	\leq 5th percentile	<10th percentile
Blood pressure (percentile)	\geq 90th	>90th	>95th	>90th

FG, fasting glucose; IGT, impaired glucose tolerance; WC, waist circumference; BMI, body mass index; HDL-C, high-density lipoprotein-cholesterol.

* = defined as a glucose concentration greater than 200 mg/dL 2 hours following a 75 gram oral glucose tolerance test.

Metabolic syndrome parameters have been categorized by 4 definitions as illustrated in Table 1. However, a consensus on which definition is the most effective for patient identification has not been determined. In addition to varying definitions, the identification of metabolic syndrome in pediatrics can be cumbersome due to blood pressure, lipid concentrations, and weight values being categorized based on percentiles specific for age and sex, as opposed to fixed values as seen in adult criteria. With such obstacles, it is not surprising that one study found only 8% of general pediatric visits included screening for metabolic syndrome.⁸ As a result, practitioners may not be identifying all children with metabolic syndrome in clinical practice.

Recently, the United States Preventive Services Task Force issued a statement recommending all children over the age of 6 years be screened for overweight and obesity.⁹ In our pilot study, we not only screened for obesity in children, but sought to identify patients at increased risks for complications due to overweight and obesity.

Objective

The objective of this pilot study was to evaluate the role of a clinical pharmacist (CP) in screening children and adolescents for components of metabolic syndrome in a pediatric ambulatory clinic located in a rural community health center.

Methods

The study was approved by the Institutional Review Board (IRB) of the University of Texas, Pan American, which ensured the study was conducted in accordance with the Helsinki Declaration of 1975. Assent and consent were obtained from the participants and 1 parent, respectively, prior to enrollment into the study.

The study was conducted at a community health center clinic, Su Clinica Familiar at South Cameron, lo-

cated outside of Brownsville, Texas. Su Clinica Familiar comprises several clinics that provide health care to the indigent population of the Lower Rio Grande Valley (LRGV) of South Texas. The LRGV region encompasses a 4-county area including Cameron, Hidalgo, Starr, and Willacy counties. It is a predominantly rural area, although rapid population growth is occurring in many cities. At the time of the study, a pediatrician traveled to the South Cameron clinic 3 times per week. No additional physician extenders attended the clinic to provide services to pediatric patients.

The CP involved in the study was a full-time faculty member at a local College of Pharmacy with 100% salary support from the university. Aside from the Doctor of Pharmacy degree, the CP also completed 3-year post-doctoral training in a pharmacy practice residency and a pediatric pharmacotherapy fellowship, with a specific focus on metabolic complications secondary to medications. As a faculty member, the CP was required to develop a practice site for clinical clerkship students. As Su Clinica Familiar had a positive experience with a CP-managed psychiatric clinic, the administration welcomed the assistance of another CP in the pediatric setting.¹⁰ The CP was able to commit 2 days a week to the clinic.

Rates of pediatric obesity in this region had been well established.¹¹ Because of the dire need to identify children and adolescents requiring intervention for obesity, and the limited pediatrician time, it was decided to utilize a CP to screen and identify which patients required treatment. Because of all the known complications of obesity, it was decided to systematically screen children for metabolic syndrome in order to capture, and hopefully halt the progression of, the co-morbid conditions related to obesity. The patients at Su Clinica Familiar typically did not have health insurance; therefore, grant funding was obtained to pay for the cost of the laboratory screenings.

The study was a 3-month, prospective, cross-sectional, pilot study. Children were eligible to participate if they were between 10 and 18 years of age and if they met

1 of the following criteria: (1) overweight (defined as greater than the 85th percentile for weight based on the Centers for Disease Control and Prevention [CDC] Growth Charts), (2) positive family history of type 2 diabetes in a first-degree relative, or (3) presence of acanthosis nigricans. Although the initial research protocol included children as young as 4 years of age, IRB restrictions did not allow for children younger than 10 years of age to participate in the study.

Patients were excluded if they were in treatment for metabolic syndrome or had an identifiable underlying cause for glucose impairment such as a previous diagnosis of type 1 or 2 diabetes mellitus, cystic fibrosis, psychiatric illness (eg, eating disorder, Willi Prader syndrome), human immunodeficiency virus, pregnancy, or a history of either a solid organ or bone marrow transplant. Patients were also excluded if they had a history of long-term oral corticosteroid use, history of growth hormone use, or a history of atypical antipsychotic use. The extensive exclusion criteria was intended to identify otherwise healthy children and adolescents at risk for or with components of metabolic syndrome.

Potential participants were identified by the pediatrician during a visit for a school or sport physical. If the patient met any of the inclusion criteria, they were asked for permission to be contacted by the CP for potential enrollment into the study. The CP reviewed the medical records to ensure the patient did not have any exclusion criteria and asked the patient to participate. Upon enrollment, participants completed a medical history (including a family history), a medical examination by the pediatrician, medication history, and a fasting laboratory analysis. The laboratory analysis included a chemistry panel, lipid panel, and a 2-hour oral glucose tolerance test. All laboratory analysis was subsidized by grant funding.

The CP plotted the participant's height, weight, and calculated body mass index (BMI) on the appropriate CDC growth chart to classify weight. The blood pressure percentile was determined using the Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents.¹² High-density lipoproteins and triglycerides were classified into percentiles for age and sex.¹³ The CP evaluated which components of metabolic syndrome were present. At the time this project was designed, 4 different validated definitions of metabolic syndrome in children and adolescents existed as shown in Table 1.⁴⁻⁷ The definition utilized for our study⁶ allowed for incorporation of participants from 4 to 20 years of age, which is the broadest age range among the existing definitions, although our study included only children greater than 10 years of age. The definition utilized was also the strictest in regard to age-adjusted cut-off points for BMI, triglycerides, high-density lipoprotein-

cholesterol (HDL-C), and blood pressure. Metabolic syndrome was diagnosed if a participant had 3 or more of the components. The CP provided a summary of the risk factors and treatment recommendations to the pediatrician. Only one CP conducted the evaluations for consistency.

All participants received a \$25 gift certificate to a local sports store for participation in the study. Additionally, the parent of the child received a \$10 gift card to a local grocery store.

Results

A total of 30 patients were identified by the pediatrician to be eligible for the study over a 3-month period. Of these, 25 (15 male and 10 female) enrolled and completed the study. Ages ranged from 10.3 to 17.3 years with a mean (\pm SD) of 13.7 ± 2.3 years. All participants were of Mexican American descent. Most participants were enrolled due to being overweight ($n = 21$), followed by presence of acanthosis nigricans ($n = 19$), and a first-degree relative with type 2 diabetes ($n = 6$). Only 1 child (4%) met 3 or more criteria required for diagnosis of metabolic syndrome. However, of the remaining participants, 7 (28%) met 2 criteria, 9 (36%) met 1 criterion, and 8 (32%) met no criteria of metabolic syndrome. Table 2 provides the mean (\pm SD) for each criterion measured and the number of participants meeting the specific criterion.

The CP provided treatment recommendations to the physician for 17 (68%) children and adolescents; in other words, any participant meeting at least 1 criterion of metabolic syndrome. As the participants did not have an underlying cause for metabolic syndrome (eg, antipsychotic medication), treatment strategies were aimed at nonpharmacological therapy. All recommendations were for further evaluation and education by the clinic nutritionist. Additionally, every participant was educated on the importance of exercise.

Table 2 Results of Each Metabolic Syndrome Component Measured

Criteria	Mean \pm SD	No. of Meeting Criteria
BMI	26.4 \pm 4.9 kg/m ²	11
TG	117.9 \pm 66.1 mg/dL	10
HDL-C	47.3 \pm 10.2 mg/dL	2
SBP/DBP	111.7 \pm 11.1 mmHg/ 67.0 \pm 8.6 mmHg	3
OGTT	106.0 \pm 29.8 mg/dL	1

BMI, body mass index; TG, triglycerides; HDL-C, high-density lipoprotein-cholesterol; SBP, systolic blood pressure; DBP, diastolic blood pressure; OGTT, oral glucose tolerance test.

Discussion

This is the first prospective study illustrating the ability of a CP to screen and identify children and adolescents for metabolic syndrome in a rural community health center. In our Mexican American population, 1 (4%) adolescent was identified as meeting 3 criteria to be diagnosed with metabolic syndrome, which is consistent with the national prevalence of 2.6%-11.1% for the same ethnic population.¹ The metabolic syndrome prevalence in all adolescents in the United States ranges between 2.0% and 9.4%, depending on the definition used.¹ However, although the actual identification of children that met criteria for metabolic syndrome was low, more than half (68%) had at least 1 component of metabolic syndrome (eg, dyslipidemia, overweight). Only those who met at least 1 component were referred to a dietician for further evaluation and nonpharmacologic therapy.

The younger age at which the participants were screened in our study could be capturing these patients before they accumulate the 3 criteria to be diagnosed with metabolic syndrome. Our patient population ages ranged from 10 to 18 years (mean 13.7), which is lower than national rates that were based on 12- to 19-year olds. With this in mind, 17 of 25 participants did exhibit at least 1 criterion, which may be an early indication of future disease.

Metabolic syndrome (ie, obesity, hypertension, dyslipidemia, impaired glucose tolerance) is comprised of disease states that all have varying degrees of complication when left untreated. In our study, 21 (84%) participants were overweight or obese. The national prevalence of metabolic syndrome in overweight or obese children ranges from 12.4% to 44.2% in 12- to 19-year olds.¹ Obesity itself can lead to complications such as cardiovascular disease, hypertension, diabetes, cancer, osteoarthritis, and hepatic steatosis. Although no participants were classified as having hypertension, 8 (32%) met prehypertension criteria. Left ventricular hypertrophy (LVH), an indication of end organ damage in children with hypertension, has been found in obese children without a diagnosis of hypertension.¹⁴ This indicates damage to the heart even in prehypertensive patients, which may extend into young adulthood.¹⁵ Therefore, identifying those with prehypertension may be beneficial in optimizing preventative care.

Rising triglyceride levels are typically seen before hypercholesterolemia develops and 10 (40%) participants had greater than or equal to 95th percentile, indicating hypertriglyceridemia. Hypercholesterolemia, an elevation in total cholesterol and low-density lipoprotein-cholesterol (LDL-C), can be accompanied by low HDL-C, which is another cardiovascular risk factor. Three (12%),

4 (16%), and 2 (8%) participants had elevated LDL-C, elevated total cholesterol, and low HDL-C, respectively. Impaired glucose tolerance precedes diabetes and can be associated with hyperinsulinemia. Nineteen (76%) participants displayed an outward symptom of hyperinsulinemia (eg, acanthosis nigricans), although only 1 (4%) had impaired glucose tolerance. In our sample, 1 (4%) participant also had hyperinsulinemia. The progression of these individual components is important to recognize in order to initiate preventive treatment strategies to halt the progression of diseases such as hypertension and diabetes.

Clinical pharmacists are active in screening for diabetes, cardiovascular disease, and metabolic syndrome in various patient populations.¹⁶⁻¹⁹ Pharmacists have been involved in performing point-of-care screenings, education, and referral of patients to their primary care physician for further analysis. Although the majority of pharmacist-initiated screenings occur in a community (or retail) setting, 1 study has described the use of a CP in a physician clinic to identify metabolic syndrome in an adult population with psychiatric disorders.¹⁹ In this particular program, a CP provided point-of-care screening for metabolic syndrome in patients taking an antipsychotic. The CP would provide the patient's physician with an assessment and treatment recommendations. Additionally, the CP provided education on diet and exercise to the individual patients. In the 92 patients screened, 71% and 60% met 1 and 2 components of metabolic syndrome, respectively. The utility of performing such assessments in the medical office allowed for immediate follow-up or referral to a primary care provider for any abnormal laboratory findings.

A weight management pharmaceutical care service for faculty and staff at Auburn University has been developed by a team of CPs.²⁰ The service provided body weight assessments and education regarding nutrition and exercise to patients. Once patients failed 6 months of diet and exercise, a pharmacological intervention was recommended to the patient's primary care provider. Over a 4-year time period, 289 patients who were enrolled in the program lost more than 1,000 kg, with an average of 3.6 kg per person. CPs also act as physician extenders and manage pharmacological therapy in patients with other diseases, such as hyperlipidemia and diabetes, and this practice has shown positive health outcomes.^{21,22} It is hoped that eventually, CPs can act as physician extenders to pediatricians and manage pharmacological therapy for obesity, hypertension, dyslipidemia, and diabetes in the pediatric population in the event that these complications cannot be averted.

Only 1 other study has been conducted in which a pharmacist identified metabolic syndrome in adolescents.²³ In this study, the authors retrospectively

reviewed the charts of 52 adolescents diagnosed with type 2 diabetes for metabolic syndrome prevalence and identified 76.9% as meeting specified criteria. Our study differs in that screening specifically excluded children with a diagnosis of type 2 diabetes in order to identify metabolic syndrome prior to the development of overt complications. The inclusion criteria in our study were intended to capture those pediatric patients at highest risk for future cardiovascular and metabolic disease. Although only 1 participant was found to have metabolic syndrome, many had at least 1 indication for referral to a nutritionist or dietician. The participants who did not meet criteria for diagnosis of metabolic syndrome or other individual diseases (eg, diabetes, hypertension) still displayed abnormal parameters. Additionally, our study differed in that it was prospective in nature and aimed at identifying children and adolescents that previously had not been identified as being high-risk for components of metabolic syndrome.

Limitations

Limitations of this study include the short time frame and the small sample size. Given that the patient population consisted primarily of adolescents, the enrollment of 25 participants in 3 months is promising. With this rate of enrollment, in a year's time over 100 children and adolescents who may be at risk could be screened and identified. The population in this study is of Mexican American descent from a rural community health center and may not be generalizable to other clinical settings. If such screenings are conducted in other ethnicities or in a metropolitan area, variations may exist. Another limitation of this study is the lack of waist circumference measurements, which is not a criteria for the definition used in the study. Obtaining these measurements would have allowed for comparisons of the rates of metabolic syndrome utilizing the various definitions of metabolic syndrome.

Conclusions

The preliminary findings in this study show that a CP can have an active and critical role in the screening and identification of metabolic syndrome in pediatric patients. The CP may aid in increasing the identification of precursors to metabolic and cardiovascular disease by working collaboratively with a pediatrician. However, future studies are necessary to fully evaluate a CP role in this setting. Furthermore, CPs may also have a role in the development of prevention and treatment strategies, including patient education, lifestyle modifications, and pharmacological therapy.

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National Patient Safety Goals

Pharmacists' Medication Reconciliation–Related Clinical Interventions in a Children's Hospital

Brian Gardner, Pharm.D.; Kevin Graner, R.Ph.

It has been estimated that 46% of medication errors occur on admission or discharge when new orders are written.¹ Medication reconciliation, a process to consciously continue, discontinue, or modify medication orders, is undertaken to ensure that patients receive all intended medications during hospitalization. It is also an effective strategy for reducing medication errors; in one study, for example, it decreased medication errors by 70%–80% and adverse drug events by more than 15%.² Bond and Raehl report that obtaining admission medication histories in adult patients significantly decreased drug costs and total costs of care.³ Surveying clinical pharmacy services offered at 1,081 participating hospitals, they found that performing admission medication histories led to the greatest reduction—51%—in medication errors.⁴ Hospitals having pharmacists obtain admission medication histories reported 85% fewer adverse drug reactions and 82% fewer medication errors that adversely affect patient outcomes than hospitals not providing this clinical pharmacy service.^{4,5}

Before 2006, there were many barriers at Mayo Eugenio Litta Children's Hospital to full compliance with Joint Commission National Patient Safety Goal 8 ("Accurately and completely reconcile medications across the continuum of care,"^{6(NPSG-14)} first implemented in 2005*). Many health care professionals obtained admission medication histories and created their own admit medication lists, often with many inaccuracies. There was also a lack of coordinated, multidisciplinary review of a patient's admission medication history, reflecting the fact that one official medication list was not defined. Finally, no formal policy existed to assign necessary responsibility for coordinated multidisciplinary medication reconciliation.

This article describes how Mayo Eugenio Litta Hospital developed and implemented a new medication reconciliation process to improve compliance with Joint Commission National Patient Safety Goal 8.

* In response to organizations' input regarding difficulties in meeting the complex requirements of this goal, the goal will continue to be evaluated but not scored until sometime in 2010. The updated goal will be posted on The Joint Commission Web site at <http://www.jointcommission.org>.

Article-at-a-Glance

Background: In response to experienced difficulties at Mayo Eugenio Litta Children's Hospital (Rochester, Minnesota) with medication reconciliation, the hospital developed and implemented a new medication reconciliation process.

Methods: In 2005, a multidisciplinary task force determined the need to improve accuracy of the admission medication list, define multidisciplinary responsibilities within the medication reconciliation process, develop a tool to readily identify patients in need of medication reconciliation, and allow for efficient documentation on completion of medication reconciliation activities. A patient-provided medication list was developed within the electronic medical record (EMR) to provide a common documentation tool for physicians, nurses, and pharmacists. Functionality was added to pharmacy's electronic pharmaceutical care Web-based program (PCARE) to alert pharmacists when a patient's admit medication history, admit medication reconciliation, or transfer medication reconciliation needs to be completed.

Results: From May 2006 to August 2007, the pediatric pharmacists performed admission medication reconciliation on 85% of the patients within 24 hours and completed transfer reconciliation on all the patients—an average of 13 admitted and 11 transfer patients a day. They documented 567 medication reconciliation–related interventions during the May 2006 through the August 2007 period; 522 (92%) occurred during admission medication reconciliation and the remaining 46 (8%) during transfer reconciliation; 505 (89%) led to a change in therapy.

Discussion: Pharmacists' medication reconciliation–related clinical interventions indicate that the time and effort of performing medication reconciliation activities results in benefits for patients.

Methods

SETTING

Mayo Eugenio Litta Children's Hospital is a 105-bed hospital within Saint Marys Hospital, a 1,340-bed tertiary care teaching hospital. Mayo Eugenio Litta Children's Hospital is composed of a pediatric intensive care unit (PICU), a transplant center, a neonatal intensive care unit (NICU), a cardiovascular surgery intensive care unit (CVS ICU), a general care area, and an ambulatory infusion therapy center (PITC). The hospital provides care for a wide variety of pediatric medical and surgical subspecialty patients.

Eleven pediatric clinical pharmacists [including B.G.], 12 pharmacy technicians, and 1 pharmacy practice resident provide pharmacy services to Mayo Eugenio Litta Children's Hospital. The pediatric pharmacy services supervisor [K.G.] oversees all provided clinical and operational services. The supervisor reports to Mayo Clinic Rochester's pharmacy leadership. Services provided by the pediatric pharmacy staff consist of the following:

- Attendance in daily team rounds in the PICU, transplant center, and CVS ICU
- Comprehensive daily medication therapy review in the PICU, transplant center, and CVS ICU
- Target-drug therapy monitoring in the NICU and general care area
- Medication order review and profiling for all areas
- Unit-dose dispensing
- Intravenous (IV) admixture service
- Participation in pediatric code team
- Training of pharmacy residents and students
- Participation in organizationwide committees, including medication safety and pharmacy and therapeutics (P&T).

Mayo Eugenio Litta Children's Hospital does not have a patient safety officer. Each individual department is responsible for safety related to its discipline. The pharmacy department has two pharmacy specialist—medication safety pharmacists.

The use of automated dispensing cabinets is limited primarily to the dispensing of controlled substances. The pediatric pharmacy satellite is open from 7:00 A.M. through 11:30 P.M. seven days a week. The area is staffed with 50 pharmacist hours and 48 technician hours per day Monday through Friday, with 30 and 40 hours, respectively, on weekends and holidays.

DESIGN AND PLANNING

In January 2005, Mayo Clinic Rochester organized a multidisciplinary task force composed of representatives from pharmacy, nursing, information services, medication safety, and the

Patient Provided Medication List (PPML) Contained in the Patient's Electronic Medical Record

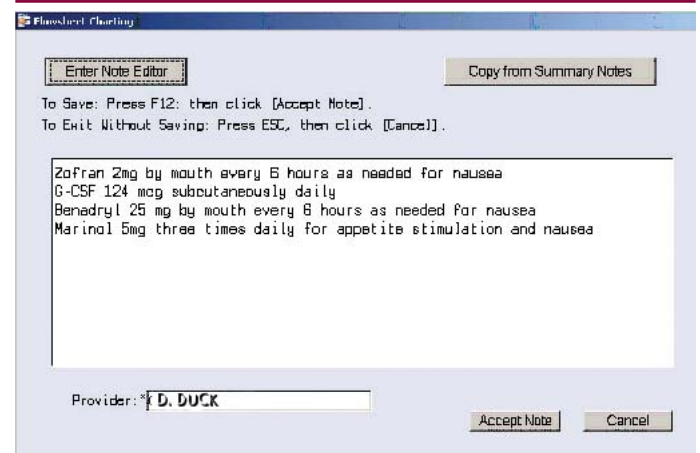


Figure 1. Each patient's admission medication list is entered in the PPML by the nurse or pharmacist. The list is then used to complete each step of the medication reconciliation process.

medical staff to improve the medication reconciliation process—and thereby improve compliance with The Joint Commission's National Patient Safety Goal 8. To achieve this goal, the task force determined that the institution needed to improve the accuracy of the admission medication list, define multidisciplinary responsibilities within the medication reconciliation process, develop a tool to readily identify patients in need of medication reconciliation, and allow for efficient documentation upon completion of medication reconciliation activities.

From January to November 2005, the task force met weekly to identify problems with the current process, decide what tools were needed to allow staff to efficiently perform medication reconciliation, and define each health care discipline's responsibilities. It concluded that one specific location in the medical record was needed for documentation regarding a patient's admission medication list. It was decided that inpatient pharmacy services should be involved in obtaining each patient's admission medication history and completing admission medication reconciliation and transfer medication reconciliation activities.

For the next four months, computer programmers created the necessary electronic tools. A new patient-provided medication list (PPML; the information is "provided" by the patient when the admission medication history is obtained) was developed within the electronic medical record (Figure 1, above) to

PCARE Admit/Transfer Medication Reconciliation Screen

Pharmacist Team 6- a Transfer Reconciliation							
Pharmacist Drug Profile Reviewed/Date	Clinic Number	Name (Peds Patient in Red)	Previous Service	Service	Transfer Date/Time	Previous Location	Current Location
Yes 06/05/07 16:18	000000	House, Mick E	MED, NEONATAL SERVICE	MED, PEDIATRICS SERVICE	06/05/07 15:57	FR3C	FR3G 121 H

Pharmacist Team 6- a Admit Reconciliation							
Medication History	Medication Reconciliation	Clinic Number	Name (Peds Patient in Red)	Admit Service	Admission Date/Time	Previous Location	Current Location
Not Complete	No	1111111	House, Minn E	MED, PED CRITICAL CARE	06/06/07 12:27	MB3G	MB3G 548 H
Not Complete	No	2222222	Duck, Darl E	MED, PEDIATRICS SERVICE	06/06/07 11:51	FR2B	FR2B 151 H

Figure 2. Pharmacists generate this report several times each day to quickly identify which patients need admission medication history, admission medication reconciliation, and transfer reconciliation completed. PCARE, Mayo Eugenio Litta Hospital's Web-based pharmaceutical care program.

provide a common documentation tool for physicians, nurses, and pharmacists. Using this tool, nurses and pharmacists create a single admission medication list. Physicians refer to the list when performing their admit medication reconciliation.

To efficiently manage the pharmacist's work flow associated with medication reconciliation activities and to document those activities, hospital leadership asked that new functionality be added to pharmacy's electronic pharmaceutical care program (PCARE). PCARE, a Mayo Clinic Rochester-created Web-based system, integrates data from disparate systems, including pharmacy, admissions, nursing, parenteral nutrition, and microbiology, into a "one-stop" screen for pharmacists. It allows pharmacists to document clinical interventions and communicate ongoing pharmaceutical care issues with colleagues within the same electronic window (Appendix 1, available in online article).

A major difficulty in getting the pharmacist involved in admission medication histories and reconciliation activities was that no process existed to efficiently identify patients needing these services. Functionality was designed within PCARE that automatically alerts pharmacists when a patient's admit medication history, admit medication reconciliation, or transfer medication reconciliation needs to be completed. PCARE allows documentation of each step after completion (Figure 2, above). The PCARE Admit Screen effectively alerts pharmacists to the need for patient admit medication history, admit medication reconciliation, and transfer reconciliation. The patient list is updated every 30 minutes and prevents staff from getting too behind. PCARE also allows for documentation of pharmacist clinical interventions secondary to medication reconciliation

activities and the production of reports to be reviewed by various leadership groups.

IMPLEMENTATION

On April 4, 2006, pharmacy clinical coordinators involved in the development of the new medication reconciliation process trained two pediatric pharmacists. During the following two weeks, these pediatric pharmacists then trained the remaining pediatric pharmacists in their new responsibilities, expected work flow relating to medication reconciliation activities, components of obtaining a thorough medication history, and use of the new PPML and PCARE tools. In preparation for medication reconciliation and other patient care responsibilities, we added 70 hours of pharmacist time per week.

Hospital policy instructs nurses to obtain a patient's home medication list and enter it into the PPML flow sheet. Within 24 hours of admission, a pharmacist completes an independent medication history and verifies or updates the PPML. The pharmacist then reviews the current inpatient hospital orders and clarifies any issues with the primary medical service. Finally, the pharmacist documents the completion of admission medication reconciliation and any subsequent interventions in PCARE.

The pharmacist performs transfer medication reconciliation when a patient transfers to a different service or level of care (for example, ICU to general care floor). He or she compares the current inpatient medication list with the PPML to determine appropriateness of all medications on transfer (for example, the possibility to restart a maintenance medication now that the patient is more stable). The pharmacist also determines if there

are any medications on the current inpatient medication list that are no longer needed or are inappropriate for the level of care. The pharmacist documents in PCARE the completion of transfer reconciliation and any subsequent interventions. The primary medical service is also responsible for performing this review on transfer of service or level of care.

Results

Pharmacists' involvement in the revised medication reconciliation process can be monitored using reporting functions within the electronic tools. Pharmacy leadership closely follows the work load associated with medication reconciliation activities and the percentage of patients receiving pharmacists' medication reconciliation service. Quality assurance reports measuring the percentage of PPML flow sheets updated/corrected by the pharmacist were collected for five weeks. Intervention reports secondary to medication reconciliation activities can also be obtained from PCARE.

From May 2006 to August 2007, the pediatric pharmacists performed admission medication reconciliation on 85% of the patients within 24 hours, and completed transfer reconciliation on 100% of the patients—an average of 13 admitted and 11 transfer patients per day. This involved reconciling all prescription, over-the-counter, and herbal medications. During the first five weeks, pharmacists corrected 24% of the PPML flow sheets. Pharmacists continue to correct the PPML based on the admission medication histories they perform; however, data are not collected on an ongoing basis.

Pediatric pharmacists documented 567 medication reconciliation-related interventions during the May 2006 through the August 2007 period—the most recent period that such data were gathered. Of the 567 interventions, 522 (92%) occurred during admission medication reconciliation, and the remaining 46 (8%) occurred during transfer reconciliation; 505 (89%) led to a change in therapy. When entering PCARE interventions, pharmacists assign a patient-related severity rating to each one (Table 1, right). Table 2 (right) summarizes the types of admission prescribing errors identified by the pharmacists. These results justified to hospital leadership the need for the allocation of resources to have pharmacists participate in the medication reconciliation process. Pharmacy and nursing continue to work together to improve the accuracy of each patient's PPML and subsequent medication reconciliation.

Discussion

The PPML and PCARE medication reconciliation functionalities were created to provide efficient tools for staff to improve

Table 1. Reconciliation-Related Interventions, May 2006–August 2007

Minimal Patient Impact: 27%

Intervention has minimal health consequences for the patient.

Example: continuation of home multivitamin

Moderate Patient Impact: 66%

Intervention results in improved patient outcome. The overall health consequences are considered to be non-life threatening.

Example: dosage change to the patient's current dose or continuation of maintenance prescription medication

Severe Patient Impact: 7%

Absence of an intervention creates a potentially life-threatening situation for the patient.

Example: continuation of tacrolimus in the transplant patient, trimethoprim and sulfamethoxazole prophylaxis in the oncology patient, or omeprazole in the patient admitted with gastrointestinal bleed

Table 2. Types of Admission Prescribing Errors for the 567 Medication Reconciliation-Related Interventions, May 2006–August 2007

Omission	339 (65%)
Subtherapeutic dose	78 (15%)
Supratherapeutic dose	68 (13%)
Incorrect medication	27 (5%)
No longer taking	10 (2%)
Total	522 (100%)

compliance with the Joint Commission National Patient Safety Goal 8 and prevent medication errors. A survey of pediatric pharmacists undertaken in September 2007 indicated that they were able to conduct an average of three to four reconciliations per eight-hour shift.

It takes an average of nine minutes per patient to identify patients with the PCARE Admit Screen (we did not collect data on the number of drugs per patient), interview the patient or family member, populate the PPML or verify the PPML, clarify any issues with the primary medical service, and document the completion of medication reconciliation and any interventions secondary to the activities in PCARE. In contrast, Nester and Hale reported it took an average of 19 minutes for staff, using a standard medication form, to perform medication reconciliation for adult patients.⁷ To date, the most challenging aspect of the program is finding the appropriate family member to provide the patient's medication information. Staff find it may take several trips to a patient's room before a thorough

admission medication history can be obtained.

Hospital leadership is fully committed to 100% compliance with complete medication reconciliation. To meet this and other pharmacy initiatives, one pediatric pharmacist shift was added per day during this time period. The 567 medication reconciliation–related clinical interventions performed by pharmacists indicate that the time and effort of performing medication reconciliation activities leads to positive benefit for patients.

Pharmacist involvement in Mayo's medication reconciliation program has improved the accuracy of the admit medication list, with one-quarter of PPML flow sheets corrected during the first five weeks. As a result of these interventions, the computer-assisted medication reconciliation process, which has continued as described, has improved patient care by aiding pharmacists to complete more thorough medication reconciliation. **J**

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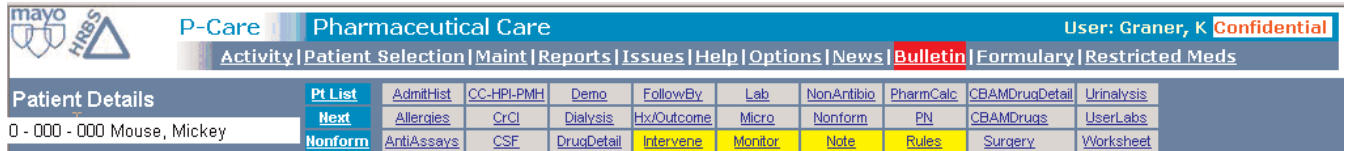
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Online-Only Content

See the online version of this article for Appendix 1. Medication History Printout.

Appendix 1. (PCARE) Program: Patient Detailed Report Screen and Contained Information

A screen shot of the top of this window is shown, along with a description of the information contained in each section of the Patient Detailed Report. PCARE, Mayo Eugenio Litta Hospital's Web-based pharmaceutical care program; CC-HPI-PMH, Chief Complaint-History of Present Illness-Past Medical History; BMI, body mass index; BSA, body surface area; HB, Harris Benedict; PCR, Polymerase chain reaction; BUN, blood urea nitrogen; INR, international normalized ratio; APTT, activated partial thromboplastin time; CSF, cerebrospinal fluid.



Patient Details		Pt List	AdmitHist	CC-HPI-PMH	Demo	FollowBy	Lab	NonAntibio	PharmCalc	CBAMDrugDetail	Urinalysis
0 - 000 - 000 Mouse, Mickey		Next	Allergies	CrCl	Dialysis	Hx/Outcome	Micro	Nonform	PN	CBAMDrugs	UserLabs
		Nonform	AntiAssays	CSF	DrugDetail	Intervene	Monitor	Note	Rules	Surgery	Worksheet

- Demographic information: age, sex, actual weight, ideal and aminoglycoside dosing weight, body surface area
- Hospital room location, primary service, and pager number
- Dates of recent hospitalizations
- Infection Control status and isolation requirements
- CC-HP-PMH note documentation
- Calculations: HB equation, BMI, BSA, aminoglycoside dosing weight
- Infectious disease service consultations and pager number
- Drug allergies
- Renal function/status
- Estimated & measured creatinine clearance
- Dialysis (if applicable): intermittent dialysis, peritoneal dialysis, or continuous renal replacement therapy (CRRT)
- Medication reconciliation history and documentation
- All medications within desired time range on a timeline grid and/or a drug detail grid
- Parenteral nutrition: composition and calculations (total calories, calories as fat/protein, deviation from HB equation)
- Microbiology data: cultures, stains, and PCR assays
- Selected laboratory data: blood counts, electrolytes, liver enzymes, creatinine, BUN, bilirubin, international normalized ratio, activated partial thromboplastin time, acid/base status, etc.
- Antimicrobial and other drug assays/serum drug levels
- Surgical operative reports
- Rule flag information with link to intervention documentation form
- Intervention information history and intervention outcomes
- Monitors (including links to reference documents) and pharmacist communication notes
- Nonformulary drug documentation and nonformulary order history
- Urinalysis
- CSF results
- Warfarin protocol history

Training Pediatric Clinical Pharmacology and Therapeutics Specialists of the Future: The Needs, the Reality, and Opportunities for International Networking



Magazine

Paediatric Drugs

January 1, 2009 | Gazarian, Madlen

Abstract

In recent years there has been a rapid and marked increase in global recognition of the need for better medicines for children, with various initiatives being implemented at global and regional levels. These exciting developments are matched by recognition of the need to build greater capacity in the field of pediatric clinical pharmacology and therapeutics to help deliver on the promise of better medicines for children. A range of pediatric medicines researchers, educators, clinical therapeutics practitioners, and experts in drug evaluation, regulation, and broader medicines policy are needed on a larger scale, in both developed and developing world settings. The current and likely future training needs to meet these diverse challenges, the current realities of trying to meet such needs, and the opportunities for international networking to help meet future training needs are discussed from a global perspective.

Pediatric clinical pharmacology and therapeutics (PCPT) can be broadly described as the 'discipline concerned with the evaluation and use of medicines in the pediatric population,' although many different descriptions of the specialty exist.[1,2] The last few years have seen a rapid and marked increase in global recognition of the need for

better medicines for children, and pediatric clinical pharmacologists have been leading this effort.[3,4] The key challenges PCPT specialists now face in delivering on the promise of better medicines for children include: (i) doing high-quality medicines research relevant to meeting actual child health needs at a global level; (ii) timely evaluation, collation, and dissemination of new research evidence about the efficacy and safety of medicines to all clinicians involved in using medicines in the pediatric population; (iii) timely access to appropriate medicines; and (iv) effective use of research evidence from appropriate pediatric studies in the routine care of pediatric patients (rational use of medicines or quality use of medicines). This includes the effective application of 'knowledge translation' research to improving medicines use and outcomes, an emerging field of expertise that is of great importance to achieving optimal therapeutics in actual practice.[5]

There is increasing recognition of the need to build greater capacity in PCPT to meet these challenges. A range of pediatric medicines researchers, educators, clinical therapeutics practitioners, and experts in drug evaluation, regulation, and broader medicines policy are needed on a larger scale. The need for greater efforts at training to meet the increasing need for expertise is recognized by a number of professional bodies at global and regional levels,[1,3] with several initiatives already underway.[4]

This article discusses the current and likely future training needs from a global perspective, the current realities of trying to meet such needs, and the opportunities for international networking to help meet training needs in the future.

What is Needed for Training in Pediatric Clinical Pharmacology and Therapeutics?

Content of Training Programs

Defining core content for PCPT training with some consistency at a global level has been problematic,[6,7] although a recent comparison of current Canadian and UK programs found considerable similarities.[2] In considering future training needs, it makes sense to look at the key challenges of delivering better medicines to children and

design training around the skills needed to address them. Some core general competencies that are needed are listed in figure 1. A range of specialized clinical and research skills, together with expertise in teaching and learning at many levels are needed. Perhaps much more so than any other specialty, PCPT experts need to be highly skilled in the public health and social, and political dimensions of healthcare, including expertise in drug development, medicines evaluation, regulation and reimbursement issues, and evidence-based therapeutic decision-making skills to inform both clinical practice and broader medicines policy. They also need sophisticated knowledge of, and skills in, ethical interactions with the pharmaceutical industry, whether through involvement in the design, conduct, or review of ethical medicines research, or through playing a key role in helping achieve rational use of medicines in clinical practice across a range of settings.

Traditionally, most PCPT experts have undertaken some type of specialty or sub-specialty pediatric clinical training, with the content and duration varying between different countries.²¹ Although most are medical specialists, some have arrived at PCPT through pediatric pharmacy clinical training. Yet others have trained in adult medicine as their clinical base. In the future, it is likely that more trainees from a diverse disciplinary background may wish to train in PCPT. Irrespective of the professional discipline in which clinical training may have originated, a core set of clinical competencies in PCPT is needed by all experts in the field. These include specialized knowledge and skills relevant to clinical care and therapeutic decision making specifically in the pediatric population (figure 2). In addition to the classically defined competencies in pharmacology and toxicology, high-level expertise in the critical evaluation of clinical research and application to evidence-based therapeutic decision making is needed. Such expertise is increasingly being valued and sought, for example, by various bodies concerned with rational therapeutics, medicines access and reimbursement, or with evidence-based therapeutic guidelines or medicines information development at local, national, and global levels. Indeed, highlighting the importance of such expertise to optimizing medicines use in healthcare settings has been suggested as critical to the survival of the specialty itself.[8]

In addition to skills relevant to using research evidence, PCPT experts must also be highly skilled in doing high-quality research to generate the needed evidence. Formal research training in a basic science field and/or in clinical research methods is optimally acquired through a higher degree in research (e.g. masters or doctorate). Although this is strongly encouraged, there is insufficient dedicated time within most PCPT training programs currently in existence, so trainees need to devote additional time to acquiring a higher degree. Given the central role most PCPT experts have played,¹¹ and will continue to play, in the design and conduct of medicines research, these are core skills relevant to all trainees. This is especially so in the current context of increased demand for pediatric medicines research globally. A range of high-level expertise in the comprehensive scientific evaluation of medicines, including the design and conduct of high-quality preand post-marketing clinical trials and observational studies relevant to the pediatric population, is needed (figure 3). Specialized expertise in the ethics of clinical research in children, including skills to appropriately address any possible ethical issues in pharmaceutical industry-funded studies, is vital.[9,10]

Expertise in teaching and learning at both undergraduate and postgraduate levels is needed by all PCPT experts. In addition to teaching trainees within the field of PCPT, there will be an increasing need to provide effective cross-disciplinary teaching about a variety of topics relevant to pediatric medicines and therapeutics to a wide variety of health professionals, scientists, and others from academia, pharmaceutical industry, and government agencies in the developed and developing worlds.

Structure and Duration of Training Programs

The structure and duration of training can be variable, with total durations ranging from 5 to 10 years in existing programs.[2,11] This is partly due to differences between countries in requirements for training in the foundation clinical discipline[1,2,11] and partly to differences in the duration of specialty training for the PCPT component, despite similar content of some programs.[2] The required duration of dedicated research training can also vary (e.g. at least 6 months in Canada and at least 12

months in the UK), although most programs emphasize that longer periods of research are highly desirable.

As the field continues to grow, it should be possible to eventually develop some global consistency about the content and duration of the specialized 'pediatric CPT' component of any training program. This could then be integrated into an overall training program structure taking into account differences in foundation disciplinary training requirements, which vary between countries. Defining minimum criteria for the nature, duration, and structure of formal research training would be highly desirable. Innovative ways of delivering the needed training should be explored. These may include, for example, enrolment in a higher degree research program concurrent with clinical specialty training as a feasible model.

Who Needs Training?

Potential trainees may come from a range of medical, pharmacy, or other backgrounds. Medical trainees could include pediatricians, pediatric sub-specialists, or those who have initially trained in adult medicine. Increasingly, scientists and health professionals from a range of settings, including the pharmaceutical industry, academia, government, and non-government organizations will need to acquire training in various aspects of PCPT, either in whole or in part. Flexible and tailored programs to meet these diverse needs will be vital to delivering relevant training and building a larger pool of expertise in the field globally. Balancing such diversity against maintaining high standards in core PCPT competencies will be challenging.

The Realities: How and Where can Training Needs be Met?

Although there are indications and expectations of increasing demand for training in PCPT at a global level, the current reality is that the capacity to meet that need is suboptimal in many parts of the world. A recent survey of European Society for Developmental Perinatal, and Paediatric Pharmacology (ESDP) members found that only four European countries had more than one pediatric clinical pharmacologist and

the total number of trainees (n = 23) exceeded the number of pediatric clinical pharmacologists (n = 18). Four trainees were in centers where there was no pediatric clinical pharmacologist.¹¹¹ The limited availability of PCPT experts to act as trainers is also the reality in many other parts of the world, with the possible exception of North America.

Even in centers where there may be a pediatric clinical pharmacologist, the capacity of a single center to deliver all of the diverse training needs is often limited. This may be due to limitations in the facility (e.g. limited infrastructure or access to an appropriate mix of patients); limitations in the ability to provide adequate supervision (e.g. number, expertise, or availability of senior staff); or limitations in the range of educational or research opportunities available. In many instances, funding for such training positions may not be available. A shift from the traditional approach to training might help address such challenges. Ultimately, the appropriateness of training may need to be determined by acquisition of required core competencies through innovative and flexible models of delivery, which may include multi-site training delivered by different trainers, rather than the traditionally defined location- and duration-based training programs. This will be especially relevant to building capacity in areas of greatest need, such as the developing world. A key determinant of the success of such an approach will be developing consensus on a core curriculum for PCPT that is globally relevant. While this has proved challenging in the past, the desirability of globally transferable skills in a field such as PCPT is an increasingly relevant need for the future.

International networking in training and capacity building to help meet this need is currently under discussion and its success will be vital to the future viability of the field. Key professional organizations such as the International Union of Basic and Clinical Pharmacology (IUPHAR) and the ESDP are actively collaborating to develop new resources and innovative modes of delivery to support training in PCPT at a global level.^[4] There are also a number of excellent training resources that are currently in existence and which could be more widely utilized by trainees from different parts of the world. These include the annual ESDPEudipharm course in 'Evaluation of Medicinal

Products in Children;' the biannual 'International Workshop on Paediatric Clinical Trials' run by the Association of Clinical Research Professionals and the Journal of Pediatric and Perinatal Drug Therapy; and education days in association with regular scientific meetings, such as those of the ESDP and the American Society for Clinical Pharmacology and Therapeutics (ASCPT). In addition, training opportunities available through local universities and relevant other organizations could be more widely utilized. For example, formal programs in clinical epidemiology and pharmacoepidemiology, clinical trials methodology, or drug development,[12] offer excellent general opportunities that can be integrated with PCPT training.

Accreditation of Programs and Assessment of Trainees

Currently, trainees spend defined periods of time undertaking specified activities at accredited training sites. Not all sites have undergone an independent or formal accreditation process. Assessment of competencies is usually through a combination of formative and summative evaluations performed by the same experts who provided the training, which has obvious drawbacks. Although none of the existing programs has so far had an exit examination at a national level, this will be a requirement in the Canadian program soon (Ito S, personal communication).[13]

A potential future model of flexible training programs built around acquisition of core competencies through a variety of sites, trainers, and learning modes will increase the need for independent, competency-based assessments. With site-based training models, processes need to be established for independent evaluation of the suitability of training programs and sites, especially as new ones emerge. It is also highly desirable to have a separation of assessment from the delivery of training. Similarly, independent processes to address potential problems arising during training are needed to ensure high-quality training experiences and outcomes. Given the current limitations in numbers of available experts in most countries, the need for independent assessments (of trainers and trainees) presents additional challenges. These might also be addressed by innovative approaches in international networking.

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Medication Dosing and Renal Insufficiency in a Pediatric Cardiac Intensive Care Unit: Impact of Pharmacist Consultation

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Abstract Pediatric patients who have undergone cardiac surgery are at risk for renal insufficiency. The impact of pharmacist consultation in the pediatric cardiac intensive care unit (ICU) has yet to be defined. Patients admitted to the pediatric cardiac ICU at our institution from January through March of 2006 were included. Patient information, collected retrospectively, included: demographics, cardiac lesion/surgery, height, weight, need for peritoneal or hemodialysis, need for mechanical support, highest and lowest serum creatinine, ICU length of stay (LOS), renally eliminated medications, pharmacist recommendations (accepted or not), and appropriateness of dosing changes.

There were 140 total admissions (131 patients; age: 3.0 ± 6.3 years) during the study period. In total, 14 classes of renally eliminated medications were administered, with 32.6 ± 56.4 doses administered per patient admission. Thirty-seven patient admissions had one or more medications adjusted for renal insufficiency; the most commonly adjusted medication was ranitidine. Patients who required medication adjustment for renal dysfunction were significantly younger compared to those patients not requiring medication adjustment. Pharmacist recommendations were responsible for 96% of medication adjustments for renal dysfunction, and the recommendations were accepted and appropriate all of the time. The monetary impact of pharmacist interventions, in doses

saved, was approximately \$12,000. Pharmacist consultation can result in improved dosing of medications and cost savings. The youngest patients are most at risk for inappropriate dosing.

Keywords Renal insufficiency · Pediatric · Cardiac surgery · Intensive care · Pharmacist interventions · Medication adjustment

Introduction

Renal function is integrally involved in the disposition of medications in the human body. Because renal dysfunction is common in patients undergoing cardiac surgery, medications often require adjustment for changes in renal clearance [26]. In adult patients, failure to adjust medication doses and schedules often results in possible adverse effects and inappropriate dosing [20]. Interventions to identify patients at risk for inappropriate medication dosing secondary to renal dysfunction have been shown to improve medication utilization [6, 12].

Patients in the pediatric cardiac intensive care unit (ICU) are at considerable risk for the development of renal insufficiency. Factors contributing to renal insufficiency include low cardiac output, medications, cardiopulmonary bypass, pathophysiology, surgical procedure, and young age [2, 3, 7, 10]. Use of peritoneal dialysis and hemodialysis is therefore not uncommon [5]. A pharmacist review of medications is likely to prevent inappropriate dosing secondary to renal dysfunction [1, 14, 15]. There is currently no literature describing the impact of a pharmacist review of medications for renal dosing in the pediatric cardiac ICU.

The purposes of this study were (1) to identify the medications in the pediatric cardiac ICU that most

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frequently require adjustment for renal dysfunction, (2) to characterize the population of patients requiring medication adjustment secondary to renal insufficiency, and (3) to characterize pharmacist consultation for adjustment of medications due to renal insufficiency in the pediatric cardiac ICU.

Materials and Methods

A renal dosing program was initiated in the pediatric cardiac ICU at our institution in August 2003. The pharmacy computer system was configured to automatically calculate creatinine clearance (CrCl) from serum creatinine (SCr) values according to the modified Schwartz equation, for pediatric patients, or the Cockcroft-Gault equation, for adult patients [8, 22]. The pharmacy staff in the ICU was required to evaluate patient medication profiles relative to patient CrCl on a daily basis. As indicated, pharmacists made recommendations to the medical team in accordance with guidelines for medication dosing in renal dysfunction located in the institutional medication formulary, which was adapted from *Pediatric Dosage Handbook*, 13th ed. [23].

Patients admitted to the pediatric cardiac ICU at our institution from January through March of 2006 were identified and a waiver of consent was obtained from the investigational review board. Patients were included in the study if they were admitted to the pediatric cardiac ICU for greater than 24 h during the study period, received at least one medication, and had at least one SCr level drawn. Patients were excluded if they spent less than 24 h admitted to the ICU, did not receive any medications while admitted to the ICU, or did not have a SCr level. Medications that are monitored by serum concentrations (e.g., aminoglycosides, enoxaparin, vancomycin) were not included in the evaluation, as renal insufficiency is not the only factor affecting their disposition. Angiotensin-converting enzyme (ACE) inhibitors, such as captopril or enalapril, are initiated at very low doses and titrated to effect over a period of days and, therefore, are not adjusted in patients with decreased renal function in our institution.

Patient information, collected retrospectively, included: demographics, cardiac lesion/surgery, height, weight, use of peritoneal or hemodialysis, need for mechanical circulatory support, high and low SCr and CrCl, ICU length of stay (LOS), medications that are renally eliminated, response to pharmacist recommendations, and appropriateness of dosing changes according to CrCl.

Appropriateness of pharmacist recommendations was assessed by the accuracy of the recommendation according to institutional guidelines. Monetary impact of pharmacist interventions was determined by calculating the number of doses that were saved by appropriately decreasing

medication doses or schedules for renal insufficiency. Patient charge, determined from current medication buying contracts and pricing, was used as the basis for determining cost savings.

Data are presented as mean \pm standard deviation, unless otherwise noted. Comparisons between groups were performed with the Wilcoxon rank sum test for nonparametric data and Fisher's exact test for categorical data.

Results

There were 140 admissions (131 patients) to the pediatric cardiac ICU during the study period, and the mean patient age on the day of admission was 3.0 ± 6.3 years (median: 168 days; range: 1 day–44 years). The mean length of stay in the ICU was 6.3 ± 8.8 days (median: 4.0 days; range: 1–65 days). Twenty-four (17.1%) admissions did not involve surgical intervention. Of the remaining 116 (82.8%) surgical admissions, 100 (86.2%) required cardiopulmonary bypass. Peritoneal dialysis was utilized in a small number of patients (19 admissions, 13.6%), and no patients underwent hemodialysis. Three (2.1%) admissions were on a form of mechanical circulatory support. Six (4.3%) admissions underwent delayed sternal closure.

The mean low and high calculated CrCl for the study cohort was 74.0 ± 37.6 ml/min/1.73 m² and 115.5 ± 56.5 ml/min/1.73 m², respectively. A reduced CrCl (<50 ml/min/1.73 m²) was observed in 40 (28.6%) admissions, a CrCl <35 ml/min/1.73 m² was observed in 21 (15.0%) admissions, and no patients had a CrCl <10 ml/min/1.73 m².

Fourteen classes of medications requiring adjustment in renal dysfunction, according to institutional guidelines, were prescribed during the study period (Table 1). A median of 18 doses (range: 1–414) of renally eliminated medications were administered per patient admission. Two patients did not receive any renally eliminated medications.

Patients who required medication adjustment for renal dysfunction were significantly younger and smaller than those patients who did not require medication adjustment. However, patients were not more likely to have undergone cardiopulmonary bypass or to have a single ventricle physiology (Table 2).

Thirty-seven (26.4%) patient admissions required adjustment of one or more medications due to renal dysfunction. Thirty-six (97.3%) of these admissions had one or more medications appropriately adjusted for renal dysfunction, according to institutional guidelines, and ranitidine was the most common medication adjusted for renal dysfunction (34 admissions, 91.8%) (Fig. 1, Table 3). Nine patients required readjustment of medications for improved renal function.

Table 1 Classes of renally eliminated medications prescribed

Medication class	Total no. of doses administered
Antibiotics	1530
Histamine-2 antagonists	1375
ACE inhibitors	821
Diuretics	167
Beta-blockers	138
Antihypertensives	140
Prokinetic agents	125
Immunosuppressants	49
Antifungal agents	43
Antiviral agents	42
Antiepileptics	28
Digoxin	27
Antiarrhythmics	27
Colchicine	5
Uricosuric agents	5

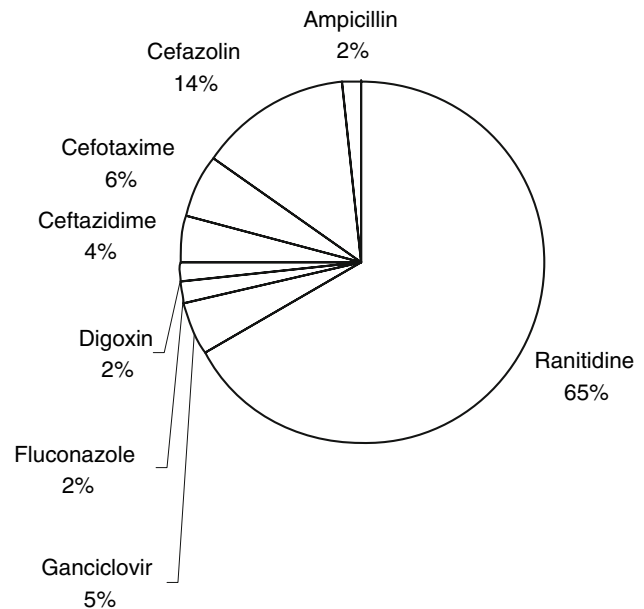
Table 2 Patient factors associated with adjustment of medications for renal dysfunction

Category	Medications adjusted (<i>n</i> = 37)	Medications not adjusted (<i>n</i> = 103)	<i>p</i> -Value
Length of stay (days)	11.2 ± 13.6	4.5 ± 4.9	<0.0001
Weight (kg)	5.9 ± 15.1	14.5 ± 18.6	<0.0001
Height (cm)	51.9 ± 21.9	78.1 ± 30.6	<0.0001
Age (months)	0.9 ± 1.1	36.5 ± 76.4	<0.0001
Presence of CPB	64.8%	75.7%	NS
>18 years of age	2.7%	5.8%	NS
Univentricular anatomy	20%	26.2%	NS

Seventy-seven (91.6%) of 84 courses of medication were appropriately adjusted for renal dysfunction. Pharmacists were responsible for 74 (96%) adjustments and physicians were responsible for 3 (4%) adjustments for renal dysfunction. Pharmacist recommendations for adjustment of medications were accepted 100% of the time. The monetary impact of pharmacist interventions, in doses saved, was \$12,482.54.

Discussion

Renal dysfunction can be a common occurrence in cardiac intensive care. Reports have documented the incidence of renal insufficiency, according to the RIFLE criteria, in adults after cardiac surgery as high as 19.6% [19]. Subsequently, programs to improve the use of medications in

**Fig. 1** Medications adjusted secondary to renal dysfunction

adult patients with renal insufficiency have been adopted. In our study population, 15% (21/140) of the admissions had renal insufficiency during ICU admission. Appropriate dosing of medications for critically ill patients with renal insufficiency is important for therapeutic, safety, and cost-effective reasons.

Although the Schwartz and Cockcroft-Gault equations are the current standard for calculation of CrCl in the clinical setting, most publications evaluating the Schwartz equation have identified an overestimation in the calculations [8, 13, 22]. Harrison et al. demonstrated that the Schwartz equation overestimates CrCl in neonates after surgery for hypoplastic left heart syndrome or transposition of the great arteries, which could lead to toxic concentrations of drugs eliminated by the kidneys [16]. If a more accurate method for estimation of CrCl is developed, there will likely be a larger incidence of patients requiring medication adjustments for renal dysfunction.

Due to significant renal insufficiency in some patients, our study population had instances of peritoneal dialysis use. Elimination of medications might be affected by peritoneal dialysis. However, there are very little data on the removal of medications due to peritoneal dialysis, and medications were not adjusted for the effects of peritoneal dialysis in our cohort [11, 17, 21]. Similarly, medications were not adjusted solely due to mechanical circulatory support, which might or might not include hemodialysis or hemofiltration [4].

Medication adjustment was more common in younger patients. Decreased renal function after cardiac surgery is a common occurrence in neonates [2, 3, 7, 9, 10]. This likely is due to the developmental changes in the kidney

Table 3 Guidelines for adjustment of medications in patients with renal dysfunction

Medication	Creatinine clearance (ml/min/1.73 m ²)	Adjustment schedule
Ampicillin	10–30	Administer every 8–12 h
	<10	Administer every 12 h
Cefazolin	10–30	Administer every 12 h
	<10	Administer every 24 h
Cefotaxime	10–50	Administer every 12 h
	<10	Administer every 24 h
Ceftazidime	30–50	Administer every 12 h
	10–29	Administer every 24 h
	<10	Administer every 48–72 h
Digoxin	10–50	Reduce dose 25–75% or administer every 36 h
	<10	Reduce dose 75–90% or administer every 48 h
Fluconazole	21–50	Reduce dose 50%
	11–20	Reduce dose 75%
Ganciclovir	50–69	2.5 mg/kg/dose every 24 h
	25–49	1.25 mg/kg/dose every 24 h
	10–24	0.625 mg/kg/dose every 24 h
	<10	0.625 mg/kg/dose 3 times/week following hemodialysis
Ranitidine	<50	Administer every 18–24 h

occurring early in life in addition to the inflammatory pathophysiology associated with cardiopulmonary bypass [2, 3, 7, 9, 10]. Additionally, younger patients might have had a higher acuity of illness, as reflected by the increased mean LOS.

Ranitidine was the medication most frequently requiring adjustment for renal dysfunction in our study group. Ranitidine is the standard for stress ulcer prophylaxis after cardiovascular surgery at our institution. Although the clinical risks associated with overdosing of ranitidine are not great, the cost benefit associated with appropriate ranitidine dosing was significant in our cohort [24].

Pharmacist involvement in pediatric patient pharmacotherapy has been documented to be beneficial [1, 14, 15, 18, 25]. Additionally, in pediatric intensive care patients, pharmacist involvement has been noted to decrease the cost of care, decrease medication errors, and optimize medical therapies via several types of activities [18]. This is the first account of pharmacist interventions focusing solely on medication adjustment in renal insufficiency in patients in a cardiac ICU. The extrapolated cost savings of ~\$50,000 per year is substantial, demonstrating the benefit of a multidisciplinary approach to pediatric critical care.

Conclusions

Patients in the pediatric cardiac ICU receive many medications that require adjustment for renal insufficiency, with the youngest patients most at risk for inappropriate dosing.

Pharmacist consultation can result in improved dosing of medications and substantial cost savings.

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Unit-based clinical pharmacists' prevention of serious medication errors in pediatric inpatients

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In 1999, the Institute of Medicine (IOM) report *To Err Is Human* estimated that 44,000–98,000 people die each year at least in part because of medical error.¹ This galvanized the patient safety movement in the United States, although a number of previous studies had documented the frequency and serious consequences of medication errors.^{2–6} Errors occur in about 5% of medication orders for adult patients; approximately 1 out of 7 of these errors has significant potential for harm.⁷ Less is known about the frequency of errors in pediatric patients, but children may be at even greater risk. Medication error rates in pediatric inpatients have been reported to be as high as 1 in every 6.4 orders.⁸ In a previous study in pediatric inpatients, we found that although medication error and preventable adverse drug event (ADE) rates were similar to those in adults, the rate of potentially harmful errors (potential ADEs or near misses) was almost three times higher in children.⁹

Most current efforts to reduce medication error rates focus on

Purpose. Rates of serious medication errors in three pediatric inpatient units (intensive care, general medical, and general surgical) were measured before and after introduction of unit-based clinical pharmacists.

Methods. Error rates on the study units and similar patient care units in the same hospital that served as controls were determined during six- to eight-week baseline periods and three-month periods after the introduction of unit-based clinical pharmacists (full-time in the intensive care unit [ICU] and mornings only on the general units). Nurses trained by the investigators reviewed medication orders, medication administration records, and patient charts daily to detect errors, near misses, and adverse drug events (ADEs) and determine whether near misses were intercepted. Two physicians independently reviewed and rated all data collected by the nurses. Serious medication errors were defined

as preventable ADEs and nonintercepted near misses.

Results. The baseline rates of serious medication errors per 1000 patient days were 29 for the ICU, 8 for the general medical unit, and 7 for the general surgical unit. With unit-based clinical pharmacists, the ICU rate dropped to 6 per 1000 patient days. In the general care units, there was no reduction from baseline in the rates of serious medication errors.

Conclusion. A full-time unit-based clinical pharmacist substantially decreased the rate of serious medication errors in a pediatric ICU, but a part-time pharmacist was not as effective in decreasing errors in pediatric general care units.

Index terms: Clinical pharmacists; Clinical pharmacy; Errors, medication; Hospitals; Interventions; Pediatrics; Pharmaceutical services

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information technology (IT)-based interventions. Computerized prescriber order entry (CPOE) has received the greatest publicity, largely because of its strong theoretical rationale and early studies showing

notable reductions in errors.^{10–13} For example, CPOE reduced nonintercepted serious medication errors by 86% from baseline in a large tertiary-care hospital.¹⁴ CPOE decreased medication errors by 40% in a tertiary-

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care pediatric hospital; ADEs were reduced by 41% in a pediatric critical care unit.^{15,16} More recently, studies have suggested that CPOE, like any intervention, can lead to new types of errors, especially during the early phase of technology deployment and dissemination.¹⁷ Furthermore, CPOE is expensive to install and update.

It is important, therefore, to evaluate other, non-IT approaches to reducing medical error. For example, standardized protocols, education programs, and initiatives that address institutional culture may be efficacious in reducing medication error rates, although the evidence base for these interventions is quite limited.^{18,19} The use of unit-based clinical pharmacists is perhaps the most promising non-IT-based intervention. Leape et al.²⁰ found that having a clinical pharmacist participate on physician rounds in an adult intensive care unit (ICU) decreased preventable ADEs at the prescription-writing stage by 66%, while Kucukarslan et al.²¹ found that unit-based clinical pharmacists reduced preventable ADEs at the same stage by 78%. These studies, conducted on adult units in single institutions, focused primarily on errors in ordering medications. Few studies have focused on errors at all stages of the medication-use process in children.

We hypothesized that unit-based clinical pharmacists might be able to reduce rates of serious medication errors in pediatric inpatients in both ICU and general care unit settings. Our study was designed to test this hypothesis in pediatric inpatient units of an academic medical center.

Methods

Study site. The prospective cohort study was conducted at a freestanding pediatric teaching hospital located in an urban area with a socioeconomically diverse patient population. Fewer than 5% of the patients treated

are adults, most of whom have complex long-term medical and surgical conditions. At the time of this study, physicians wrote orders on paper charts. Copies were sent to the pharmacy, and nurses transcribed orders into the medication administration record (MAR). Before the study intervention, dispensing pharmacists sent ready-to-administer doses to the patient care units but participated only intermittently in unit-based rounds.

We studied the error rates before and after pharmacist intervention in two general medical units, two general surgical units, the pediatric ICU, and the cardiac ICU. The pairs of general units were selected because of their similar characteristics and patient populations. The ICUs, however, had differences in case mix; whereas the cardiac ICU served primarily patients with heart diseases, the pediatric ICU had patients from the general surgery, neurosurgery, orthopedic, craniofacial reconstruction, otolaryngology, and medicine services. One of the medical units and one of the surgical units were randomly selected as experimental groups, and the others served as controls. The pediatric ICU was randomly selected as an experimental group; the cardiac ICU served as its control. Despite the differences between cardiac ICU patients and pediatric ICU patients, these were the most similar patient populations in terms of severity and complexity of disease. The hospital's human subjects research committee approved the study protocol.

Definitions. We used IOM definitions for the study.¹ Medication errors were defined as errors in drug ordering, transcribing, dispensing, administering, or monitoring. Medication errors with significant potential for injuring patients were defined as near misses or potential ADEs. Near misses were further subdivided into intercepted and nonintercepted potential ADEs. Whereas intercepted near misses were corrected before the

medication reached the patient, non-intercepted near misses were administered but did not cause any harm. ADEs were defined as injuries that resulted from the use of a drug.²² An ADE was considered preventable if it was associated with a medication error and nonpreventable if it was not. For example, a rash due to penicillin in a known penicillin-allergic patient was considered a preventable ADE, whereas a penicillin-related rash in a patient with no known allergies was a nonpreventable ADE. Serious medication errors were defined as preventable ADEs and nonintercepted near misses. An effective patient safety intervention should decrease serious medication error rates, but it may increase rates of intercepted near misses. These same definitions have been used in previous studies.^{13,14}

We used the term "unit-based clinical pharmacist" to describe a pharmacist whose duties include making rounds with physicians as well as monitoring drug dispensing, storage, and administration. The unit-based clinical pharmacists all had earned the Doctor of Pharmacy degree and had comparable skill levels. In contrast, the primary role of "dispensing pharmacists" at our institution is to dispense medications.

Data collection. Before collecting data, we enlisted the support of staff members and educated them on the study's purpose and methods. We trained nurse data collectors for two weeks to develop a comprehensive, uniform approach to error detection. Interrater reliability was verified in the month before formal data collection and again every other month during the study period.

Baseline data were collected for six to eight weeks in each unit during a six-month period from March to August 2000. After the introduction of unit-based clinical pharmacists, data were collected concurrently in each intervention and control ICU or general unit pair

for three months between June and November 2000.

Medication errors, near misses, and ADEs were identified through detailed review of all medication orders, MARs, and patient charts by a nurse data collector randomly assigned to each study unit on a daily basis. These reviews were performed each weekday and on Mondays for the previous weekend. To compile as complete a list as possible, we also solicited reports of errors from house officers, nurses, and pharmacists. Reporting a medication error did not trigger a review of clinical data; rather, all clinical data were reviewed daily for all patients enrolled in the study. All reported errors had previously been identified in the review process.

Data collected for each error, near miss, or ADE included the drug name, dose, route, and category; the point in the system at which the error occurred; the type of error; medical teams involved; and additional work resulting from the error. The data collectors evaluated whether near misses had been intercepted. Data on the complexity of individual drug regimens, including number and types of drugs, were recorded. Clinical and demographic data were collected from patient records and institutional administrative databases. Morbidity and disability data were collected until discharge for all patients with an ADE.

Two physicians independently reviewed each suspected ADE and near miss and classified them as ADEs, near misses, or medication errors. The reviewers were blinded to the time period (i.e., before or after intervention) and the unit location of events in order to minimize potential bias. The reviewers used a four-point Likert scale to rate the severity of injury for ADEs and near misses. Preventability of ADEs was rated on a five-point Likert scale, and attribution (i.e., the likelihood that an incident was due to the specific

drug) was rated with the algorithm of Naranjo et al.²³ Disagreements between reviewers were resolved through discussion and consensus.

Intervention. After baseline error rates were obtained for all six units, a unit-based clinical pharmacist was added to the team in one medical unit, one surgical unit, and one ICU. These pharmacists' primary role was to provide physicians with timely information and advice on ADEs, drug interactions, and appropriate dosages, dose intervals, and routes of administration. In addition, they facilitated communication between the medical care team and the pharmacy and assisted nurses with drug preparation by providing information on administration and monitoring. They also helped monitor the order transcription process and the medication preparation, storage, and distribution systems. The pharmacist was an integral part of the unit-based continuous quality-improvement (CQI) team, which included a unit nurse administrator, a unit attending physician, a member of the unit nursing staff, a member of the house staff, and one of the study's principal investigators or coinvestigators. The CQI team met bimonthly to review serious medication errors and to design process changes and system improvements to be implemented after the completion of data collection.

In the ICU, the pharmacist was present full-time (40 hours per week) and participated daily in physician rounds. In the general medical and surgical units, the pharmacist was available only on a part-time basis during morning hours. The pharmacist in the general surgical unit often had difficulty attending rounds with surgeons, which occurred in the early morning before the start of daytime pharmacist shifts and before scheduled surgeries. In the general medical unit, the pharmacist tended to leave shortly after physician rounds were completed.

Statistical methods. We report preintervention and postintervention rates of serious medication errors (nonintercepted near misses and preventable ADEs) per 1000 patient days, assuming a Poisson distribution. Measures of interrater reliability (before discussion and consensus) were calculated using the kappa statistic, with moderate-to-excellent levels of agreement (0.75 for incident classification). The a priori level of significance was 0.05.

Results

During the study period, we examined a total of 1249 admissions in the ICUs, 1690 admissions in the general medical units, and 1924 admissions in the general surgical units. Table 1 summarizes patient demographics. Preintervention patients were generally similar to postintervention patients in all studied units, with most variation occurring in age distribution.

Table 2 summarizes serious medication error rates. The ICU with the full-time unit-based clinical pharmacist had a decrease in serious medication errors from 29 per 1000 patient days before the intervention to 6 per 1000 patient days after the intervention ($p < 0.01$). On the other hand, during the intervention period, the rate of intercepted near misses in the intervention ICU increased from 32 to 57 per 1000 patients ($p = 0.08$). There was no significant difference between the two ICUs in the preintervention rates of serious medication errors. There were 33 fewer net serious medication errors per 1000 patient days in the intervention ICU (where the reduction was 23 errors per 1000 patient days) than in the control ICU (where the rate increased by 10 errors per 1000 patient days) ($p < 0.001$). There was no reduction in the rate of serious medication errors with pharmacist participation in the general units. In both ICUs, a majority of detected errors occurred at the drug ordering stage (67–100%).

Table 1.
Demographic Characteristics of Study Patients^a

Characteristic	Intervention Unit		Control Unit	
	Preintervention	Postintervention	Preintervention	Postintervention
<i>Intensive Care Units</i>				
<i>n</i>	209	401	280	359
Mean LOS (days) (95% CI)	5.94 (4.12–7.76)	6.50 (4.80–8.19)	5.45 (4.29–6.62)	6.28 (4.92–7.65)
No. (%) female	79 (38)	179 (45)	128 (46)	169 (47)
Race (no. [%])				
White	129 (62)	253 (63)	190 (68)	221 (62)
Black	18 (9)	36 (9)	17 (6)	19 (5)
Asian	6 (3)	9 (2)	6 (2)	8 (2)
Hispanic	15 (7)	31 (8)	14 (5)	26 (7)
Other	7 (3)	23 (6)	22 (8)	32 (9)
Unknown	34 (16)	49 (12)	31 (11)	53 (15)
Age (no. [%])				
0–1 mo	17 (8)	34 (8)	44 (16)	78 (22)
2 mo–1 yr	39 (19)	81 (20)	64 (23)	100 (28)
2–5 yr	37 (18)	78 (19)	47 (17)	58 (16)
6–12 yr	54 (26)	87 (22)	54 (19)	55 (15)
13–19 yr	52 (25)	86 (21)	55 (20)	35 (10)
>19 yr	10 (5)	35 (9)	16 (6)	33 (9)
No. (%) with Medicaid	51 (24)	83 (21)	52 (19)	85 (24)
<i>General Medical Units</i>				
<i>n</i>	56	296	383	955
Mean LOS (days) (95% CI)	4.49 (3.21–5.77)	5.70 (4.73–6.66)	2.89 (2.47–3.31)	2.88 (2.52–3.24)
No. (%) female	26 (47)	143 (48)	172 (45)	428 (45)
Race (no. [%])				
White	29 (53)	182 (61)	187 (49)	485 (51)
Black	10 (18)	37 (13)	51 (13)	140 (15)
Asian	2 (4)	4 (1)	16 (4)	30 (3)
Hispanic	6 (11)	35 (12)	57 (15)	161 (17)
Other	1 (2)	15 (5)	31 (8)	47 (5)
Unknown	7 (13)	23 (8)	41 (11)	92 (10)
Age (no. [%])				
0–1 mo	2 (4)	20 (7)	56 (15)	187 (20)
2 mo–1 yr	17 (30)	37 (13)	176 (46)	289 (30)
2–5 yr	5 (9)	50 (17)	76 (20)	204 (21)
6–12 yr	18 (32)	96 (32)	58 (15)	168 (18)
13–19 yr	12 (21)	73 (25)	15 (4)	98 (10)
>19 yr	2 (4)	20 (7)	2 (1)	9 (1)
No. (%) with Medicaid	17 (30)	81 (27)	89 (23)	188 (20)
<i>General Surgical Units</i>				
<i>n</i>	369	745	279	531
Mean LOS (days) (95% CI)	3.53 (2.88–4.18)	3.74 (3.33–4.14)	4.46 (3.68–5.24)	6.60 (4.10–9.10)
No. (%) female	188 (51)	370 (50)	112 (40)	223 (42)
Race (no. [%])				
White	286 (78)	557 (75)	195 (70)	388 (73)
Black	16 (4)	48 (6)	18 (6)	36 (7)
Asian	9 (2)	13 (2)	5 (2)	7 (1)
Hispanic	19 (5)	45 (6)	27 (10)	39 (7)
Other	13 (4)	20 (3)	10 (4)	23 (4)
Unknown	26 (7)	62 (8)	24 (9)	38 (7)

Continued on next page

Table 1 (continued)

Characteristic	Intervention Unit		Control Unit	
	Preintervention	Postintervention	Preintervention	Postintervention
Age (no. [%])				
0–1 mo	0	2 (0)	32 (11)	59 (11)
2 mo–1 yr	18 (5)	33 (4)	139 (50)	253 (48)
2–5 yr	46 (13)	72 (10)	93 (33)	155 (29)
6–12 yr	129 (35)	273 (37)	15 (5)	56 (11)
13–19 yr	143 (39)	287 (39)	0	8 (2)
>19 yr	33 (9)	78 (10)	0	0
No. (%) with Medicaid	55 (15)	117 (16)	41 (15)	75 (14)

*Data are reported for preintervention and postintervention periods, although no intervention occurred in the control units. LOS = length of stay, CI = confidence interval.

Interception of errors by unit-based clinical pharmacists occurred at all stages of the medication process, with most intercepted errors (79%) occurring at the physician ordering stage.

The increase in the serious medication error rate in the control ICU was largely attributable to an incorrect preprinted order template for acetaminophen that resulted in the ordering of significant overdoses. After excluding these acetaminophen errors from our data analysis, there would still be a net of 30 fewer serious medication errors per 1000 patient days in the intervention ICU than in the control ICU ($p = 0.01$). The acetaminophen template error was recognized and rectified through review of data by the CQI team.

Discussion

Our results suggest that the introduction of a full-time unit-based clinical pharmacist was associated with a 79% reduction in the serious medication error rate in critically ill pediatric inpatients. However, we found no apparent effect from adding part-time unit-based clinical pharmacists to the general medical and surgical units. Because of the low baseline error rates on these units, the study may have been underpowered to detect a difference associated with the intervention. We speculate, however, that the primary reason for efficacy of the intervention only in

the ICU may have been the full-time presence of the pharmacist in the ICU and only part-time involvement in the general medical and surgical units.

Some patient care units appear to have organizational characteristics that either facilitate or impede collaboration with a clinical pharmacist. For example, rounds in the ICU were conducted with a multidisciplinary team at the bedside, whereas rounds in the general medical and surgical units were often conducted away from the bedside and orders were not entered during rounds. Such procedural differences may have mitigated the ability of the pharmacist to correct errors in real time. In addition, the ICU tends to treat fewer patients, and house staff physicians usually are in or near the unit and easily accessible to staff, including unit-based clinical pharmacists. In the general units, patients are more spread out, and each physician is responsible for more patients, often on multiple floors. In addition, surgeons spend a considerable portion of each day in the operating room; although the surgeons had a covering nurse practitioner, it has been previously demonstrated that opportunities for error increase when decision-making responsibilities are “handed off” from one provider to another.^{24,25}

Further research is necessary to determine if the addition of a full-time unit-based clinical pharmacist

and increased physician–pharmacist interaction decrease medication errors in the general medical or surgical unit setting. A recent study by Kucukarslan et al.²¹ suggests that pharmacist participation on a general medicine unit may indeed contribute to a significant reduction in preventable ADEs. Our study supports the conclusion that adding pharmacists to medical and surgical rounds is challenging. Altering the shifts of clinical pharmacists so that they are available early for surgeons’ rounds, having them available throughout the day, and having them make rounds with covering nurse practitioners are strategies for improving their effectiveness on general medical or surgical units.

The benefit of unit-based clinical pharmacists in the pediatric ICU in this study is similar to what has been observed in adult ICUs. We found a 79% decrease in the rate of serious medication errors in the pediatric ICU, while Leape et al.,²⁰ using a very similar method, found a 66% decrease in preventable ADEs at the ordering stage in an adult ICU. Our study showed a decrease in serious medication error rates at all stages, whereas Leape et al. were concentrating on errors at the ordering stage.

Like many previous studies, our study documented higher rates of serious medication errors in the pediatric intensive care setting.^{9,22} This is likely the result of greater patient

Table 2.

Occurrence of Serious Medication Errors (SMEs) in Study Units^a

Variable	Intervention Unit		Control Unit	
	Preintervention	Postintervention	Preintervention	Postintervention
<i>Intensive Care Units</i>				
No. patient days	311	835	1062	759
No. SMEs	9	5	21	23
SMEs/1000 patient days	29	6	20 ^b	30 ^c
<i>General Medical Units</i>				
No. patient days	660	1163	604	1319
No. SMEs	5	10	4	10
SMEs/1000 patient days	8	9	7 ^d	8 ^e
<i>General Surgical Units</i>				
No. patient days	573	1109	737	1253
No. SMEs	4	10	6	12
SMEs/1000 patient days	7	9	8 ^f	10 ^g

^aData are reported for preintervention and postintervention periods, although no intervention occurred in the control units.

^b $p = 0.38$ for comparison with intervention unit.

^c $p < 0.01$ for comparison with intervention unit.

^d $p = 0.84$ for comparison with intervention unit.

^e $p = 0.78$ for comparison with intervention unit.

^f $p = 0.81$ for comparison with intervention unit.

^g $p = 0.89$ for comparison with intervention unit.

morbidity and medication complexity. Implementing error prevention strategies such as the use of unit-based clinical pharmacists in ICUs is particularly efficacious because of these higher baseline error rates.

Despite a growing body of data demonstrating the potential of unit-based clinical pharmacists to decrease medication errors, only 30% of hospitals nationwide have pharmacists participating in physician rounds.²⁶ Pharmacists actively participating in rounds provide real-time advice to physicians in the same way that CPOE systems provide real-time computerized decision support. Studies have demonstrated that physicians are much more amenable to changing therapeutic direction when advice is given before rather than after order completion.²⁷ Since about 80% of near misses in pediatric inpatients occur during medication ordering,⁹ unit-based clinical pharmacists can intercept errors and inform clinical choices before orders are finalized. They can also intercept other types of medication errors by independently monitoring the transcription, drug preparation, storage, and dispensing of medications.

In addition to being effective, unit-based clinical pharmacists are practical and financially justifiable. Both adult and pediatric ICUs have shown significant cost savings from implementation of a unit-based clinical pharmacist program.^{28,29} Unit-based clinical pharmacists are generally less expensive than most IT-based patient safety interventions, which can cost millions of dollars to implement and maintain.³⁰ By restructuring existing pharmacist resources from centralized to unit-based positions, hospitals can quickly decrease errors and, perhaps, the overall cost of care.

Our study has several limitations. First, it was performed in a single, freestanding academic pediatric hospital, which limits its generalizability. Ideally, unit-based clinical pharmacists would have been present full-time on all study units, but this was not achieved. It also seems likely that the individual attributes of clinical pharmacists have an important impact on their efficacy in reducing error rates. However, given the single-institution design of this study, we were unable to assess such factors.

Conclusion

A full-time unit-based clinical pharmacist substantially decreased the serious medication error rate in the pediatric intensive care setting, but a part-time pharmacist was not as effective in general care pediatric units.

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Effects of a pharmacist-led pediatrics medication safety team on medication-error reporting

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Medication errors have been recognized as one of the major causes of iatrogenic disease in the United States and have risen to the forefront of safety initiatives in health care institutions.^{1,2} It has been estimated that 44,000–98,000 people die each year in the United States as a result of a medication error.³ Medication errors are prevalent in both adult and pediatric populations. Errors have the capacity to result in harm and can occur during any phase of the medication-use process. Although medication errors occur at similar rates in the adult and pediatric populations, errors in pediatric patients have three times the potential to cause harm.⁴ Compared with errors that occur in adults, medication errors in children are understudied and most likely underreported.⁵

Medication errors have been reported in a variety of pediatric settings, including general pediatrics wards, pediatric intensive care units (PICUs), neonatal intensive care units, and pediatric emergency departments.^{1,3–6} Children in intensive care settings are at greatest risk for iatrogenic complications, most likely a result of environmental intensity, clinical symptoms, severity of illness,

Purpose. The effects of a pharmacist-led pediatrics medication safety team (PMST) on the frequency and severity of medication errors reported were studied.

Methods. This study was conducted in a pediatric critical care center (PCCC) in three phases. Phase 1 consisted of retrospective collection of medication-error reports before any interventions were made. Phases 2 and 3 included prospective collection of medication-error reports after several interventions. Phase 2 introduced a pediatrics clinical pharmacist to the PCCC. A pediatrics clinical pharmacist-led PMST (including a pediatrics critical care nurse and pediatrics intensivist), a new reporting form, and educational forums were added during phase 3 of the study. In addition, education focus groups were held for all intensive care unit staff. Outcomes for all phases were measured by the number of medication-error reports processed, the number of incidents, error severity, and the specialty of the reporter.

Results. Medication-error reporting increased twofold, threefold, and sixfold between phases 1 and 2, phases 2 and 3, and phases 1 and 3, respectively. Error severity decreased over the three time periods. In phases 1, 2, and 3, 46%, 8%, and 0% of the errors were classified as category D or E, respectively. Conversely, the reporting of near-miss errors increased from 9% in phase 1 to 38% in phase 2 and to 51% in phase 3.

Conclusion. An increase in the number of medication errors reported and a decrease in the severity of errors reported were observed in a PCCC after implementation of a PMST, provision of education to health care providers, and addition of a clinical pharmacist.

Index terms: Clinical pharmacists; Documentation; Education; Errors, medication; Forms; Health professions; Hospitals; Interventions; Pediatrics; Reports; Team
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comorbidities, and an inability to communicate.^{1,7,8}

Multiple studies have analyzed error-prevention strategies utilizing a clinical pharmacist.^{1–4,9} Several reports have shown that ward-based clinical pharmacists reduce medication errors.^{9–12} Other studies have ad-

ressed collaboration between nursing and other disciplines, but only a limited number of articles have been published regarding nurse–pharmacy collaboration.¹³ An extensive review of the literature did not produce any studies evaluating the effects of a nurse–pharmacist team on medi-

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cation errors in a PICU. However, intensive care outcomes resulting from interdisciplinary collaboration among nursing, medicine, and other disciplines have been reported.^{14,15} We hypothesized that the use of an interdisciplinary team, including a nurse, pharmacist, and physician, would reduce the severity of medication errors through nonpunitive reporting and increased awareness through staff education. The objectives of the study were to increase medication-error reporting and reduce the severity of medication errors reported in the pediatric critical care center (PCCC) by implementing a pediatrics medication safety team (PMST), comprising a pediatrics clinical pharmacist, a pediatrics critical care nurse, and a pediatrics medical intensivist.

Methods

The study was approved by the hospital's institutional review board and conducted in three phases in a 19-bed PCCC. Phase 1, conducted between September and December of 2004, involved a retrospective analysis of medication-error reports retrieved from the institution's medication-incident database. The reports were sorted by number of incidents, error type, severity, and specialty of reporter (i.e., nurse, physician, pharmacist, or dietitian). During phase 2, conducted between February and May of 2005, a clinical pharmacist was introduced to the PCCC. The pharmacist's effect on medication errors was analyzed prospectively utilizing the existing medication-error reporting system. When phase 2 was completed, three variables were introduced to the pediatrics critical care staff: a PMST, a new reporting system, and monthly focus groups. The PMST included a nurse leader, medical director, and clinical pharmacist, all of whom had expertise in pediatrics critical care.

The new medication-incident reporting form was adapted from

Cimino et al.¹⁶ (Figure 1). When a medication incident was identified, the form was completed and placed in a labeled box kept in the medication room of the PCCC. Staff were not required to sign the form or identify themselves in any manner. Inservice education on the reporting process was provided to all staff. At the end of each month, the nurse leader and pharmacist reviewed the medication-incident reports. Each incident was subsequently entered into the medication-incident database by the clinical pharmacist. The database classifies incidents by severity (appendix).

Education was provided to health care providers during patient care rounds and during monthly open forums with the critical care staff and the PMST. All monthly forums were interactive. At the beginning of each meeting, the prior month's medication incidents were addressed using root-cause analysis. This method was used to discover and address system flaws, instead of focusing on individual staff members. During the second part of each meeting, the new reporting process was reviewed and staff brainstormed to develop innovative ways to prevent future medication errors. The outcomes of these interventions were measured prospectively in phase 3 (June–September 2005).

Results

A total of 109 medication-error reports were identified between June and September of 2005. Over the three phases of the study, patient volume remained constant in the PCCC. The total numbers of reported errors for each phase of the study are shown in Figure 2. There was a twofold increase in medication-error reporting between phase 1 (baseline) and phase 2 and a sixfold increase between phases 1 and 3. A threefold increase was observed between phases 2 and 3. Table 1 shows the occurrence of medication errors during phase 3 by

error type and discipline (nursing, medicine, pharmacy). Medication omission (dispensing delay in service or error in administration time), wrong medication, and wrong dose accounted for the highest number of reported errors. Error severity decreased over the three time periods. In phases 1, 2, and 3, 46%, 8%, and 0% of the errors reported were category D or E, respectively. Conversely, the reporting of near-miss errors increased from 9% in phase 1 to 38% in phase 2 and to 51% in phase 3.

Discussion

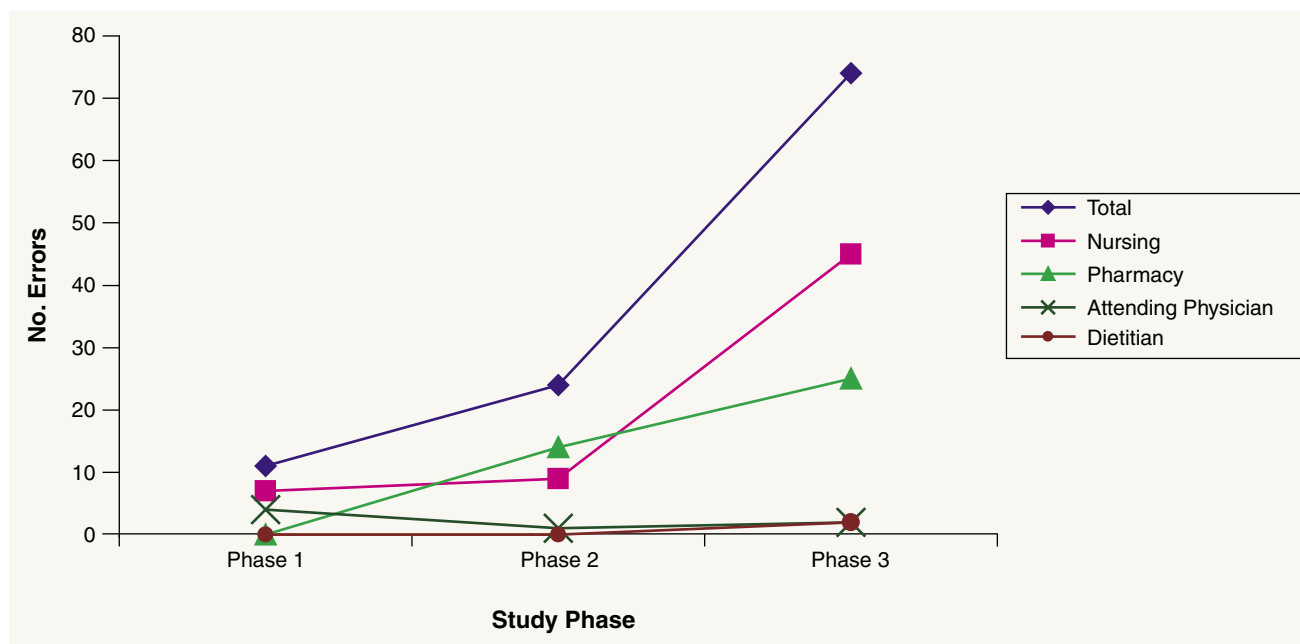
Medication-error reporting was increased and the severity of medication errors reduced in the PCCC after the implementation of a PMST, educational forums, and the addition of a clinical pharmacist. Overall, medication-error reporting increased during phases 2 and 3. We anticipated that the increase in phase 2 would result from the introduction of a clinical pharmacist, who would raise staff awareness of medication safety and encourage reporting of all incidents. However, the increased reporting in phase 2 did not demonstrate the anticipated change, since the increase was almost entirely accounted for by incidents captured during rounds and chart review by the clinical pharmacist. These findings demonstrated that the introduction of a clinical pharmacist did not change the existing culture of medication-incident reporting during the study period. Reports made by nursing staff remained relatively constant, and physician reports decreased. The dramatic increase in reporting during phase 3 was most likely due to several intervening factors, including the vigilance of the team leader during rounds and continued presence in the unit, the nonpunitive reporting form, and the open forums with the intensive care staff. If medication incidents were discovered during rounds, staff were encouraged to report them. The in-

■ **NOTES Medication-error reporting**

Figure 1. Medication-incident reporting form.¹⁶

Patient Name _____	MR# _____
Date of Suspected Error _____	Unit/Department Occurred _____
Medication Name/Dose/Route _____	
Level of Staff That Made Initial Error	
<input type="checkbox"/> Pharmacy <input type="checkbox"/> Nursing <input type="checkbox"/> Attending <input type="checkbox"/> Resident/Intern <input type="checkbox"/> Other _____	
Error Type (✓ all that apply for <input type="checkbox"/> type and <input type="radio"/> subtype)	
<input type="checkbox"/> Delay in Service <input type="checkbox"/> Duplication/Extra Dose <input type="checkbox"/> Expired Medication Given <input type="checkbox"/> Given without Orders <input type="checkbox"/> Given without Proper Storage <input type="checkbox"/> Given without Checking Parameters <input type="checkbox"/> Mislabeled <input type="checkbox"/> Omission <input type="checkbox"/> Procedure Error <input type="checkbox"/> Wrong Dose <input type="checkbox"/> Wrong Dosage Interval <input type="checkbox"/> Wrong Dose Form <input type="checkbox"/> Wrong Patient <input type="checkbox"/> Wrong Infusion Rate <input type="checkbox"/> Wrong Medication/I.V. <input type="checkbox"/> Wrong Route <input type="checkbox"/> Wrong Duration of Therapy <input type="checkbox"/> Wrong Patient Weight/Age <input type="checkbox"/> Incomplete Order <input type="radio"/> Patient Name <input type="radio"/> ID Number <input type="radio"/> Patient Weight <input type="radio"/> Medication <input type="radio"/> Dose <input type="radio"/> Dosage Form <input type="radio"/> Dosing Interval <input type="radio"/> Route <input type="radio"/> Transcription Error <input type="radio"/> Handwriting Illegible <input type="checkbox"/> Monitoring <input type="radio"/> Allergy Information Not Checked <input type="radio"/> Clinical Information <input type="radio"/> Drug–Drug Interaction <input type="radio"/> Drug–Food Interaction <input type="radio"/> I.V. Incompatibility <input type="radio"/> Laboratory <input type="checkbox"/> Other _____	
Brief Description of Event and Patient Outcome	

Did Medication Reach Patient? <input type="checkbox"/> No <input type="checkbox"/> Yes	
*****If Medication Reached Patient in Error — Notify Physician	
Was Order Reconciled with Prescriber? <input type="checkbox"/> No <input type="checkbox"/> Yes	
Could Medication Error Have Been Prevented? <input type="checkbox"/> No <input type="checkbox"/> Yes	
Was the Medication Accessed from:	
<input type="checkbox"/> Pyxis <input type="checkbox"/> Cassette <input type="checkbox"/> Pharmacy <input type="checkbox"/> Code Cart	
If Accessed from Pyxis, Was It an Override? <input type="checkbox"/> No <input type="checkbox"/> Yes	
Medication Error Identified by (✓ all that apply):	
<input type="checkbox"/> Pharmacy <input type="checkbox"/> Nursing <input type="checkbox"/> Attending <input type="checkbox"/> Resident/Intern <input type="checkbox"/> Other _____	

Figure 2. Number of errors reported during study period. No errors were reported by medical residents during any phase of the study.

terventions that resulted in a predictive change in behavior and culture were the anonymous medication-error reporting form and nonpunitive action by unit leadership.

Before the initiation of the anonymous medication-error reporting form, unit leadership addressed medication errors by counseling staff in the traditional method, in which staff received an oral warning for the first incident, a written warning for the second incident, and possible suspension and termination for the third incident. Therefore, staff perceived any medication-error reporting as a “black mark” on their personnel file that could potentially lead to termination. In phase 3, unit leadership dealt with all errors through root-cause analysis, focusing on education and systems changes to prevent future errors.

We believe that the reduction in error severity over the three study phases most likely resulted from increased staff awareness through targeted medication-error education, the global process of medication delivery, administration, and the reporting of errors earlier in the medication-use

process. For example, if a category D or E error resulted from a prescribing, transcribing, dispensing, or administration error, staff would have a heightened awareness of the error and thus be more diligent when performing the first three steps of the medication-use process. Thus, the error severity would be reduced because it would be discovered earlier in the process.

Education appeared to reach all members of the medical team, as exemplified by an instance in which the clinical dietitian reported an error related to an order for total parenteral nutrition. Medication-error reporting by attending physicians did not increase; in fact, it decreased. There were no reports made by attending physicians in the last phase of the study. Further examination of the data revealed that physicians reported incidents that resulted in temporary or permanent harm to the patient and incidents that required the patient to have increased monitoring. There were no category D or higher incidents reported during phase 3.

In all phases, there was a lack of reporting by medical residents,

even though they were specifically targeted at educational forums. We did observe a dramatic increase in nurses’ reports. Overall, nursing staff became more proactive over the study period, which we attribute to the nonpunitive reporting form, improved pharmacy–nursing interaction, and improved communication and feedback through focus groups.

Improvements in medication-error reporting and reductions in the severity of medication errors can be achieved through planned interventions, such as the introduction of a PMST. Changing the hospital culture and environment is essential, but it must include an integrative approach. Increased communication through education forums, the presence of a clinical pharmacist as a team leader, and a nonpunitive approach by medical and nursing leadership can produce culture changes that positively affect patient outcomes. One area that requires further attention is the effort to change the behavior of medical residents, since they are responsible for prescribing many medication regimens in teaching hospitals.

Table 1.
Number and Type of Medication Errors Reported during Phase 3 by Discipline

Type of Error	Discipline		
	Prescriber	Pharmacy	Nursing
Omission error	0	31	0
Wrong medication or dosage	16	28	1
Wrong patient	0	2	0
Pyxis error	0	1	0
Wrong or incomplete order	10	0	1
Transcription error	0	0	6
Wrong rate	0	0	5
Unauthorized drug	0	0	3

An unexpected observation during the study was that the current pharmacy services could not meet the demands of a pediatric critical care unit. The study provided support that led to the development of a pediatrics pharmacy satellite and improved pharmacy services.

Conclusion

An increase in the number of medication errors reported and a decrease in the severity of errors reported were observed in a PCCC after implementation of a PMST, provision of education to health care providers, and addition of a clinical pharmacist.

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Appendix—Definitions of error severity

Type of Error	Category	Description
No error	A	Circumstance or event had the capacity to cause an error.
Error, no harm	B	An error occurred but did not reach the patient (an "error of omission" reaches the patient).
	C	An error occurred that reached the patient but did not cause patient harm.
	D	An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient or required intervention to preclude harm.
	E	An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention.
Error, harm	F	An error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization.
	G	An error occurred that may have contributed to or resulted in permanent patient harm.
	H	An error occurred that required intervention necessary to sustain life.
Error, death	I	An error occurred that may have contributed to or resulted in the patient's death.

THE ANNALS: 40-YEAR EVOLUTION

2006 marks the 40th year of publication for *The Annals*. Over that time, *The Annals* has been an important contributor to the development of clinical pharmacy. Throughout 2006, we are publishing articles reflecting on the history of clinical pharmacy through the eyes of practitioners, including those pioneering clinical pharmacy, as well as those who have more recently entered the profession and a well-established specialty. In addition, we are also presenting articles and editorials from the early history of *The Annals* that have given direction and shape to the practice of clinical pharmacy (see page 1174).

Evolution of Pediatric Clinical Pharmacy

Milap C Nahata

Nearly 42 years ago, Harry Shirkey (a pediatrician from Cincinnati) termed infants and children as “therapeutic orphans.” He was concerned that drugs may be given to these patients without adequate studies on their efficacy and safety. Although progress has been made, many drugs continue to be used in young pediatric patients when they have been approved by the Food and Drug Administration (FDA) only for adults. For the first time, the FDA Modernization Act provides a “carrot” of 6 months of market exclusivity for drugs under patent if the manufacturer conducts studies in children. The Best Pharmaceuticals for Children Act of 2002 directs the Secretary of the Department of Health and Human Services (through the National Institutes of Health Director and the FDA Commissioner) to develop and prioritize a list of drugs that need to be studied. Table 1 provides a list of drugs requiring pediatric studies.

This suggests that the need for pharmacokinetic, pharmacodynamic, pharmacogenetic, efficacy, and safety studies in pediatric patients continues. Since most drugs not la-

beled for this population are not available in appropriate dosage forms, the need for the development of suitable pediatric drug formulations also exists.

What Has Changed in Terms of Pediatric Pharmacy Practice?

Robert Levin described clinical pharmacy practice in a pediatric clinic in the pages of this journal in 1972 (see page 1175). Pharmacists’ clinical responsibilities at that time included counseling patients and families about medications by obtaining complete family and medication history, identifying adverse drug reactions, and monitoring drug therapy, as well as teaching physicians and pharmacy students about drug therapy.

John Piccoro began an inpatient pediatric clinical pharmacy practice at the University of Kentucky Medical Center in 1969. His recollection of major accomplishments included establishment of a well-defined role in patient care; involvement with making rounds with pediatric teams; provision of unit dose dispensing, dose standardization, parenteral nutrition, resuscitation medications, and clinical pharmacy services through a satellite pharmacy; and training of pharmacy residents as well as pharmacy

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Dr. Nahata is Editor-in-Chief of *The Annals*.

students. He also was aware of pediatric pharmacy services offered by Roger Klotz in Chicago.

In 1979, I was the first clinical pharmacist at Columbus Children's Hospital and faced similar challenges. I can remember my first day on the infectious disease ward when all of the physicians seemed to wonder why a pharmacist was on the 6th floor rather than in the basement. I was the interface between the dispensing pharmacist and the physicians and offered clinical pharmacy services and therapeutic drug monitoring. My other responsibilities included developing a research program (writing grants, abstracts, and articles) and teaching physicians, pharmacists, and medical and pharmacy students at the hospital as well as at Ohio State University (OSU). Soon, other specialties, including neonatology, hematology/oncology, and critical care, started requesting clinical pharmacy services. Today, there are 7 clinical pharmacy specialists at Children's—6 funded by the hospital and 1 funded by the college.

Pediatric Pharmacy Advocacy Group (PPAG) developed pediatric pharmacy practice guidelines in 1991. American Society of Health-System Pharmacists [ASHP] Guidelines for Providing Pediatric Pharmaceutical Services in Organized Health Care Systems were published in 1993. These included general principles, orientation and training programs, inpatient services, ambulatory care services, drug information, therapeutic drug monitoring, pharmacokinetic services, patient and caregiver education, medication errors, adverse drug reactions, drug use evaluations, and research. We are able to treat most illnesses more effectively today than before, and yet new challenges among children and adolescents include rising rates of obesity, type 2 diabetes, primary hypertension, and psychiatric/behavioral disorders.

How Has Pediatric Pharmacy Education and Training Changed Over the Past 40 Years?

The majority of schools of pharmacy during the 1960s through the 1980s offered a BS (Pharmacy) degree; PharmD is now the sole entry-level degree. Both didactic education

and clerkship experiences are now being provided for every pharmacy student. The required number of lecture hours has increased, and many schools, including OSU, offer an elective course in pediatric drug therapy. Clerkship experience in pediatrics is required by the Accreditation Council for Pharmacy Education.

Residencies and fellowships have been instrumental in preparing practitioners and scholars. There are 19 specialty residency programs in pediatric pharmacy practice currently accredited by the ASHP. Additional general pharmacy practice residencies with emphasis in pediatrics may also be offered to PharmD graduates. Seven pediatric fellowship programs are listed in the American College of Clinical Pharmacy (ACCP) database. We have provided fellowship training to 25 fellows over the past 20 years. However, the number of residency and fellowship programs appears to be too low to meet future needs. The funding of 13 pediatric pharmacology research units by the National Institute of Child Health and Human Development has stimulated research in pediatric pharmacotherapy.

Summary

Pediatric drug therapy has definitely improved over the past 40 years. Activities in practice, research, and education have all expanded. The Pediatric Special Interest Group of ASHP was the main venue for pharmacists; ACCP's Practice and Research Network and PPAG are now additional venues for pediatric practitioners to share their knowledge and skills with colleagues. The future of pediatric pharmacotherapy indeed looks bright.

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I appreciate the input from John Piecoro MS PharmD at the University of Kentucky.

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Table 1. Drugs Listed by Department of Health and Human Services Requiring Studies in Pediatric Patients^a

Acyclovir	Daunomycin	Heparin	Lithium	Promethazine
Ampicillin	Dexrazoxane	Hydrochlorothiazide	Lorazepam	Rifampin
Ampicillin/sulbactam	Diazoxide	Hydrocortisone valerate ointment and cream	Meropenem	Sevelamer
Azithromycin	Dobutamine	Hydroxychloroquine	Methadone	Sodium nitroprusside
Baclofen	Dopamine	Hydroxyurea	Methotrexate	Spironolactone
Bumetanide	Eletriptan	Isoflurane	Metoclopramide	Vincristine
Bupropion	Ethambutol	Ivermectin	Metolazone	Zonisamide
Clonidine	Flecainide	Ketamine	Morphine	
Cyclosporine	Furosemide	Lindane	Piperacillin/tazobactam	
Dactinomycin	Griseofulvin		Pralidoxime	

^aApril 25, 2006.

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Computerized Physician Order Entry and Medication Errors in a Pediatric Critical Care Unit

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Computerized Physician Order Entry and Medication Errors in a Pediatric Critical Care Unit

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ABSTRACT. *Objective.* Medication errors are a major concern of health care professionals and medical institutions, especially errors involving children. Studies in adults have shown that computerized physician order entry (CPOE) systems reduce medication errors and adverse drug events (ADEs). The effect of CPOE implementation in a pediatric population has not been reported. The objective of this study was to evaluate the impact of CPOE on the frequency of errors in the medication ordering process in a pediatric critical care unit (PCCU).

Methods. A prospective trial was conducted of 514 pediatric patients who were admitted to a 20-bed PCCU in a tertiary-care children's hospital before and after implementation of CPOE. Medication errors were identified after review of all orders during the study period and then further classified as potential ADEs, medication prescribing errors (MPE), and rule violations (RV).

Results. A total of 13 828 medication orders were reviewed. Before implementation, potential ADEs occurred at a rate of 2.2 per 100 orders, MPEs at a rate of 30.1 per 100 orders, and RVs at a rate of 6.8 per 100 orders. After implementation, the rate of potential ADEs was reduced to 1.3 per 100 orders, MPEs to 0.2 per 100 orders, and RVs to 0.1 per 100 orders. The overall error reduction was 95.9%. Potential ADEs were reduced by 40.9%, and MPEs and RVs were reduced by 99.4% and 97.9%, respectively.

Conclusions. The implementation of CPOE resulted in almost a complete elimination of MPEs and RVs and a significant but less dramatic effect on potential ADEs. *Pediatrics* 2004;113:59–63; medication errors, critical care, pediatrics, clinical decision support systems; computer-assisted drug therapy.

ABBREVIATIONS. ADE, adverse drug event; CPOE, computerized physician order entry; IOM, Institute of Medicine; PCCU, pediatric critical care unit; MPE, medication prescribing error; RV, rules violation.

Medication errors are a major concern of health care professionals and medical institutions, especially errors involving children. Children have significant differences in both

pharmacokinetics and pharmacodynamics compared with adults that can make this population more susceptible to medication errors and related injuries. Several factors make children in a critical care setting especially vulnerable to medication errors and adverse events. These factors include weight-based dosing, significant weight changes over a relatively short period of time, lack of commercially available products leading to dilution of stock medications, and the decreased communication ability of critically ill patients.^{1,2} These problems are magnified by the use of vasoactive infusions and the emergent use of drugs during cardiopulmonary resuscitation. Each patient requires complex calculations to determine the concentration of many drugs, including vasoactive agents, to be mixed by the pharmacy and the rate of delivery to achieve a desired dose. The process of prescribing medications for critically ill children is complex and lacks standardization, which can increase the risk of medication errors and adverse events.

The significance of medication errors in pediatric inpatients has only recently been described. Kaushal et al¹ studied 1120 pediatric patients who were admitted to 2 hospitals during a 6-week period. The authors analyzed >10 000 medication orders and found 616 medication errors, resulting in an error rate of 5.7%. This error rate is consistent with the rate reported in adults.³ In addition, this study evaluated the frequency at which medication errors occurred at different points in the medication system.¹ Seventy-nine percent of potential adverse drug events (ADEs) occurred at the time of physician ordering, whereas a smaller percentage occurred at the point of transcription or administration.

Recent trends toward cost containment, standardization, and accessibility of common medications have led to the implementation of various entities of automation and technology. Computerized physician order entry (CPOE) has been identified by the Institute of Medicine (IOM), Leapfrog Group, Institute for Safe Medication Practices, American Medical Association, American Academy of Pediatrics, and others as a tool that may prevent errors that occur during the medication ordering process.^{1,4–10} The Leapfrog Group has also identified CPOE as 1 of 3 initial hospital safety standards and has described several benefits of CPOE that may result in improved quality of care and reduced health care costs.⁵ These benefits may include enhanced communication be-

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tween health care professionals through the elimination of illegible or incomplete orders and the increased efficiency of order processing through instantaneous transmission of orders to other hospital systems. Computerized decision support associated with CPOE systems, such as displaying age-specific dosing regimens to the user, checking for doses above or below the usual range, providing warnings if current laboratory values indicate that the drug or regimen would be inappropriate for a particular patient, and screening for allergies and drug-drug interactions may also improve the ordering process.

The role of CPOE in preventing medication errors and ADEs has been noted in the adult literature. Bates et al⁶ evaluated the medication error rates of 3 medical units before and after CPOE during a 4-year period. The authors concluded that CPOE substantially decreased the rate of medication errors with additional reductions observed after the addition of decision support and other features. Another study evaluated the use of CPOE in an adult population and found that serious medication errors were reduced by 55%.⁷

The development of CPOE systems that are adaptable to pediatric critical care environments has been problematic. Developing systems that provide weight-based dosing, as well as age-specific algorithms, is difficult and applicable only to a small proportion of the overall health care market. There are limited data on the impact of CPOE on medication errors in pediatric patients. Most literature has evaluated medication errors and ADEs that have resulted in patient injury regardless of the point in the system at which the error occurred. We evaluated medication errors that occurred specifically at the time of prescribing rather than administration or dispensing. The objective of this study was to determine the impact of CPOE on the frequency of medication errors at the point of physician ordering in a pediatric critical care unit (PCCU).

METHODS

Study Setting

The study was conducted in a 20-bed multidisciplinary PCCU at an academic institution located in a major metropolitan area. The institution provides services to a diverse socioeconomic patient population. The PCCU has an average daily census of 16.3 patients, and the average length of stay is 4.1 days. The hospital cares for both adult and pediatric patients, but pediatric services are both geographically and administratively distinct.

Patient Population

This study included all patients who were admitted to the PCCU during the designated study periods and encompassed both medical and surgical patients. Disease states represented in this patient population included postoperative congenital heart defect repair, metabolic disorders, trauma, respiratory diseases, bone marrow and solid organ transplantation, and other childhood illnesses.

Study Design

In this prospective cohort study, a comparison was made between the occurrences of errors in the medication ordering process before and after implementation of a CPOE system in the PCCU. Approval from the Institutional Review Board at Vanderbilt University Medical Center was obtained. Data were collected before

CPOE implementation for a 2-month period from October 4, 2001, to December 4, 2001. There was a 1-month period when no data were collected to allow for CPOE implementation and training of all attendings, fellows, residents, and staff. Post-CPOE data collection then occurred for a 2-month period from January 4, 2002, to March 4, 2002.

Computer Systems

WizOrder is a CPOE system developed in 1994 by the faculty in the division of Biomedical Informatics at Vanderbilt University.¹¹ WizOrder is the precursor to the commercially available Horizon Expert Order system (McKesson, Atlanta, GA) and currently interfaces with the Pyxis Medstation 2000 system (Pyxis Corp, San Diego, CA) and the pharmacy computer system, McKesson Series. WizOrder provides clinicians with several types of decision support, including drug allergy alerts, dose checking, drug interaction alerts, and US Food and Drug Administration alerts. In addition, WizOrder includes clinical pathways using >900 preprogrammed individual order sets and links to drug monographs, evidence-based literature sites, and the National Library of Medicine PubMed site. This system also interfaces to a computerized archive of medical records that serves as a clinical data repository so that order-related and laboratory-related alerts can be generated for each individual patient. The depth of clinical decision support can be adjusted on the basis of predetermined criteria such as age or patient location. Recommendations for medication dosage adjustment for impaired renal function, for example, varies between adult and pediatric patients. Adjustments are recommended for adult patients on the basis of estimates of creatinine clearance using standard formulas. Unfortunately, these formulas cannot reliably be used in pediatric patients. For these patients, clinical decision support provides only recent laboratory values and an alert to take renal function into account during the ordering process. Another aspect of clinical decision support that has been implemented is information on varying medication dosage by clinical indication. The system calculates the dose once the clinician selects 1 of the recommendations. WizOrder had been implemented on all adult units and the general medical/surgical pediatric wards before its implementation in the PCCU.

Review Process

All medication orders were included in this analysis except for the following: fluids, dialysate, total parental nutrition (TPN)/lipids, and chemotherapeutic agents. TPN and lipids had not been added to the CPOE system at the time of the study. Fluids, dialysate, and chemotherapy orders were entered in the CPOE system but will be evaluated at a later date. A designated clinical pharmacist reviewed all eligible orders. Errors were entered into a database that included information such as patient name, age, weight, drug, presence of error, dose, interval, and route. Errors were identified and further classified into categories on the basis of the definitions and classifications listed in Table 1 and reviewed for accuracy and relevance by a second clinical pharmacist. A physician reviewer independently evaluated all original medication orders for 10% of randomly selected patients in both the pre-CPOE and post-CPOE groups to determine level of agreement with clinical pharmacists.

Main Outcome Measures

This study focused on errors that occurred during the medication ordering process. An error was determined to have occurred when an order was found to be incomplete, incorrect, or inappropriate at the time of physician ordering. Errors were classified as potential ADEs, medication prescribing errors (MPEs), or rule violations (RVs). A potential ADE was defined as any error that, if allowed to reach the patient, could result in patient injury. Potential ADEs are those errors in which the ordering physician provided incorrect or inappropriate information. They also include instances in which the ordering physician failed to account for patient-specific information (eg, allergy). MPEs were defined as errors in which inadequate information was provided or further interpretation (eg, illegibility) was required for the order to be processed. RVs were defined as errors that were not compliant with standard hospital policies (eg, abbreviations).

TABLE 1. Error Classifications and Definitions

Medication error	Any order that was incomplete, incorrect, or inappropriate at the time of physician ordering
Potential ADEs	Any error that, if allowed to reach the patient, could result in patient injury
Duplicate therapy	Same drug prescribed twice or 2 or more drugs from the same class with no evidence-based medicine to prove benefit from both
Inappropriate dose ¹²	Based on a 10% difference in published dosing guidelines or our PCCU standards of practice
Inappropriate interval ¹²	Based on differences found from published dosing guidelines
Inappropriate route ¹²	Drug not available or not recommended to be given in the route ordered
Wrong drug	Incorrect drug ordered
Wrong units	Units are not correct for drug, diagnosis, or dose used (eg, units/kg/min vs mcg/kg/min)
Drug interaction	Documented drug interaction between 2 medications that deems drug ineffective or contraindicated (eg, beta-blocker with beta-agonist)
Allergy	Documented allergy to drug ordered
MPE	
Missing information	Missing route, interval, concentration, rate, or dose that results in an incomplete order
No weight	Patient's weight not available
Illegible	Unable to read, required further interpretation
RVs	
Abbreviation	Shortened or symbolized representation of a drug name (eg, dopa, epi, MSO ₄). Does not include CaCl ₂ or NaHCO ₃ .
Trailing zeros	Zeros to the right of the decimal point (eg, 1.0 mg)

Statistical Analysis

A χ^2 analysis and Fisher exact test for smaller sample sizes were used for pre-CPOE and post-CPOE data comparison. The STATA statistical program was used for analysis (Stata Corp, College Station, TX). The interrater reliability was calculated using the percentage of agreement and the κ statistic. The κ statistic for interrater reliability between the physician reviewer and clinical pharmacist was 0.96. This corresponds to excellent reliability.

RESULTS

A total of 13 828 medication orders involving 514 patients were analyzed throughout the study period. A total of 268 patients were evaluated during the pre-CPOE study period and 246 patients were evaluated during the post-CPOE period. The mean age of patients in the pre-CPOE group was 6.5 ± 12.0 years and in the post-CPOE group was 5.4 ± 10.3 years. This was not a significant difference between the 2 groups. Overall length of stay in the PCCU for both groups was also not significantly different. The mean length of stay was 4.2 ± 10.7 days for the pre-CPOE group and 4.1 ± 6.6 days for the post-CPOE group.

During pre-CPOE, 6803 orders were analyzed. A total of 2662 (39.1 per 100 orders) errors and RVs were identified and are described in further detail in Table 2. After additional classification, 2.2 per 100 orders were identified as potential ADEs, 30.1 per 100 orders were identified as MPEs, and 6.8 per 100 orders were identified as RVs. The most common errors in the last 2 categories were missing information and abbreviations.

During post-CPOE, 7025 orders were analyzed and a total of 110 (1.6 per 100 orders) overall errors and RVs were identified (Table 2). Of those, 1.3 per 100 orders were categorized as potential ADEs. The rate for MPEs and RVs was only 0.2 per 100 orders and 0.1 per 100 orders, respectively. CPOE significantly reduced the rate of MPEs and RVs ($P < .001$; Table 2). Because of almost a complete elimination of MPEs and RVs, potential ADEs became the most common level of error in the post-CPOE period. Errors involving medication dosage and interval

TABLE 2. Overall Medication Error Analysis Before and After CPOE

	Pre-CPOE (n = 6803)		Post-CPOE (n = 7025)		P Value
	Total Number	Number Per 100 Orders	Total Number	Number Per 100 Orders	
Potential ADEs	147	2.2	88	1.3	<0.001
Duplicate therapy	4	0.06	0	0	<.001
Inappropriate dose	53	0.78	59	0.84	.69
Inappropriate interval	24	0.35	19	0.27	.39
Inappropriate route	6	0.09	0	0	.01
Wrong drug	6	0.09	1	0.01	.07
Allergy	1	0.01	0	0	.49
Drug interaction	1	0.01	0	0	.49
Wrong units	52	0.76	9	0.13	<.001
MPEs	2049	30.1	12	0.2	<.001
Weight not available	22	0.32	0	0	<.001
Missing Information	1979	29.09	12	0.17	<.001
Illegible	48	0.71	0	0	<.001
RVs	466	6.8	10	0.1	<.001
Trailing zeros	55	0.81	10	0.14	<.001
Abbreviation	411	6.04	0	0	<.001

were the most prevalent potential ADEs. The reduction in error rates for dosing ($P = .69$) and interval ($P = .39$) after CPOE implementation was not significant.

Overall, CPOE resulted in a 95.9% ($P < .001$) reduction in all types of errors associated with medication ordering. Figure 1 shows a significant reduction in MPEs (99.4%; $P < .001$) and RVs (97.9%; $P < .001$). A smaller but still significant reduction was found with potential ADEs (40.9%; $P < .001$) after CPOE implementation.

DISCUSSION

During the past decade, the prevention of medication errors and ADEs has become a major focus of medical institutions. Public knowledge regarding the frequency and seriousness of medication errors and the steps that patients can take to prevent such events from happening has increased accordingly. In addition, improving patient safety through reduction of medication errors and ADEs has received the attention of government officials at both state and national levels.

In 1999, the impact of medical errors was dramatically publicized by an IOM report, which estimated that between 44 000 and 98 000 people die each year partly as a result of medical errors.⁸ This report laid out a comprehensive strategy by which government, health care providers, and consumers could reduce medication errors. Another report of the IOM released in March 2001, *Crossing the Quality Chasm: A New Health System for the 21st Century*, focused on improving and redesigning the health care system.¹³ Prepared by the IOM's Committee on the Quality of Health Care in America, this report recommends the use of automated systems for order processing and the elimination of handwritten clinical information by the end of this decade.

ADEs are associated with significant morbidity and mortality and are often preventable. Classen et al¹⁴ reported a 2-fold increase in death associated

with ADEs as well as prolonged hospitalization. In another study, Bates et al¹⁵ found that 28% of ADEs were preventable and that 56% of those occurred at the point of medication prescribing. The overall cost of ADEs has been estimated to exceed \$2000 per event, with preventable ADEs associated with an annual national cost of >\$2 billion.^{14,16} The American Academy of Pediatrics has also stated that medication errors in particular are associated with significant morbidity and mortality and increased health care costs by an estimated \$1900 per patient.^{9,17} This figure does not reflect the additional emotional costs incurred by patients and their families.

Most guidelines that address methods to reduce medication errors recommend that institutions implement CPOE systems. However, there are limited data evaluating the impact of CPOE on medication errors in the pediatric population. In this study, we evaluated errors that occur only during the medication ordering process. In addition, the separation of potential ADEs, MPEs, and RVs provides for a detailed analysis of the specific impact of CPOE on different types of errors.

In this study, CPOE significantly reduced all categories of errors. MPEs and RVs were virtually eliminated, and potential ADEs were reduced by 40.9%. In addition, during the study, there were no reports of errors caused by the CPOE system, including no reports of orders being entered on the wrong patient. MPEs and RVs often lead to confusion and lack of efficiency as a result of incorrect or missing information that requires interpretation and clarification by pharmacy and nursing personnel. Our study demonstrated that a major benefit of CPOE is the enhancement of communication between health care professionals that subsequently decreases the possible misinterpretation of medication orders.

Potential ADEs were significantly reduced ($P < .001$) but not nearly to the extent of MPEs and RVs. Potential ADEs were identified as errors in which incorrect or inappropriate information was provided or patient-specific factors were not taken into account and potential injury could occur to the patient if the medication were received as ordered. Overall, most types of potential ADEs, including duplicate therapy, wrong drug, wrong units, allergy, and drug interactions, were eliminated or significantly reduced. This error reduction, when extrapolated annually, would equate to a decrease of approximately 300 instances per year in which a potential ADE was prevented. However, errors involving dose and interval showed no significant difference between pre-CPOE and post-CPOE. This may be explained by the lack of decision support, on initial CPOE implementation, that would assist the prescriber in choosing an age- and indication-specific dose and interval for the patient. This is an area in which additional enhancements to CPOE systems are needed. Targeted decision support associated with CPOE was shown to be effective in adult inpatients with renal insufficiency by Chertow et al.¹⁸ Decision support tools focused on pediatric issues such as weight-based calculations for infusions and age-specific dosing guidelines may result in additional reductions in these types of errors.

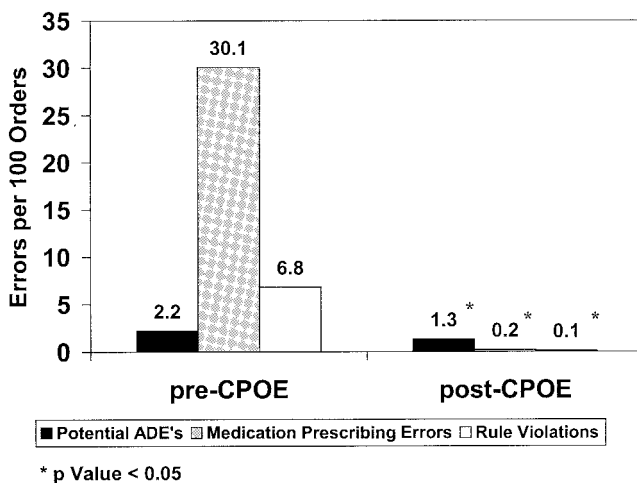


Fig 1. Comparison of rates of potential ADEs, MPEs, and RV is between pre-CPOE and post-CPOE phases. All categories of errors decreased significantly ($P < .001$) after CPOE implementation. The overall reduction was 40.9% ($P < .001$) for potential ADEs, 99.4% ($P < .001$) for MPEs, and 97.9% ($P < .001$) for RVs.

Our study evaluated medication errors that occur at the time of physician ordering. The prevention of actual ADEs involves multiple facets of the medication delivery process. Kaushal et al¹ showed that the frequency of preventable ADEs is very low (0.05 per 100 orders). Despite the significant number of errors in the ordering phase of medication delivery, our study was not appropriately powered to evaluate the impact of CPOE on overall preventable ADEs. An appropriately powered study would require a sample size that is 20 times the number evaluated in our study. Another limitation of our study is that we did not investigate how these errors were detected by other components of the medication use system, such as verification of the order by a pediatric pharmacist or review of the order by nursing staff before administration.

Medication error rates have not been well studied in pediatrics. The rate reported in this study may seem elevated because of our conservative definition of errors in the medication ordering process. Limited data are available on error rates associated with medication ordering in the pediatric critical care setting. With this study, we have established an error rate for a multidisciplinary PCCU that serves a patient population that is broad in both age and disease state.

Although CPOE offers significant advantages in almost eliminating MPEs and RVs, CPOE is not the sole solution for preventing potential ADEs. The addition of decision support has previously been shown to increase the effectiveness of CPOE in preventing medication errors in adult patients.^{6,18} Developing features that accommodate the wide range of ages and weights found in pediatric patients is complex. Incorporating pediatric-specific dosing guidelines and calculators for continuous infusions may prove to reduce the incidence of these types of errors. Additional evaluation is needed to determine the benefits of enhancing CPOE with additional decision support designed for the pediatric population. Specifically, the issues of gestational age, postnatal age, and rapid weight changes in neonatal patients are currently being incorporated into WizOrder in preparation for implementation in our neonatal intensive care unit. Unfortunately, pediatrics is a small portion of the overall CPOE market and limited financial rewards may prevent commercial vendors from committing the necessary resources for development of these tools.

CONCLUSIONS

In conclusion, CPOE significantly reduced and almost completely eliminated MPEs and RVs while still demonstrating a significant reduction in the frequency of potential ADEs. CPOE offers significant

benefits, including ensuring legible and complete physician orders. Incorporation of pediatric-specific decision support tools into CPOE systems may result in even further reductions of potential ADEs leading to improved patient safety. Additional evaluation of these safety features is needed and will be the focus of future studies.

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Computerized Physician Order Entry and Medication Errors in a Pediatric Critical Care Unit

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Impact of a pediatric clinical pharmacist in the pediatric intensive care unit

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Objective: To study the impact of a clinical pharmacist in a pediatric intensive care unit. The goals of the study were to determine the type and quantity of patient care interventions recommended by a clinical pharmacist and to specifically examine cost savings (or loss) that resulted from clinical pharmacist recommendations.

Design: A prospective case series.

Setting: Ten-bed pediatric intensive care unit in a university-affiliated children's hospital.

Patients: All patients admitted to the pediatric intensive care unit during the study period.

Interventions: None.

Measurements and Main Results: During the 24-wk study period, the pediatric clinical pharmacist documented all interventions that occurred during her shift. She rounded with the pediatric intensive care unit team approximately two times a week and reviewed medication lists daily. Drug acquisition costs were used to calculate drug cost savings. Demographic information

was collected on all the patients in the pediatric intensive care unit during the study period.

There were 35 recommendations per 100 patient days. The most common interventions were dosage changes (28%), drug information (26%), and miscellaneous information (22%). The average time spent per day by the clinical pharmacist in the pediatric intensive care unit was 0.73 hrs or 0.02 full-time equivalent. The total cost direct savings for the study period was \$1,977. Extrapolated to direct cost savings per year, the total amount saved was \$9,135/year or 0.15 full-time equivalent. Indirect savings from educational activities, avoidance of medication errors, and optimization of medical therapies represent an additional nonquantifiable amount.

Conclusion: We conclude that a clinical pharmacist is an important and cost-effective member of the pediatric intensive care unit team. (Crit Care Med 2002; 30:919–921)

KEY WORDS: pediatric clinical pharmacist; cost savings; pediatric intensive care

In recent years, changes in health care financing have necessitated that health care providers delineate and justify both a medical and an economic basis for their involvement in patient care. Numerous studies have evaluated the role of the clinical pharmacist in adult intensive care units (1–7). Few have addressed the role of the clinical pharmacist in the pediatric intensive care unit (ICU) (8). Our intent was to study the medical and economic impact of a clinical pediatric pharmacist in our pediatric ICU.

The goals of the study were to determine the type and quantity of patient care interventions recommended by a clinical pharmacist and to specifically examine

cost savings (or loss) that resulted from clinical pharmacist recommendations in the pediatric ICU. We hypothesized that the pediatric ICU clinical pharmacist would have a positive impact on patient care and medical staff education and would prove to be cost effective.

METHODS

Doernbecher Children's Hospital is a 124-bed comprehensive pediatric hospital, including pediatric intensive care, general medical/surgery, hematology/oncology, and neonatal care units. Pharmacy services are provided 24 hrs a day, 7 days a week from a centralized pharmacy. Clinical pharmacy services are provided directly on the units 5 days a week by a pediatric clinical pharmacist who reviews medication records for all patients. Weekend services are provided in a centralized location. At the time of this study, the pediatric ICU pharmacist (MIK) had worked at the institution as the pediatric clinical pharmacist for approximately 4 yrs.

The study took place in the 10-bed medical/surgical pediatric ICU at Doernbecher Children's Hospital, OR Health Sciences Uni-

versity. The study was approved by the Institutional Review Board. The study was conducted from November 19, 1996, to May 6, 1997, and included 24 consecutive 4-day weeks (79 days), excluding days that the pediatric clinical pharmacist was off duty.

The following data were recorded for all pediatric ICU patients enrolled in the study: subject number, age, gender, daily Pediatric Risk of Mortality Index (PRISM) score (as a measure of severity of illness) (9), and total number and specific type of medications they received. During the study, the pediatric clinical pharmacist (MIK) documented all interventions that occurred during the shift (7:00 am to 3:30 pm) attributable to recommendations made on rounds or from a private discussion with the physicians. The clinical pharmacist attended morning rounds with the pediatric ICU service approximately two times per week.

Drug acquisition costs were used to calculate drug cost savings. Drug acquisition costs were multiplied by 2.4 days of therapy (the average length of stay for pediatric ICU patients) to obtain the total cost savings for discontinued drugs if treatment began on day 1 of the patient's pediatric ICU stay. If the

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Table 1. Selected demographic features of the study population

	Admissions to the PICU With Rx Recommendations (n = 77)	Admissions to the PICU Without Rx Recommendations (n = 138)
Age, yrs, median (25th, 75th quartiles)	5.0 (0.1, 10.5)	3.5 (0.8, 10.7)
Male, n (%)	44 (57)	68 (49)
PRISM Score, median (25th, 75th quartiles)	4 (0, 5)	2.5 (0, 4)
PICU days, median (25th, 75th quartiles) ^a	3 (1, 6)	1 (1, 3)
Total hospital days, median (25th, 75th quartiles) ^a	7 (3, 13)	5 (2, 11)
Pharmacist time in rounds, mins, median (25th, 75th quartiles) ^a	2 (0, 5)	0 (0, 3)
Pharmacist total time in patient care, mins, median (25th, 75th quartiles) ^a	7 (5, 13)	3.5 (2, 6)

PICU, pediatric intensive care unit; PRISM, Pediatric Risk of Mortality Index.

^a*p* < .05.

patient had already stayed in the pediatric ICU >2.4 days, the cost was calculated for 1 day. If the drug was changed to a more or less expensive counterpart, the difference in drug costs before and after the change was determined. If the more expensive medication was therapeutically superior, then the costs was not added into the calculation. Labor, supplies, or any other indirect costs were not included.

The database was managed by using GraphPad Prism PPC (GraphPad Software, San Diego, CA). Descriptive statistics for the analysis including means, standard deviations, medians, and 25th and 75th quartiles were calculated. Subjects who received at least one recommendation from the pharmacist were compared with those who did not by using the Mann-Whitney U test for continuous data and the chi-square test for categorical data. We also examined correlations between patient diagnosis, severity of illness (PRISM), and total and specific pharmaceutical interventions. Significance was defined as *p* < .05.

RESULTS

Two hundred and one children were admitted to the pediatric ICU during the study days. Twelve were readmitted to the pediatric ICU during the study, and one child was admitted three times during the study days for a total of 215 patient admissions to the pediatric ICU. Children who received recommendations during an admission had significantly longer pediatric ICU stays as well as total hospital stay (Table 1). They also tended to be more severely ill with higher median PRISM scores, although this was not statistically significant. The longer length of stay and PRISM scores suggest that the children with recommendations were more severely ill compared with the children who did not have pharmacy interventions.

As expected, the pharmacist spent significantly more time in both rounds and in total time devoted to a patient in children who received a recommendation compared with those who did not have a recommendation from the pharmacist. Among children who received recommendations from the pharmacist, the median number of recommendations was 1 (25th and 75th quartiles, 1 and 2). The groups did not differ significantly by age or gender.

There were 493 total patient days studied. The pharmacist made 172 recommendations for 77 patients either during rounds or when reviewing their medication lists during the study period. There were 35 recommendations per 100 patient days. We found the most common interventions were dosage changes, drug information, and miscellaneous information (Table 2).

The average time spent per day by the clinical pharmacist in the pediatric ICU was 0.73 hrs. The total cost savings for the study period was \$1,977. Extrapolated to cost savings per year, the total amount saved was \$9,135/year if the pharmacist was employed full-time.

DISCUSSION

This study documents a major educational role for the clinical pharmacist in the pediatric ICU and demonstrates an economic savings from decreases in drug cost. Critically ill patients frequently require multiple drug therapy and may have multiple-system organ dysfunction that alters drug pharmacokinetics and pharmacodynamics. In addition to these challenges, patients in the pediatric ICU have a wide range of age and weight, adding to the complexity of pharmacy

interventions compared with adult ICU patients.

Our study demonstrated that changes in drug dosing were the most common interventions that the clinical pharmacist made in our pediatric ICU. The potential medical benefit and economic savings from avoidance of medication error attributable to over- or underdosing, although not possible to accurately calculate, are likely substantial. The presence of a pediatric clinical pharmacist in the pediatric ICU also improved staff education regarding pharmacologic therapy. Two of the most common recommendations involved drug information and general information to the physicians and nurses. Other reports on activities of a clinical pharmacist in adult ICUs also confirm the importance of staff education (10–11).

We found that even in a relatively small pediatric ICU (average census during the study, 4.9 patients), interventions by the clinical pharmacist resulted in substantial drug costs savings and provided the medical staff with important drug education. The average time spent per day was <1 hr, allowing the pharmacist time to attend to other duties.

The cost savings that we estimated are conservative because discontinued medication costs were calculated on 24-hr supply of drug; labor, materials, and other cost savings were not included. Furthermore, improvements in dosing efficiency were not included; the pharmacist did not round daily with the service (although the pharmacist did review patient medications daily), and the cost of errors that were avoided could not be accurately estimated. Even so, our results suggest that the direct cost savings from the pediatric ICU pharmacist activities may account for up to 0.15 full-time equivalent of the average starting salary for a hospital-based pharmacist in 1997 (\$62,400) (12). This direct amount more than justifies the average time spent in the pediatric ICU of 0.73 hrs/day or 0.02 full-time equivalent. In addition, this calculation does not take into account the potential indirect savings/benefits from the avoidance of medical errors, benefits from ongoing education, and optimization of patient medical therapies. Avoidance of medical errors recently has received intense scrutiny by both the federal government and general public (13–15). Furthermore, the Society of Critical Care Medicine has endorsed the

Table 2. Recommendations from the pharmacist

Interventions	n	%
Change in drug dosing	49	28
Drug information	45	26
Miscellaneous information	38	22
Discontinue drug	18	10
Start new drug	5	3
Change drug	5	3
Order test/drug level	4	2
Identification of actual or potential adverse drug reactions	3	2
Change in dose form or route of administration	2	1
Report adverse drug event	2	1
Cancel laboratory test	1	0.6

need for subspecialty pharmacy expertise in the care of critically ill patients (16).

Our findings are similar to reports of adult ICUs (11, 12) and general medical wards (17–19) that have documented the important educational role of the pharmacist in addition to realized cost savings. Montazeri and Cook (10) reported that 575 interventions occurred over a 3-month period in a 15-bed medical-surgical ICU, resulting in a net savings of \$10,010.60 (Canadian). Furthermore, the pharmacist played an important educational function by providing drug information to physicians and nurses. Miyagawa and Rivera (11) studied the impact of a clinical pharmacist in a 14-bed surgical ICU. Over a 13-wk period, a total of 322 interventions to improve drug therapy were made, resulting in an annual cost savings of >\$72,000 (11). Another study found that 724 medication errors were averted over a 4-yr period in their ICUs because of pharmacist intervention (17). A more recent, prospective, epidemiologic study in two academic university hospitals found that although the preventable adverse drug event rate in children was similar to that of a previous adult hospital study, the potential adverse drug event rate was three-fold higher (15). Physician reviewers judged that ward-based clinical pharmacists could have prevented 94% of potential adverse drug events (15).

The activities of critical care pharmacists are expanding and evolving (6, 20). Critical care pharmacists in many institutions no longer primarily function in roles of drug preparation and dispensing. The new focuses are on monitoring drug dosages and interactions, making recommendations to the physician staff regarding changes in medication therapy, and developing pharmacotherapeutic plans to optimize drug therapy for ICU patients

and avoid adverse medication interactions and errors (15).

There are a number of limitations to this study. First, although it was prospectively designed, it was not a controlled trial so there is no control population. Thus, benefits need be assumed rather than proven as causal. We have taken care to provide conservative estimates when required. Second, the patients' clinical course was not factored into the potential savings or expenditures as a result of the pharmacist's interventions. Third, we have no direct evidence of positive or lasting impact on medical staff education, only intuitive assumptions based on changes made in care. Fourth, it is possible that bias was introduced as a result of the clinical pharmacist being one of the authors (MIK), although this seems unlikely.

Even taking into account these real and potential limitations, we suggest that the results from this study are valid taken within the context of the study design. Our results add to the growing body of evidence that supports the use, safety, and cost-effectiveness of a clinical ICU pharmacist. It is clear that additional economically sophisticated studies are required to more completely evaluate the role of the clinical pharmacist in the ICU.

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Survey of pharmaceutical services in pediatric resuscitation

KIMBERLY HAHN, KAREN MARLOWE, AND MIKE CHICELLA

Am J Health-Syst Pharm. 2001; 58:1626-8

A cardiopulmonary resuscitation (CPR) event can be chaotic and confusing if participants lack understanding of the roles of individual resuscitation team members and have inadequate training or education. The confusion may be aggravated by inadequate hospital policies on the content and location of the emergency drug cart.¹ These factors are multiplied in an emergency situation involving a child. Children who suffer cardiopulmonary arrest have a very poor prognosis, with reported survival rates of 0–17%.² Emergency care, which has traditionally focused on adult needs, may leave some institutions unprepared for pediatric cardiopulmonary arrests.

Pediatric patients include a diverse range of ages and sizes; therefore, medication dosages and fluid requirements also vary widely. Guidelines for pediatric advanced life support (PALS) provide instruction on the use of certain emergency medica-

tions but do not give information on which drugs should be available for resuscitation efforts.³ A large variety of drugs and concentrations would only encourage indecision and possibly delay action. Ideally, only one drug per critical category should be included in the emergency drug cart unless clinically significant differences exist among drugs in the same class.⁴ Pharmacy departments have the opportunity to play an important role in pediatric resuscitation and to influence which medications are included in the cart.

The purpose of this survey was to assess pharmaceutical services related to pediatric resuscitations, including medications routinely stored in pediatric emergency drug carts and pharmacist participation in resuscitation activities.

Methods. A 14-question, two-page questionnaire was developed and evaluated for content and clarity by several pharmacists involved on an

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emergency resuscitation team. The survey was mailed in March 2000 to the directors of pharmacy at 558 institutions selected according to information found in the 1998–99 *AHA Guide*.⁵ Only institutions listing pediatric intensive care services and having ≥ 100 licensed beds were included. A cover letter explained the purpose of the study, and a postage-paid return envelope was provided. The pharmacy directors were invited to forward the survey to the most appropriate person in the department.

The survey asked for demographic data, such as the type of hospital, number of licensed pediatric beds and pediatric intensive care beds, and estimated number of pediatric emergency resuscitation attempts per year; a list of the medications included on the institution's emergency drug cart and how other drugs might be obtained during an emergency situation; and the extent and nature of pharmacist participation in resuscitation efforts. A list of possible pharmacist functions was provided, including preparing medications, administering medications, providing drug information, documenting drug administration, calculating doses, and performing CPR. The survey also asked whether the hospital had a special emergency drug cart for pediatric patients. All results are reported as means, medians, and in some instances ranges.

Results. One hundred forty-four surveys were returned, for a response rate of 25.8%. Surveys were received from 39 states and the District of Columbia. Of the questionnaires, 123 (85%) were returned by adult hospitals with some pediatric services, and 21 (15%) came from specialized pediatric institutions. Eighty-one (57%) were teaching hospitals, including all the specialized pediatric institutions.

The mean number of pediatric resuscitation attempts reported per institution per year was 22 (median, 9; range, 0–300) for all responding hospi-

tals. The mean number of licensed pediatric beds was 75 (median, 37; range, 2–325). There were an average of 14 licensed pediatric intensive-care-unit beds (median, 9; range, 0–100).

Respondents from 118 hospitals provided information about medications included in their emergency carts. A total of 109 medications were reported. Table 1 lists the drugs included in $>50\%$ of respondents' carts. Although no specific neuromuscular blocking agents are mentioned in the PALS guidelines,³ vecuronium was the most commonly included neuromuscular agent (32 institutions [27.7%]). Of the 123 adult institutions, 109 (89%) reported having a separate pediatric cart. Respondents reported several mechanisms for obtaining medications not included in the cart. The most common mechanism was obtaining the medications from the central or a satellite pharmacy. Medi-

cations were also supplied by automated dispensing machines, through a pneumatic tube system, from floor stock, or by pharmacists participating in the resuscitation attempt.

Of the institutions surveyed, 91 (63%) reported pharmacist participation on resuscitation teams (Table 2). Pharmacist participation was either required or voluntary and either 24 hours a day or on certain shifts only. The most common duties of pharmacists during resuscitation efforts were calculating drug dosages (93% of respondents with pharmacist participation), providing drug information (93%), preparing medications (92%), and mixing intravenous fluids (91%). Other reported duties include timing and documenting drug administration (40% and 33%, respectively), setting up infusion pumps (13%), administering drugs (10%), and performing CPR (6%).

Table 1.
Medications Most Commonly Included in Emergency Medication Carts
(*n* = 118 Hospitals)

Drug	No. (%) Responding Hospitals Including Drug in Emergency Carts
Sodium bicarbonate	118 (100)
Epinephrine	117 (99)
Atropine	115 (98)
Naloxone	115 (98)
Lidocaine	114 (97)
Dextrose	112 (95)
Dopamine	109 (92)
Calcium chloride	106 (90)
Adenosine	87 (74)
Isoproterenol	86 (73)
Dobutamine	72 (61)
Furosemide ^a	71 (60)
Bretylium	70 (59)
Diphenhydramine ^a	65 (55)
Heparin ^a	63 (53)
Phenytoin ^a	61 (52)

^aDrug not mentioned in pediatric advanced life-support guidelines.

Table 2.
Pharmacist Participation in Emergency Resuscitation by Type of Facility

Facility	Pharmacists	
	Total No.	No. (%) Participating
Pediatric teaching	21	13 (61.9)
Adult teaching	58	37 (63.8)
Adult nonteaching	57	35 (61.4)
Other	8	6 (75.0)
All	144	91 (63.2)

Discussion. The PALS guidelines, although not specifically addressing which drugs should be included in emergency resuscitation carts, discuss the use of adenosine, alprostadil, atropine, bretylium, calcium chloride, dextrose, dobutamine, dopamine, epinephrine, isoproterenol, lidocaine, naloxone, and sodium bicarbonate.³ The results of this survey indicate that adenosine, isoproterenol, dobutamine, and bretylium are included in fewer than 75% of pediatric emergency carts. Alprostadil was included at less than 5% of the responding institutions.^a This finding is attributed to the refrigeration requirement for alprostadil, as well as the limited indications for its use during resuscitation efforts, such as maintaining a patent ductus arteriosus in an infant with cyanosis related to congenital heart disease.

The medications included in emergency carts represent a large investment for a pharmacy department. In areas with few pediatric resuscitation needs, these medications may expire without being used. Hospitals must determine the best combination of medications and formulations for emergency needs while complying with PALS guidelines.

The survey results indicate varied

means for obtaining medications not included in the carts. Each institution should define the mechanism for obtaining such drugs or for obtaining additional stock when cart medications are depleted during resuscitation efforts. Automated dispensing machines and pharmacists bringing supplies may be the most efficient mechanisms.

In a previous survey of pharmacy directors, the rate of pharmacist participation in resuscitation attempts (nonspecified as adult or pediatric) was estimated at 30–33%.⁶ In the current survey, pharmacist participation was >60%. This may represent response bias; it is possible that institutions interested in this information or involved in a resuscitation program were more likely to respond to the survey. It is also possible that a broader definition of participation increased this percentage. The degree of participation was similar between children's hospitals and adult institutions. Pharmacists are completing tasks ranging from calculating dosages and providing drug information to administering medications. Many of these skills are not specifically addressed in basic or advanced life support training. Inpatient pharmacists should be trained for these particular skills.

Ideally, duplicate letters should have been sent to all nonrespondents, and a telephone survey of nonresponders should have been performed. These interventions were not performed because of cost constraints.

Conclusion. Institutions differed in their choice of drugs stocked in pediatric emergency carts and mechanisms for obtaining necessary drugs not in the carts. A substantial percentage of pharmacists participated in resuscitation efforts.

^aAlprostadil (prostaglandin E) is not included in any PALS algorithms but is discussed in the PALS manual.³ We therefore included it in our list of drugs in the questionnaire.

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Appendix G-3

ACPE PLAN Programming Live Forum Knowledge Activity



P.L.A.N. Search Results

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Title	UAN	Hours (CEUs)	City	Activity Type	Provider Information
	0180-0000-12-119-L04-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
26th Clinical Conference- The Team Approach to Pediatric Diabetes ? It takes a Village	0239-0000-11-076-L01-P	0.83 (0.083)	http://professional.diabetes.org/cc	Knowledge	0239 - American Diabetes Association
26th Clinical Conference- Transitioning from Pediatric to Adult Care	0239-0000-11-090-L01-P	1.5 (0.15)	http://professional.diabetes.org/cc	Knowledge	0239 - American Diabetes Association
26th Clinical Conference- Treatment and Diagnosis of Type 2 Diabetes in Children and Adolescents	0239-0000-11-079-L01-P	0.83 (0.083)	http://professional.diabetes.org/cc	Knowledge	0239 - American Diabetes Association
4th Annual VITALine Symposium: There's No Place Like	0266-0000-12-548-L01-P	6.5 (0.65)	Danville/ www.geisinger.edu/800.272.6692	Knowledge	0266 - Geisinger Health System
A Cast Approach to Fluid, Electrolyte, Nutrition Management in a Premie	0180-0000-10-021-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
A Cast Approach to Fluid, Electrolyte, Nutrition Management in a Premie	0180-0000-10-021-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
A Crash Course in Pediatric Pharmacotherapy	0136-0000-12-034-L01-P	2 (0.2)	Somerville	Knowledge	0136 - New Jersey Pharmacists Association
A Crash Course in Pediatric Pharmacotherapy	0136-0000-12-034-L01-T	2 (0.2)	Somerville	Knowledge	0136 - New Jersey Pharmacists Association
A Review of Antiemetic Therapy used for Chemotherapy Induced Nausea and Vomiting	0180-0000-11-003-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
A SURVEY OF CHILDREN'S HOSPITALS ON THE USE OF EXTEMPORANEOUS LIQUID	0180-0000-09-132-L04-P	0.25 (0.025)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
A Weighty Issue: Use of Medications in Overweight Children	0053-0000-11-030-L01-P	1 (0.1)	Oklahoma City	Knowledge	0053 - University of Oklahoma College of Pharmacy



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A Weighty Issue: Use of Medications in Overweight Children	0053-0000-11-030-L01-P	1 (0.1)	Tulsa	Knowledge	0053 - University of Oklahoma College of Pharmacy
a. How Much is Too Much? The Use of Rasburicase in the Treatment of Tumor Lysis Syndrome	0180-0000-11-504-L01-P	1 (0.1)	St. Louis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
AACP11: Geriatric Pharmacy Education SIG: Pediatrics and Geriatrics: Integration or Specialization in the Curriculum?	0294-9999-11-069-L04-P	1.5 (0.15)	San Antonio	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
AAE Conference Day 2: Asthma Educators: Called to Encourage, Empower and Educate	0047-9999-10-130-L01-P	5 (0.5)	Orlando	Knowledge	0047 - North Dakota State University College of Pharmacy, Nursing, and Allied Sciences
Academia Workshop: The Changing Face of the Pediatric Faculty Member	0180-0000-10-014-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Academia Workshop: The Changing Face of the Pediatric Faculty Member	0180-0000-10-014-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Acetaminophen Poisoning: What's the FDA Thinking? How Would You Vote?	0204-0000-10-263-L01-P	2 (0.2)	Anaheim	Knowledge	0204 - American Society of Health-System Pharmacists
Addressing Trends in Pediatric Psychological Treatment	0106-9999-10-036-L01-P	1 (0.1)	Ledyard, CT	Knowledge	0106 - Connecticut Pharmacists Association
Addressing Trends in Pediatric Psychological Treatment	0106-9999-10-036-L01-T	1 (0.1)	Ledyard, CT	Knowledge	0106 - Connecticut Pharmacists Association
ADHD	0062-9999-12-096-L01-P	1 (0.1)	North Charleston (843-876-1925)	Knowledge	0062 - South Carolina College of Pharmacy



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ADHD: Treatment Myths and Controversies	0204-0000-11-216-L01-P	1 (0.1)	New Orleans	Knowledge	0204 - American Society of Health-System Pharmacists
Adolescent Issues	0180-0000-09-115-L04-P	1.5 (0.15)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Advances in Antimicrobial Therapy in Pediatric Patients with Cystic Fibrosis in the Last 20 years. (The	0180-0000-10-033-L04-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Advances in Antimicrobial Therapy in Pediatric Patients with Cystic Fibrosis in the Last 20 years. (The	0180-0000-10-033-L04-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Adverse Drug Events in Children: Using Voluntary Reports to Measure the Impact of Medication Safety	0180-0000-12-116-L05-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Adverse Effects of Antiepileptic Medications	0180-0000-10-203-L01-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Adverse Effects of Antiepileptic Medications	0180-0000-10-203-L01-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Adverse Events Associated with Parenteral Nutrition	0180-0000-11-029-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Advocacy Workshop: Getting Involved in a Child Health Initiative at the Local and International Levels	0180-0000-10-029-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Advocacy Workshop: Getting Involved in a Child Health Initiative at the Local and International Levels	0180-0000-10-029-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Advocacy Workshop: Healthcare Reform	0180-0000-10-013-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Advocacy Workshop: Healthcare Reform	0180-0000-10-013-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Agents of Change: Systems and Strategies to Address Family, Social, and Developmental Needs in the Type 1 Pediatric Populations	0069-9999-11-207-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0069 - American Association of Diabetes Educators



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Ahhh-choo! Cough and cold medications in young children	0004-0000-11-063-L01-P	1.5 (0.15)	Little Rock & Fayetteville	Knowledge	0004 - University of Arkansas for Medical Sciences College of Pharmacy
Antidepressants and Antipsychotics in Youth: do the Benefits Outweigh the Risks?	0180-0000-10-205-L04-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Antidepressants and Antipsychotics in Youth: do the Benefits Outweigh the Risks?	0180-0000-10-205-L04-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Anti-fungal Prophylaxis and Treatment Considerations in Neutropenic Patients	0180-9999-11-006-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Antimicrobial Stewardship in Pediatric Practices	0485-0000-12-008-L01-P	1.5 (0.15)	Orlando mad-id-15th-annual-meeting	Knowledge	0485 - MAD-ID, Inc.
Application of Pharmacogenomics to the treatment of the Patient with Epilepsy	0180-0000-10-202-L01-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Application of Pharmacogenomics to the treatment of the Patient with Epilepsy	0180-0000-10-202-L01-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Approach to a Complicated Patient in the Pediatric Clinical Care Unit	0180-0000-10-004-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Approach to a Complicated Patient in the Pediatric Clinical Care Unit	0180-0000-10-004-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Argatroban and Lepirudin Utilization in a Pediatric Population: A Five Year Experience	0180-0000-10-020-L04-P	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Argatroban and Lepirudin Utilization in a Pediatric Population: A Five Year Experience	0180-0000-10-020-L04-T	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Assuring Safe Technology Implementation in Specialty Areas: Pediatrics, Oncology, and Investigational Drug Services	0204-0000-10-235-L05-P	2 (0.2)	Anaheim	Knowledge	0204 - American Society of Health-System Pharmacists
Basics of Bone Marrow Transplant	0180-0000-11-005-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Bedside Feeding Practices: Best Practice and Avoiding Morbidities	0263-0000-09-096-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Beyond the Basics: Vitamins and Pancreatic Enzymes in Cystic Fibrosis	0180-0000-10-010-L01-P	0.5 (0.05)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Blinded Volume Verification in a Pediatric Bar-code Medication Administration System (BCMA) to	0180-0000-09-128-L04-P	0.25 (0.025)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Blood Thinners in Babies: Anticoagulation in infants < 1 year of age	0180-0000-11-030-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Breaking News I: Patient Safety Issues	0202-0000-10-138-L01-P	1.5 (0.15)	Washington	Knowledge	0202 - American Pharmacists Association
Building A Standardized Approach to Acute Pediatric Care	0180-0000-10-007-L04-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Building A Standardized Approach to Acute Pediatric Care	0180-0000-10-007-L04-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Cardiometabolic Risk in Children	0239-0000-10-018-L01-P	1.5 (0.15)	San Francisco	Knowledge	0239 - American Diabetes Association
Caring for Kids: Pediatric Therapeutic Update for Pharmacists	0038-0000-11-023-L04-P	3 (0.3)	Piscataway	Knowledge	0038 - Rutgers University Ernest Mario School of Pharmacy
Caring for Kids: Pediatric Therapeutic Update for Pharmacists	0038-0000-11-023-L04-T	3 (0.3)	Piscataway	Knowledge	0038 - Rutgers University Ernest Mario School of Pharmacy
Caring for our Tiniest Babies: Evidence-Based Practices for Better Outcomes	0263-0000-09-090-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Cerebral Palsy	0180-0000-10-023-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Cerebral Palsy	0180-0000-10-023-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Challenges of Antimicrobial Dosing in Obese Pediatric Patients	0180-0000-12-138-L01-P	1 (0.1)	St. Louis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Chemotherapy Safety for You and the Patient	0180-0000-09-114-L01-P	1.5 (0.15)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Chemotherapy Safety-Processes and Technology	0180-0000-11-014-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Children's Health and Nutrition	0491-0000-09-008-L01-P	6 (0.6)	Albuquerque	Knowledge	0491 - Cross Country Education, LLC
Children's Health and Nutrition	0491-0000-09-008-L01-P	6 (0.6)	Cincinnati	Knowledge	0491 - Cross Country Education, LLC
Children's Health and Nutrition	0491-0000-09-008-L01-P	6 (0.6)	Columbus	Knowledge	0491 - Cross Country Education, LLC
Children's Health and Nutrition	0491-0000-09-008-L01-P	6 (0.6)	Denver	Knowledge	0491 - Cross Country Education, LLC
Children's Health and Nutrition	0491-0000-09-008-L01-P	6 (0.6)	Indianapolis	Knowledge	0491 - Cross Country Education, LLC
Children's Health and Nutrition	0491-0000-09-008-L01-P	6 (0.6)	Phoenix	Knowledge	0491 - Cross Country Education, LLC
Chronic Dermatology	0180-0000-10-209-L04-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Chronic Dermatology	0180-0000-10-209-L04-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
CJW: NICU Updates	0294-9999-10-135-L04-P	1 (0.1)	Richmond	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
Clinical Lecture 1: The Role of Biologics in Pediatric Rheumatology	0180-0000-09-107-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Clinical Lecture I: Medication Use during ECMO and Continuous Renal	0180-0000-09-119-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Clinical Lecture II: Management of Pediatric Chemical Casualties: Are We Prepared?	0180-0000-09-108-L04-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Clinical Pearls - Changing Times: Updates from the World of Poisonings	0180-0000-10-016-L04-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Clinical Pearls - Changing Times: Updates from the World of Poisonings	0180-0000-10-016-L04-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Clinical Pearls: Pediatrics, Pulmonary Arterial Hypertension, Refeeding Syndrome	0112-0000-12-106-L04-P	1.3 (0.13)	Detroit	Knowledge	0112 - Michigan Pharmacists Association
Community Acquired Methicillin-resistant Staphylococcus aureus (MRSA) in Pediatric Patients	0112-0000-11-146-L01-P	1.3 (0.13)	Detroit	Knowledge	0112 - Michigan Pharmacists Association
Community Acquired Pneumonia in the Critical Care Setting	0180-0000-11-035-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Comparison of Initial and Final Alprostadil Dose Needed to Maintain Patency of the Ductus Arteriosus:	0180-0000-09-130-L04-P	0.25 (0.025)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Complex Cases of Neonatal Resuscitation	0263-0000-11-255-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Continuous Infusion Beta-Lactam Therapy for Management of Acute Exacerbations in Cystic Fibrosis:	0180-0000-10-038-L01-P	0.5 (0.05)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Continuous Infusion Beta-Lactam Therapy for Management of Acute Exacerbations in Cystic Fibrosis:	0180-0000-10-011-L01-P	0.75 (0.075)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Continuous infusion versus scheduled antibiotics	0180-0000-12-113-L01-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Corticosteroids in Pediatric Hematology/Oncology: Clinical Applications, Toxicities, and Controversies	0465-0000-12-022-L01-P	0.5 (0.05)	Orlando	Knowledge	0465 - Hematology/Oncology Pharmacy Association (HOPA)



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CPOE and chemotherapy, The Implementation Process	0180-0000-11-013-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Cultural Considerations in Clinical Practice	0180-0000-11-023-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Cultural Diversity	0180-0000-10-207-L04-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Cultural Diversity	0180-0000-10-207-L04-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Current Advances in Neonatal Nutrition	0263-0000-09-087-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Current Best Evidence for Education in the Type 2 Pediatric Population	0069-0000-11-149-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0069 - American Association of Diabetes Educators
Current Issues in the Management of Pediatric patients with Cystic Fibrosis: Update 2009	0180-0000-09-126-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Cystic Fibrosis	0173-0000-12-009-L04-P	1 (0.1)	Boise, 208-342-2581	Knowledge	0173 - Idaho Society of Health-System Pharmacists
Cystic Fibrosis: Current Challenges and Implicationf for Drug Therapy	0180-0000-10-034-L01-P	0.5 (0.05)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Development of Novel Therapies for the Treatment of RSV Infection	0180-0000-11-032-L01-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Devices, Gadgets and Gizmos	0053-0000-11-032-L01-P	1.5 (0.15)	Oklahoma City	Knowledge	0053 - University of Oklahoma College of Pharmacy
Devices, Gadgets and Gizmos	0053-0000-11-032-L01-P	1.5 (0.15)	Tulsa	Knowledge	0053 - University of Oklahoma College of Pharmacy



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Diabetes in Children and Adolescents	0062-9999-12-012-L01-P	1 (0.1)	North Charleston (843-876-0968)	Knowledge	0062 - South Carolina College of Pharmacy
DKA & HHS	0180-0000-09-100-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Dosing in ECMO and CRRT	0180-0000-10-022-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Drug Adherence in Adolescence	0180-0000-11-008-L04-P	0.25 (0.025)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Drugs in Pregnancy; Treating the Mother- Protecting the Unborn	0180-0000-12-115-L01-P	1 (0.1)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Eculizumab in Paroxysmal Nocturnal Hemoglobinuria	0180-0000-11-009-L01-P	0.25 (0.025)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Educational Tours of Texas Children's Hospital	0180-0000-12-137-L04-P	1 (0.1)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Efficacy of Bar-code Medication Administration (BCMA) on Errors in a Pediatric Medical Surgical Unit	0180-0000-09-131-L04-P	0.25 (0.025)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Eicosapentaenoic Acid Attenuates Bile Acid-Induced Apoptosis via the Fas and TRAIL-R2 Death Receptors	0180-0000-10-017-L04-P	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Eicosapentaenoic Acid Attenuates Bile Acid-Induced Apoptosis via the Fas and TRAIL-R2 Death Receptors	0180-0000-10-017-L04-T	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Emergency Medicine Update: Hot Topics 2010	0277-0000-10-146-L01-P	16.75 (1.675)	Wailea, Maui	Knowledge	0277 - University of California Davis Health System Department of Pharmacy
Evaluation and Management of Infants with Suspected Heart Disease	0263-0000-09-089-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Evaluation of the Incidence of Parenteral Nutrition-Associated Liver Disease in Infants Requiring	0180-0000-11-021-L01-P	0.25 (0.025)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Evaluation of Vancomycin Dosing for Complicated Infections in Pediatric Patients	0180-0000-10-018-L04-P	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Evaluation of Vancomycin Dosing for Complicated Infections in Pediatric Patients	0180-0000-10-018-L04-T	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Evidence Based Neonatal Skin Care: Update on Bathing, Disinfectants, Adhesives and	0263-0000-09-086-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Extreme Dosing	0180-0000-09-116-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Fetal Care	0180-0000-10-035-L04-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Fetal Care	0180-0000-10-035-L04-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Fetus & Newborn-Main Conference	0263-0000-09-083-L04-P	7 (0.7)	San Francisco	Knowledge	0263 - Contemporary Forums
Fundamental Updates in Pediatrics: Outpatient and Inpatient Pearls	0003-0000-10-123-L01-P	2 (0.2)	Tucson	Knowledge	0003 - University of Arizona College of Pharmacy, The
General Overview of Epilepsy	0180-0000-10-200-L01-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
General Overview of Epilepsy	0180-0000-10-200-L01-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Genetic Epidemiology of Early-Onset Depression and Alcohol Use Disorders	0284-0000-10-014-L01-P	1 (0.1)	San Antonio	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Glucarpidase for Methotrexate Toxicity	0180-0000-11-007-L01-P	0.25 (0.025)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Grant Writing	0180-0000-09-109-L04-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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H2 blocker use and late onset sepsis in the neonate	0180-0000-11-039-L01-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Hawaii Pharmacists Annual Mtg 2010: Childhood Obesity	0168-0000-10-110-L04-P	1 (0.1)	Kapolei/Ihilani/ www.hipharm.org	Knowledge	0168 - Hawaii Pharmacists Association (HPhA)
Hawaii Pharmacists Annual Mtg 2010: Childhood Obesity	0168-0000-10-110-L04-T	1 (0.1)	Kapolei/Ihilani/ www.hipharm.org	Knowledge	0168 - Hawaii Pharmacists Association (HPhA)
Hawaii Pharmacists Annual Mtg 2012: Session6 - Can You Help Me Vaccinate My Child Tight Away?	0168-0000-12-006-L04-P	1 (0.1)	Honolulu/ www.hipharm.org	Knowledge	0168 - Hawaii Pharmacists Association (HPhA)
Hawaii Pharmacists Annual Mtg 2012: Session6 - Can You Help Me Vaccinate My Child Tight Away?	0168-0000-12-006-L04-T	1 (0.1)	Honolulu/ www.hipharm.org	Knowledge	0168 - Hawaii Pharmacists Association (HPhA)
Head, Shoulders, Knees and Toes (and Ears and Mouth and Nose and . . .): Antibiotic Essentials for Children	0096-0000-10-090-L01-P	1 (0.1)	TTUHSC SW Campus - Dallas	Knowledge	0096 - Texas Tech University Health Sciences Center School of Pharmacy
Helms Award	0180-0000-09-118-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Helms Lecture Series	0180-0000-11-022-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
◆Help, I have Tricky-itis◆ (Treatment of Tracheitis)	0180-0000-12-108-L01-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Hemophilia Workshop	0180-0000-10-212-L04-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Hemophilia Workshop	0180-0000-10-212-L04-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Hospital Pharmacy Technicians and the Pediatric Patient	0156-0000-10-096-L04-T	1 (0.1)	San Antonio	Knowledge	0156 - Texas Society of Health-System Pharmacists, The
Hot Topics	0180-0000-09-124-L04-P	2 (0.2)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Hot Topics from the Neonatal-Perinatal Literature	0263-0000-09-092-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Hot Topics in Clinical Pediatric Practice: Antimicrobial Stewardship and Drug Disposition in ECMO	0204-0000-12-112-L01-P	2 (0.2)	Baltimore	Knowledge	0204 - American Society of Health-System Pharmacists
Hot Topics in Clinical Pediatric Practice: Ketogenic Diet and Update on Antiepileptic Agents	0204-0000-12-111-L01-P	2 (0.2)	Baltimore	Knowledge	0204 - American Society of Health-System Pharmacists
Hot Topics in Pediatrics	0278-0000-11-034-L01-P	2 (0.2)	Virginia Beach	Knowledge	0278 - Virginia Pharmaceutical Association
Hot Topics in Pediatrics	0278-0000-11-034-L01-T	2 (0.2)	Virginia Beach	Knowledge	0278 - Virginia Pharmaceutical Association
How a Tennessee pharmacist became CEO of the world's #1 pediatric cancer hospital	0180-0000-11-016-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Immunization update/Management of Pandemics	0180-0000-11-038-L01-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Immunization Update: Expanding the Pharmacist Role	0047-0000-11-136-L01-P	7 (0.7)	Fargo	Knowledge	0047 - North Dakota State University College of Pharmacy, Nursing, and Allied Sciences
Improvement or Reversal of Parenteral Nutrition Associated Liver Disease in Six Infants with Short	0180-0000-09-127-L04-P	0.25 (0.025)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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In a World of Their Own: Diagnosis and Treatment of Autism	0284-0000-10-002-L01-P	1 (0.1)	San Antonio	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
In Search of a Healthy America: Meeting Families Where They Begin Through Integrated Prenatal, Pediatric, and Behavioral Health	0022-9999-10-173-L01-P	0.75 (0.075)	Louisville	Knowledge	0022 - University of Kentucky College of Pharmacy
Incorporating Pharmaceutical Care into Pediatric HIV	0180-0000-10-213-L02-P	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Incorporating Pharmaceutical Care into Pediatric HIV	0180-0000-10-213-L02-T	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Infant and Pediatric Formulas: History, Content and Indications	0180-0000-11-028-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Infectious Disease - CAMRSA	0180-0000-09-120-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Influenza: Strategies to Diagnose, Treat, and Reduce Risk in Community and Patient Health Care	0347-0000-09-065-L01-P	1 (0.1)	Tacoma, Western State Hospital, Grand Rounds, 8:00	Knowledge	0347 - Foundation for Care Management
Informatics 101	0180-0000-12-132-L04-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Initiative for Pediatric Palliative Care Educational Retreat	0298-9999-09-015-L01-P	16.5 (1.65)	Clearwater	Knowledge	0298 - Bayfront Medical Center
Intrauterine Infections, Prematurity and Neonatal Sepsis: Strategies for Diagnosis and Prevention.	0263-0000-09-097-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Intravenous Lock Therapy	0180-0000-12-103-L01-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Irritability and Elation: The Consequences of Thinking about Pediatric Bipolar Disorder and Severe Mood Dysregulation	0284-9999-11-014-L04-P	1 (0.1)	Phoeniz/cpn.org/2011/402-476-1677	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists



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Issues in Pediatric Hematology/Oncology	0173-0000-11-009-L04-P	1 (0.1)	Boise www.ishp.shuttlepod.org	Knowledge	0173 - Idaho Society of Health-System Pharmacists
Issues in Pediatric Infectious Diseases	0485-0000-11-005-L01-P	1.5 (0.15)	Orlando mid-id.org/registration.htm	Knowledge	0485 - MAD-ID, Inc.
Keynote Address: National Commission on Children & Disasters	0180-0000-09-105-L04-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
KIDS are PEOPLE Too! Drug Therapy in Children	0499-9999-12-004-L01-T	1 (0.1)	Florence	Knowledge	0499 - Southeastern Continuing Medical Education Consultants, LLC
Late Breakers, II	0217-0000-11-090-L01-P	1.5 (0.15)	Pittsburgh -- www.accp.com/am	Knowledge	0217 - American College of Clinical Pharmacy
Lean Management ♦ Stories from the Frontline	0180-0000-12-127-L04-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Little Hands, New Life: Complications and Pharmaceutical Care of Newborns	0124-0000-10-006-L01-T	1 (0.1)	Novi	Knowledge	0124 - Southeastern Michigan Society of Health-System Pharmacists
Live at LeBonheur Children's Hospital ♦	0180-0000-11-033-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Live at St. Jude Children's Research Hospital	0180-0000-11-017-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Long Term Complications of Pediatric Chemotherapy	0043-0000-11-024-L01-P	1 (0.1)	Jamaica	Knowledge	0043 - St. John's University College of Pharmacy and Health Sciences
Mama Said Knock You Out: Innovative Sedation	0180-0000-11-037-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Management of Diabetes, Type I	0180-0000-09-102-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Management of Diabetes, Type II	0180-0000-09-104-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Management of Fluid & Electrolyte Disorders in the LBW Infant	0263-0000-09-095-L01-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Management of Pancreatic Insufficiency in Cystic Fibrosis	0180-0000-11-041-L01-P	1 (0.1)	Columbus	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Management of Pulmonary Hypertension - General Session	0180-0000-10-006-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Management of Pulmonary Hypertension - General Session	0180-0000-10-006-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Management of the Neonate with Critical Congenital Heart Disease From Birth Through Hospital	0263-0000-11-259-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Managing Drug Shortages: A Panel Discussion	0180-0000-12-125-L04-P	1 (0.1)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Managing GI Issues in Children	0107-0000-11-030-L01-P	1 (0.1)	Des Moines	Knowledge	0107 - Collaborative Education Institute
Managing the Treatment of Pediatric Patients	0042-0000-11-004-L01-P	5 (0.5)	E Elmhurst NY www.liu.edu/pharmce	Knowledge	0042 - Arnold and Marie Schwartz College of Pharmacy and Health Sciences of Long Island University
Mechanisms of Antibiotic Resistance & Strategies for Prevention	0180-0000-12-102-L01-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Medical-Legal Issues in Neonatal Care: Litigation Hot Spots	0263-0000-09-091-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Medication Adherence Workshop	0180-0000-10-211-L04-P	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Medication Adherence Workshop	0180-0000-10-211-L04-T	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Medication Safety Issues in the Breastfeeding Mother	0096-0000-10-091-L04-P	1 (0.1)	TTUHSC SOP SW Campus - Dallas	Knowledge	0096 - Texas Tech University Health Sciences Center School of Pharmacy
Medication Therapy Management in a Pediatric Medical Home	0180-0000-12-118-L04-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Meet the Professors	0485-0000-12-011-L01-P	2 (0.2)	Orlando Caribe Roylee	Knowledge	0485 - MAD-ID, Inc.
Mending Tender Skin: Diaper Dermatitis, Ostomies, Excoriations and IV Infiltrates	0263-0000-09-093-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Meta-Analysis	0180-0000-09-121-L04-P	2 (0.2)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Mommy and Me: Medications in Pregnancy	0053-0000-11-033-L01-P	1 (0.1)	Oklahoma City	Knowledge	0053 - University of Oklahoma College of Pharmacy
Mommy and Me: Medications in Pregnancy	0053-0000-11-033-L01-P	1 (0.1)	Tulsa	Knowledge	0053 - University of Oklahoma College of Pharmacy
Narcotics/Sedation/NAS, etc.	0180-0000-09-123-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
NEC: The Road to Zero	0263-0000-11-253-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Neonatal Abstinence Syndrome	0180-0000-10-002-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Neonatal and Pediatric Hot Topics	0180-0000-10-027-L04-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Neonatal and Pediatric Hot Topics	0180-0000-10-027-L04-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Neonatal and Pediatric Nutrition - Day One	0263-0000-11-219-L01-P	7 (0.7)	San Diego	Knowledge	0263 - Contemporary Forums
Neonatal Circulatory Support	0180-0000-10-005-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Neonatal Emergencies and Other Surprises in the Delivery Room: Case Studies of Complex Situations	0263-0000-09-085-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Neonatal Resuscitation: Evidence-Based Care	0263-0000-09-098-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
New Therapies in Neuroblastoma	0180-0000-11-011-L02-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Novel Strategies for Therapeutic Dilemmas -- Mental Health Across the Ages	0217-0000-09-088-L01-P	1.5 (0.15)	Anaheim, www.accp.com	Knowledge	0217 - American College of Clinical Pharmacy
Novel Strategies for Therapeutic Dilemmas -- The Problem with Lipids	0217-0000-09-112-L01-P	1.5 (0.15)	Anaheim, www.accp.com	Knowledge	0217 - American College of Clinical Pharmacy
Obesity in Pregnancy: Implications for Mother and Baby	0263-0000-11-258-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Off-Label Drug Use in Pediatric Patients: How Can We Change the System?	0180-0000-11-026-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
OSHP 2010 Annual Meeting: Residency Project Pearls - Session 2	0053-9999-10-028-L01-P	1 (0.1)	Oklahoma City	Knowledge	0053 - University of Oklahoma College of Pharmacy
OTC's in Pediatrics	0154-0000-10-018-L04-P	1 (0.1)	www.rxcellence.org	Knowledge	0154 - Texas Pharmacy Association
OTC's in Pediatrics	0154-0000-10-018-L04-T	1 (0.1)	www.rxcellence.org	Knowledge	0154 - Texas Pharmacy Association



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Over-the-counter medications in young children; uses, misuses, and myths	0455-0000-09-006-L01-P	2 (0.2)	M Resort - Henderson, NV	Knowledge	0455 - Roseman University of Health Sciences
Palliative Care Advances in Pediatric Oncology	0180-0000-11-010-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pathology, Diagnosis and Management of Type 1 Diabetes in Children and Adolescents	0046-9999-10-004-L01-P	3 (0.3)	Fayetteville	Knowledge	0046 - University of North Carolina Eshelman School of Pharmacy
Pathology, Diagnosis and Management of Type 1 Diabetes in Children and Adolescents	0046-9999-10-004-L01-T	3 (0.3)	Fayetteville	Knowledge	0046 - University of North Carolina Eshelman School of Pharmacy
Patient Assistant Programs 101	0180-0000-10-206-L04-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Patient Assistant Programs 101	0180-0000-10-206-L04-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pay Attention to This! Lessons Learned on Medications for ADHD	0096-0000-10-088-L01-P	1 (0.1)	TTUHSC SW Campus - Dallas	Knowledge	0096 - Texas Tech University Health Sciences Center School of Pharmacy
Pediatric & Neonatal Emergency Medications	0062-9999-11-133-L04-T	1 (0.1)	Columbia (PHR Resident Series)	Knowledge	0062 - South Carolina College of Pharmacy
Pediatric Clinical Controversies in Inhaled Therapy	0180-0000-11-001-L01-P	1 (0.1)	St. Louis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Clinical Controversies in Inhaled Therapy	0180-0000-11-001-L01-T	1 (0.1)	St. Louis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Clinical Pearls	0053-0000-11-034-L04-P	1.5 (0.15)	Oklahoma City	Knowledge	0053 - University of Oklahoma College of Pharmacy



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Pediatric Clinical Pearls	0053-0000-11-034-L04-P	1.5 (0.15)	Tulsa	Knowledge	0053 - University of Oklahoma College of Pharmacy
Pediatric Electronic Medical Record	0180-0000-10-030-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Electronic Medical Record	0180-0000-10-030-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric HIV/AIDS Treatment: Worlds Apart	0180-0000-12-124-L02-P	1 (0.1)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Immunizations	0173-0000-12-002-L04-P	1 (0.1)	Boise, 208-342-2581	Knowledge	0173 - Idaho Society of Health-System Pharmacists
Pediatric Infectious Disease Update for the Outpatient Setting	0202-0000-10-206-L01-P	1 (0.1)	Chattanooga	Knowledge	0202 - American Pharmacists Association
Pediatric Infectious Disease Update for the Outpatient Setting	0202-0000-10-206-L01-T	1 (0.1)	Chattanooga	Knowledge	0202 - American Pharmacists Association
Pediatric Medication Adherence and Counseling	0179-9999-11-029-L04-P	1 (0.1)	Buffalo	Knowledge	0179 - Louisiana Society of Health-System Pharmacists
Pediatric Medication Adherence and Counseling	0179-9999-12-006-L04-P	1 (0.1)	New Orleans	Knowledge	0179 - Louisiana Society of Health-System Pharmacists
Pediatric Medication Adherence and Counseling	0179-9999-12-006-L04-T	1 (0.1)	New Orleans	Knowledge	0179 - Louisiana Society of Health-System Pharmacists
Pediatric Medication Safety Across the Continuum	0134-0000-12-028-L05-P	1 (0.1)	Saratoga	Knowledge	0134 - New York State Council of Health-System Pharmacists



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Pediatric Medication Safety Across the Continuum	0134-0000-12-028-L05-T	1 (0.1)	Saratoga	Knowledge	0134 - New York State Council of Health-System Pharmacists
Pediatric Medicine	0060-9999-11-030-L01-P	5 (0.5)	Bar Harbor	Knowledge	0060 - University of Rhode Island College of Pharmacy
Pediatric Medicine	0060-9999-11-030-L01-T	5 (0.5)	Bar Harbor	Knowledge	0060 - University of Rhode Island College of Pharmacy
Pediatric Obesity	0046-9999-09-182-L04-P	1.5 (0.15)	Wilson	Knowledge	0046 - University of North Carolina Eshelman School of Pharmacy
Pediatric Obesity	0046-9999-09-182-L04-T	1.5 (0.15)	Wilson	Knowledge	0046 - University of North Carolina Eshelman School of Pharmacy
Pediatric Obesity: Clinical and Research Innovation	0022-9999-10-156-L01-P	0.75 (0.075)	Louisville	Knowledge	0022 - University of Kentucky College of Pharmacy
Pediatric OTC Therapy Options	0136-0000-12-020-L01-P	1 (0.1)	Newark	Knowledge	0136 - New Jersey Pharmacists Association
Pediatric Pain	0173-0000-12-011-L04-P	1 (0.1)	Boise, 208-342-2581	Knowledge	0173 - Idaho Society of Health-System Pharmacists
Pediatric Pearls	0120-9999-12-007-L04-P	0.5 (0.05)	Fort Wayne	Knowledge	0120 - Indiana Pharmacists Alliance
Pediatric PET/CT ? Challenges, Pitfalls, and Normal Variants	0165-0000-10-074-L04-P	1 (0.1)	Orlando	Knowledge	0165 - Florida Pharmacy Association
Pediatric PET/CT ? Challenges, Pitfalls, and Normal Variants	0165-0000-10-074-L04-T	1 (0.1)	Orlando	Knowledge	0165 - Florida Pharmacy Association



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Pediatric Pharmacology and Therapeutics	0180-0000-10-037-L04-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Pharmacology and Therapeutics	0180-0000-10-037-L04-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Pharmacotherapy Update for Pharmacists and Nurse Practitioners	0499-0000-11-025-L01-P	3 (0.3)	Charleston	Knowledge	0499 - Southeastern Continuing Medical Education Consultants, LLC
Pediatric Pharmacy Practice: Past Present and Future (What is old is new)	0180-0000-12-120-L04-P	1 (0.1)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Pharmacy Update	0499-0000-11-010-L01-P	2 (0.2)	Charleston	Knowledge	0499 - Southeastern Continuing Medical Education Consultants, LLC
Pediatric Pharmacy Update	0499-0000-11-010-L01-P	2 (0.2)	Greenville	Knowledge	0499 - Southeastern Continuing Medical Education Consultants, LLC
Pediatric Pharmacy Update	0499-0000-11-010-L01-T	2 (0.2)	Charleston	Knowledge	0499 - Southeastern Continuing Medical Education Consultants, LLC
Pediatric Pharmacy Update	0499-0000-11-010-L01-T	2 (0.2)	Greenville	Knowledge	0499 - Southeastern Continuing Medical Education Consultants, LLC
Pediatric Procedural sedation	0180-0000-11-036-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Septic Shock	0180-0000-11-034-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Pediatric Sickle Cell Disease	0202-0000-11-176-L01-P	1 (0.1)	Dallas	Knowledge	0202 - American Pharmacists Association
Pediatric Sickle Cell Disease	0202-0000-11-176-L01-T	1 (0.1)	Dallas	Knowledge	0202 - American Pharmacists Association
Pediatric Thrombosis	0282-0000-10-018-L01-P	1 (0.1)	Gillette, WY 307-688-6009	Knowledge	0282 - Campbell County Memorial Hospital
Pediatric Thrombosis	0282-0000-10-018-L01-T	1 (0.1)	Gillette, WY 307-688-6009	Knowledge	0282 - Campbell County Memorial Hospital
Pediatric Update	0266-0000-11-531-L04-P	6 (0.6)	Danville/www.geisinger.edu/800-272-6692	Knowledge	0266 - Geisinger Health System
Pediatric Update	0266-0000-12-549-L04-P	6.5 (0.65)	Danville/www.geisinger.edu/800/272/6692	Knowledge	0266 - Geisinger Health System
Pediatric Updates: 1, 2, 3 of Pediatric Assessment & Sports Related Injuries in School-Age Children	0097-0000-10-027-L04-P	3 (0.3)	Wilkes-Barre	Knowledge	0097 - Nesbitt School of Pharmacy at Wilkes University
Pediatrics 1	0465-0000-12-013-L01-P	1 (0.1)	Orlando	Knowledge	0465 - Hematology/Oncology Pharmacy Association (HOPA)
Pediatrics 3	0465-0000-12-024-L01-P	1 (0.1)	Orlando	Knowledge	0465 - Hematology/Oncology Pharmacy Association (HOPA)
Pediatrics for the Non-Pediatric Practitioner: Practicing Evidence-Based Medicine without the Evidence	0204-0000-10-256-L04-P	1.75 (0.175)	Anaheim	Knowledge	0204 - American Society of Health-System Pharmacists
Pediatrics Part I	0163-9999-12-088-L01-P	1 (0.1)	Gainesville	Knowledge	0163 - Florida Society of Health-System Pharmacists, Inc.



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Pediatrics Part II	0163-9999-12-093-L01-P	1 (0.1)	Gainesville	Knowledge	0163 - Florida Society of Health-System Pharmacists, Inc.
Pediatrics Primer	0178-0000-11-013-L04-P	1.5 (0.15)	Destin	Knowledge	0178 - Alabama Pharmacy Association Research & Education Foundation
Pediatrics Primer	0178-0000-11-013-L04-T	1.5 (0.15)	Destin	Knowledge	0178 - Alabama Pharmacy Association Research & Education Foundation
Pediatrics: How to Knock 'em Out and Lock 'em Out	0204-0000-11-227-L01-P	2.5 (0.25)	New Orleans	Knowledge	0204 - American Society of Health-System Pharmacists
Personal and Organizational Greatness	0180-0000-10-204-L04-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Personal and Organizational Greatness	0180-0000-10-204-L04-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Perturbations in Blood Glucose: Causes and Concerns	0263-0000-11-257-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Pharmacist Development, General Workshop	0180-0000-10-026-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacist Development, General Workshop	0180-0000-10-026-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacist in ED	0180-0000-09-122-L01-P	2 (0.2)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacist Role in SIDS Risk Reduction	0282-9999-11-011-L05-P	1 (0.1)	Casper, WY 307-688-6009	Knowledge	0282 - Campbell County Memorial Hospital



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Pharmacist Validation of Doses Outside Smart Pump Limits	0180-0000-09-129-L04-P	0.25 (0.025)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacists involvement in Multi-Centered, Clinical Trials in a Pediatric Hospital	0180-0000-11-024-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacogenomics-Applications in Pediatric Oncology	0180-0000-11-002-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacology of New Agents in Pediatric Oncology	0180-0000-11-015-L01-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pharmacy Practice Pearls	0144-9999-12-017-L01-P	1 (0.1)	Ocean City / 410-727-0746	Knowledge	0144 - Maryland Pharmacy Continuing Education Coordinating Council
Pharmacy Practice Pearls	0144-9999-12-017-L01-T	1 (0.1)	Ocean City / 410-727-0746	Knowledge	0144 - Maryland Pharmacy Continuing Education Coordinating Council
Physiological and Pharmacokinetic Differences between Adults and Children	0173-0000-12-006-L04-P	1 (0.1)	Boise, 208-342-2581	Knowledge	0173 - Idaho Society of Health-System Pharmacists
Pk/PD	0180-0000-09-112-L01-P	1.5 (0.15)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
PK/PD differences in infants and children with Acyanotic and Cyanotic Congenital Heart Disease	0180-0000-11-031-L01-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pneumonia	0485-0000-12-004-L01-P	1.5 (0.15)	Orlando mad-id-1th-annual-meeting	Knowledge	0485 - MAD-ID, Inc.
PPHN: Causes, Care and Controversies	0263-0000-09-099-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums



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Preceptor Development: Mentorship	0180-0000-11-025-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Predictors of Hepatotoxicity in Pediatric Patients Receiving Voriconazole	0180-0000-12-117-L04-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Prevailing Ethical Issues in Neonatal Care: Viability and Other Challenges	0263-0000-09-094-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Preventing Infectious Diseases: Update on Pediatric Vaccines	0053-0000-11-029-L01-P	1 (0.1)	Oklahoma City	Knowledge	0053 - University of Oklahoma College of Pharmacy
Preventing Infectious Diseases: Update on Pediatric Vaccines	0053-0000-11-029-L01-P	1 (0.1)	Tulsa	Knowledge	0053 - University of Oklahoma College of Pharmacy
Principles of Pediatric Pharmacotherapy	0741-0000-12-004-L01-P	5 (0.5)	Las Vegas/ www.UniversityLearning.com/800-940-5860	Knowledge	0741 - University Learning Systems, Inc.
Pro-Calci what? (Procalcitonin Use In Infectious Disease)	0180-0000-12-107-L01-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pumps, Pens, & Other Devices	0180-0000-09-103-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Reducing the Burden of RSV Infection through Recommended Prevention and Treatment	0022-9999-10-009-L01-P	1 (0.1)	Dallas/Fort Worth TBD	Knowledge	0022 - University of Kentucky College of Pharmacy
Reducing the Burden of RSV Infection through Recommended Prevention and Treatment	0022-9999-10-009-L01-P	1 (0.1)	Los Angeles Wilshire Hotel	Knowledge	0022 - University of Kentucky College of Pharmacy
Reducing the Burden of RSV Infection through Recommended Prevention and Treatment	0022-9999-10-009-L01-P	1 (0.1)	NYC, TBD	Knowledge	0022 - University of Kentucky College of Pharmacy



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Reducing the Burden of RSV Infection through Recommended Prevention and Treatment	0022-9999-10-009-L01-P	1 (0.1)	Orlando Peabody Hotel	Knowledge	0022 - University of Kentucky College of Pharmacy
Reducing the Burden of RSV Infection through Recommended Prevention and Treatment	0022-9999-10-009-L01-P	1 (0.1)	Philadelphia TBD	Knowledge	0022 - University of Kentucky College of Pharmacy
Reducing the Burden of RSV Infection through Recommended Prevention and Treatment	0022-9999-10-009-L01-P	1 (0.1)	Washington, TBD	Knowledge	0022 - University of Kentucky College of Pharmacy
Reducing your Infection Rate and Risk: A Total Body Approach	0263-0000-09-088-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
Relationship of caffeine dosing with serum alkaline phosphatase levels in extremely low birth-weight infants	0180-0000-11-020-L01-P	0.25 (0.025)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Research Workshop: How to Get Your Residency Project Done in One Year	0180-0000-10-028-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Research Workshop: How to Get Your Residency Project Done in One Year	0180-0000-10-028-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Research Workshop: Pharmacogenomics Impact on Pediatric Pharmacy Practice	0180-0000-10-012-L04-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Research Workshop: Pharmacogenomics Impact on Pediatric Pharmacy Practice	0180-0000-10-012-L04-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Residency Project Pearls (2)	0053-9999-12-032-L01-P	1 (0.1)	Tulsa	Knowledge	0053 - University of Oklahoma College of Pharmacy
Resuscitation and RSI Pharmacotherapy - Level 1 (PICU)	0180-0000-10-001-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Resuscitation and RSI Pharmacotherapy - Level 1 (PICU)	0180-0000-10-001-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Safety First: The In?s and Out?s of Medications in Pediatrics	0088-9999-11-041-L01-P	1 (0.1)	Myrtle Beach	Knowledge	0088 - Campbell University College of Pharmacy and Health Sciences
SCCM11: Year in Review Pediatrics	0294-9999-11-101-L04-P	0.5 (0.05)	Roanoke	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
Selection of Antibiotics, Dosing and Length of Therapy	0180-0000-10-036-L01-P	0.5 (0.05)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Sepsis and Septic Shock	0180-0000-10-025-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Shots for Tots: A Pharmacist's Refresher	0060-9999-11-031-L04-P	1 (0.1)	Bar Harbor	Knowledge	0060 - University of Rhode Island College of Pharmacy
Shots for Tots: A Pharmacist's Refresher	0060-9999-11-031-L04-T	1 (0.1)	Bar Harbor	Knowledge	0060 - University of Rhode Island College of Pharmacy
Should Kernicterus Be a "Never Event"?	0263-0000-11-251-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Sickle Cell Workshop	0180-0000-10-210-L04-P	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Sickle Cell Workshop	0180-0000-10-210-L04-T	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Simplifying Leadership Complexities in Pediatric Pharmacy Patient Care	0180-0000-09-111-L04-P	2 (0.2)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Skin Breakdown and Wound Care in the NICU Patient	0263-0000-11-256-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Solid Organ Transplant ? Long Term Considerations	0180-0000-10-214-L04-P	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Solid Organ Transplant ? Long Term Considerations	0180-0000-10-214-L04-T	1.5 (0.15)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Successful Mentoring: Students, Residents, New Practitioners	0180-0000-12-126-L04-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Super Session: Clinical Microbiology Review	0180-0000-10-031-L01-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Super Session: Clinical Microbiology Review	0180-0000-10-031-L01-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
The 411 on New Drugs in 2011	0414-0000-11-214-L01-P	1 (0.1)	Wingate	Knowledge	0414 - Wingate University School of Pharmacy
The Art and Science of Transition - Transition Nuts & Bolts	0453-9999-12-116-L01-P	1.5 (0.15)	Boston	Knowledge	0453 - Amedco, LLC
The Art and Science of Transition - Transition: Collaboration,	0453-9999-12-117-L01-P	1.5 (0.15)	Boston	Knowledge	0453 - Amedco, LLC
The Childhood Cancer Survivor Study: Defining Risks Among Long-term Survivors	0180-0000-11-004-L04-P	1.5 (0.15)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
The Complexity of Transplant Care- Partnering with the Medical	0453-9999-12-126-L01-P	1.5 (0.15)	Boston	Knowledge	0453 - Amedco, LLC
The Fetus & Newborn: State-of-the-Art Care - Day 3	0263-0000-11-260-L01-P	4.25 (0.425)	Las Vegas	Knowledge	0263 - Contemporary Forums
The Impact of a Pharmacist-Managed RSV Prevention Clinic on Palivizumab Compliance and RSV	0180-0000-10-009-L01-P	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
The Impact of a Pharmacist-Managed RSV Prevention Clinic on Palivizumab Compliance and RSV	0180-0000-10-009-L01-T	1 (0.1)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
The Interrelationship Among Sleep Disturbances and Chronic Pain in	0451-0000-12-025-L01-P	1.5 (0.15)	Honolulu	Knowledge	0451 - American Pain Society
The Late Preterm	0263-0000-11-250-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
The Late Pre-Term Infant	0018-9999-11-140-L04-P	1 (0.1)	Lafayette	Knowledge	0018 - Purdue University College of Pharmacy



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The Late Preterm Infant: A National Epidemic	0263-0000-09-084-L04-P	1.5 (0.15)	San Francisco	Knowledge	0263 - Contemporary Forums
The Role of Pediatric School Psychology in Integrated Health Care	0022-9999-10-155-L01-P	0.75 (0.075)	Louisville	Knowledge	0022 - University of Kentucky College of Pharmacy
The Skinny of Childhood Obesity and the Cardiovascular Consequences	0165-0000-10-090-L01-P	1.5 (0.15)	Orlando	Knowledge	0165 - Florida Pharmacy Association
The Skinny of Childhood Obesity and the Cardiovascular Consequences	0165-0000-10-090-L01-T	1.5 (0.15)	Orlando	Knowledge	0165 - Florida Pharmacy Association
The Treatment of Diabetes From Pediatrics to Geriatrics: A Focus on Outpatient and Inpatient Management	0042-0000-09-015-L01-P	5 (0.5)	LaGuardia Marriott Hotel, E. Elmhurst	Knowledge	0042 - Arnold and Marie Schwartz College of Pharmacy and Health Sciences of Long Island University
Time to Appropriate Antimicrobial Use for Pediatric Pneumonia	0180-0000-12-109-L01-P	0.25 (0.025)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Topics in Pediatric Anticoagulation - General Session	0180-0000-10-003-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Topics in Pediatric Anticoagulation - General Session	0180-0000-10-003-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Transfusion-Based Practices in the NICU: What's the Evidence?	0263-0000-11-243-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Transitioning Points in Students Lives - Navigating the Journey with Diabetes	0069-0000-11-140-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0069 - American Association of Diabetes Educators
Treatment of Mycobacterium Infections	0180-0000-12-105-L01-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



P.L.A.N. Search Results

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Treatment of Pediatric Asthma	0154-0000-10-222-L01-P	1 (0.1)	Austin	Knowledge	0154 - Texas Pharmacy Association
Treatment of Pediatric Neurological Disorders	0289-0000-11-044-L01-P	6 (0.6)	Asheville	Knowledge	0289 - PESI HealthCare
Treatment of Pediatric Neurological Disorders	0289-0000-11-044-L01-P	6 (0.6)	Charleston	Knowledge	0289 - PESI HealthCare
Treatment of Pediatric Neurological Disorders	0289-0000-11-044-L01-P	6 (0.6)	Frederick	Knowledge	0289 - PESI HealthCare
Treatment of Pediatric Neurological Disorders	0289-0000-11-044-L01-P	6 (0.6)	Knoxville	Knowledge	0289 - PESI HealthCare
Treatment of Pediatric Neurological Disorders	0289-0000-11-044-L01-P	6 (0.6)	Morgantown	Knowledge	0289 - PESI HealthCare
Treatment of Pediatric Neurological Disorders	0289-0000-11-044-L01-P	6 (0.6)	Nashville	Knowledge	0289 - PESI HealthCare
Treatment of Status Epilepticus	0180-0000-10-201-L01-P	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Treatment of Status Epilepticus	0180-0000-10-201-L01-T	1 (0.1)	Salt Lake City	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Troubled Teenager 101	0007-0000-12-006-L01-P	1.5 (0.15)	Ojai, California	Knowledge	0007 - University of Southern California School of Pharmacy
Turning Your Clinical Observations into Publications	0180-0000-11-027-L04-P	1 (0.1)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Type 1 Diabetes in Children and Adolescents	0062-9999-11-115-L01-P	1.5 (0.15)	Greenville ((864-560-6265)	Knowledge	0062 - South Carolina College of Pharmacy
Update in Endocrinology and Metabolism: New Therapies for Obesity, Diabetes and Cardiovascular Disease	0277-0000-09-140-L01-P	8.5 (0.85)	Monterey	Knowledge	0277 - University of California Davis Health System Department of Pharmacy
Updates in Neonatology: Infant Vaccination and Neonatal Abstinence Syndrome	0112-9999-11-313-L01-P	1 (0.1)	Internet	Knowledge	0112 - Michigan Pharmacists Association



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Updates in Pediatric Self-Care	0046-9999-09-087-L04-P	1.5 (0.15)	Wilmington	Knowledge	0046 - University of North Carolina Eshelman School of Pharmacy
Updates in Pediatric Self-Care	0046-9999-10-029-L04-P	2 (0.2)	Wilmington	Knowledge	0046 - University of North Carolina Eshelman School of Pharmacy
Use of Dexmedetomidine for Sedation in Critically Ill Pediatric Patients	0033-0000-09-051-L01-P	1 (0.1)	St. Louis	Knowledge	0033 - St. Louis College of Pharmacy
Use of subcutaneous catheters for enoxaparin administration	0180-0000-11-019-L04-P	0.25 (0.025)	Memphis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
UVA: Being the Pharmacist at a Pediatric Code	0294-9999-10-128-L04-P	1 (0.1)	Charlottesville	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
UVA: Don't You Know that I'm Toxic? A Review of Pediatric Toxic Exposures	0294-9999-11-037-L04-T	1 (0.1)	Charlottesville	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
Vaccine Update	0180-0000-12-110-L01-P	1.5 (0.15)	Houston	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Vaccines in the Neonatal Intensive Care Unit	0180-0000-11-043-L01-P	1 (0.1)	St. Louis	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Validation of a Set of Asthma Illustrations in Children with Chronic Asthma in the Emergency	0180-0000-10-019-L04-P	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Validation of a Set of Asthma Illustrations in Children with Chronic Asthma in the Emergency	0180-0000-10-019-L04-T	0.25 (0.025)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Vancomycin Dosing & Monitoring: Applying the IDSA Guidelines to Pediatric Patients	0180-0000-09-110-L01-P	2 (0.2)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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VASPEN10: The microbiome and probiotics in the pediatric patient	0294-9999-10-153-L01-P	1 (0.1)	Wintergreen	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
Viability and Ethics	0263-0000-11-252-L01-P	1.5 (0.15)	Las Vegas	Knowledge	0263 - Contemporary Forums
Warning: Pregnant or Nursing Mom	0180-0000-10-024-L01-P	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Warning: Pregnant or Nursing Mom	0180-0000-10-024-L01-T	1.5 (0.15)	St. Charles	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
What Do I Say Now? OTC Cough & Cold Products in the Pediatric Patient	0278-0000-10-012-L01-P	1 (0.1)	Hampton	Knowledge	0278 - Virginia Pharmaceutical Association
What the Pharmacist Needs to Know About Pediatric Emergencies	0062-0000-11-137-L01-P	2 (0.2)	Columbia (SCCP Fall Seminar) Call 803-777-9979 for	Knowledge	0062 - South Carolina College of Pharmacy
What's New with RSV and Palivizumab Usage	0180-0000-09-125-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Yaffe Award Lecture:	0180-0000-09-106-L01-P	1 (0.1)	Cleveland	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
YES! Youth Education and Screening in Primary Care	0022-9999-10-160-L01-P	0.75 (0.075)	Louisville	Knowledge	0022 - University of Kentucky College of Pharmacy
You Are What You Eat: Guidelines for Adult and Pediatric Nutrition Support in the Critically Ill	0202-0000-10-232-L01-P	1 (0.1)	Chattanooga	Knowledge	0202 - American Pharmacists Association
You Are What You Eat: Guidelines for Adult and Pediatric Nutrition Support in the Critically Ill	0202-0000-10-232-L01-T	1 (0.1)	Chattanooga	Knowledge	0202 - American Pharmacists Association

Appendix G-4

ACPE PLAN Programming Live Forum Application Activity



P.L.A.N. Search Results

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Title	UAN	Hours (CEUs)	City	Activity Type	Provider Information
"PharmaTECHonomics" Implementing Technology in the Pediatric Setting	0180-0000-12-121-L04-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
2011 Oncology Pharmacy Preparatory Review Course	0217-9999-11-047-L01-P	23 (2.3)	San Antonio/ www.accp.com	Application	0217 - American College of Clinical Pharmacy
2012 Oncology Pharmacy Preparatory Review Course: Pediatric Malignancies	0217-9999-12-065-L01-P	1.5 (0.15)	Denver/ www.accp.com	Application	0217 - American College of Clinical Pharmacy
Antimicrobial Stewardship Programs: What works and what doesn't	0180-0000-12-111-L01-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Application of Adult Vancomycin Guidelines to the Pediatric Population	0033-0000-09-054-L01-P	1 (0.1)	St. Louis	Application	0033 - St. Louis College of Pharmacy
Clinical Considerations for Drug Dosing in Obesity	0204-0000-10-267-L01-P	2.5 (0.25)	Anaheim	Application	0204 - American Society of Health-System Pharmacists
Common Infections in Pediatrics	0097-0000-09-045-L01-P	1 (0.1)	Wilkes-Barre	Application	0097 - Nesbitt School of Pharmacy at Wilkes University
Communication Strategies for Inside and Outside Your Department	0180-0000-12-131-L04-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Community Acquired Pneumonia-Evidence for Changes in Practice	0180-0000-12-101-L01-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Controversies in Difficult to Treat Gram-negative Infections	0180-0000-12-106-L01-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Current Concepts in Pediatric Critical Care	0236-0000-11-01-L04-P	15 (1.5)		Application	0236 - Society of Critical Care Medicine
Decision Support in EMR: How Much is Enough (or Too Much)?	0180-0000-12-128-L04-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group



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Discovering and Developing Your Strengths	0180-0000-12-134-L04-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Fostering Wellness and Safe Nonprescription Medication Use in Pediatric Patients	0202-0000-10-141-L04-P	1.5 (0.15)	Washington	Application	0202 - American Pharmacists Association
How Sweet It Is: Sucrose Analgesia in Infants	0112-0000-10-148-L01-P	1.3 (0.13)	Detroit	Application	0112 - Michigan Pharmacists Association
How to Be a Great Journal Reviewer	0180-0000-12-123-L04-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
How to Have Successful (and Meaningful) Resident or Student Projects for Your Department	0180-0000-12-136-L04-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Infections You Thought You Would Never See	0180-0000-12-114-L01-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Kids and Drugs: The Changing Landscape of Substance Abuse	0165-0000-10-009-L01-P	2 (0.2)	Tampa	Application	0165 - Florida Pharmacy Association
Kids and Drugs: The Changing Landscape of Substance Abuse	0165-0000-10-009-L01-T	2 (0.2)	Tampa	Application	0165 - Florida Pharmacy Association
Lifelong Protection: A Focus on Pediatric and Geriatric Vaccinations	0165-0000-10-006-L01-P	1.5 (0.15)	Tampa	Application	0165 - Florida Pharmacy Association
Lifelong Protection: A Focus on Pediatric and Geriatric Vaccinations	0165-0000-10-006-L01-T	1.5 (0.15)	Tampa	Application	0165 - Florida Pharmacy Association
Managing the Use of Propofol for Procedural Sedation in the Emergency Department	0204-0000-10-274-L01-P	2 (0.2)	Anaheim	Application	0204 - American Society of Health-System Pharmacists
Neuro Workshop	0180-0000-09-113-L01-P	1.5 (0.15)	Cleveland	Application	0180 - Pediatric Pharmacy Advocacy Group
New Developments in Pediatric Cardiac Care	0236-0000-11-56-L01-P	1 (0.1)		Application	0236 - Society of Critical Care Medicine



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Overview of Autism: Definitions and Treatments	0484-0000-09-014-L04-P	3.5 (0.35)	Kenilworth Inn, Kenilworth	Application	0484 - Comprehensive Continuing Education, LLC
Overview of Autism: Definitions and Treatments	0484-0000-09-014-L04-P	3.5 (0.35)	Woodcliff Lake Hilton, Woodcliff Lake	Application	0484 - Comprehensive Continuing Education, LLC
Overview of Autism: Definitions and Treatments	0484-0000-09-014-L04-T	3.5 (0.35)	Kenilworth Inn, Kenilworth	Application	0484 - Comprehensive Continuing Education, LLC
Overview of Autism: Definitions and Treatments	0484-0000-09-014-L04-T	3.5 (0.35)	Woodcliff Lake Hilton, Woodcliff Lake	Application	0484 - Comprehensive Continuing Education, LLC
Patient and Caregiver Communications for Pediatric and Geriatric Populations	0009-0000-12-030-L04-P	1 (0.1)	Storrs	Application	0009 - University of Connecticut School of Pharmacy
Pediatric HIV Refresher	0180-0000-12-112-L02-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Interactive Cases	0236-0000-11-28-L01-P	2 (0.2)		Application	0236 - Society of Critical Care Medicine
Pediatric Medication Adherence and Counseling	0133-9999-10-016-L04-P	1 (0.1)	New Orleans	Application	0133 - Louisiana Pharmacists Association
Pediatric Medication Adherence and Counseling	0133-9999-10-016-L04-T	1 (0.1)	New Orleans	Application	0133 - Louisiana Pharmacists Association
Pediatric Pharmacology: A Primer	0097-0000-09-044-L01-P	1 (0.1)	Wilkes-Barre	Application	0097 - Nesbitt School of Pharmacy at Wilkes University
Pediatric Pharmacotherapy Pearls	0163-9999-10-037-L04-P	1 (0.1)	Orlando	Application	0163 - Florida Society of Health-System Pharmacists, Inc.



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Pediatric Pharmacotherapy Pearls	0163-9999-10-037-L04-T	1 (0.1)	Orlando	Application	0163 - Florida Society of Health-System Pharmacists, Inc.
PEDIATRIC PHARMACY CLINICAL PEARLS	0163-0000-10-052-L04-T	1 (0.1)	Ft. Myers	Application	0163 - Florida Society of Health-System Pharmacists, Inc.
Pediatric Pneumonia Pharmacotherapy	0163-9999-11-174-L01-P	1 (0.1)	Orlando	Application	0163 - Florida Society of Health-System Pharmacists, Inc.
Pediatric Pneumonia Pharmacotherapy	0163-9999-11-174-L01-T	1 (0.1)	Orlando	Application	0163 - Florida Society of Health-System Pharmacists, Inc.
Pediatric Poisonings: Pearls and Perils	0165-0000-10-010-L01-P	1.5 (0.15)	Tampa	Application	0165 - Florida Pharmacy Association
Pediatric Poisonings: Pearls and Perils	0165-0000-10-010-L01-T	1.5 (0.15)	Tampa	Application	0165 - Florida Pharmacy Association
Pediatric PRN Focus Session ♦ Shake, Rattle and Role: Exploring the Place in Therapy for	0217-0000-10-123-L01-P	2 (0.2)	Austin, www.accp.com/am	Application	0217 - American College of Clinical Pharmacy
Pediatrics for the Non-Pediatric Practitioner: Timely Topics in Caring for Tots	0204-0000-11-256-L04-P	1.75 (0.175)	New Orleans	Application	0204 - American Society of Health-System Pharmacists
Pediatrics PRN Focus Session ♦ Staying Ahead of the Curve: Contemporary Dosing	0217-0000-11-082-L01-P	2 (0.2)	Pittsburgh -- www.accp.com/am	Application	0217 - American College of Clinical Pharmacy
Pharmacy Practice Model Initiative	0180-0000-12-130-L04-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Practice-Based Research Networks	0180-0000-12-122-L04-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group



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Pregnancy and Lactation	0097-0000-09-043-L01-P	1 (0.1)	Wilkes-Barre	Application	0097 - Nesbitt School of Pharmacy at Wilkes University
Preventing Medication Errors in Children	0053-0000-11-028-L05-P	1 (0.1)	Oklahoma City	Application	0053 - University of Oklahoma College of Pharmacy
Preventing Medication Errors in Children	0053-0000-11-028-L05-P	1 (0.1)	Tulsa	Application	0053 - University of Oklahoma College of Pharmacy
Promoting Resiliency: Recognizing and Preventing Burnout	0180-0000-12-135-L04-P	1 (0.1)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Recurrent Infections in Children	0107-0000-11-015-L01-P	1 (0.1)	Des Moines	Application	0107 - Collaborative Education Institute
Responding to Pediatric Poisonings	0097-0000-09-046-L01-P	1 (0.1)	Wilkes-Barre	Application	0097 - Nesbitt School of Pharmacy at Wilkes University
Small People in Big Trouble: Pharmacotherapy of Common Pediatric Emergencies	0163-9999-10-138-L01-P	1 (0.1)	Jacksonville	Application	0163 - Florida Society of Health-System Pharmacists, Inc.
Small People in Big Trouble: Pharmacotherapy of Common Pediatric Emergencies	0163-9999-10-138-L01-T	1 (0.1)	Jacksonville	Application	0163 - Florida Society of Health-System Pharmacists, Inc.
Sniffing, Sneezing and Coughing: Best OTC Treatments for Pediatrics	0053-0000-11-031-L01-P	1 (0.1)	Oklahoma City	Application	0053 - University of Oklahoma College of Pharmacy
Sniffing, Sneezing and Coughing: Best OTC Treatments for Pediatrics	0053-0000-11-031-L01-P	1 (0.1)	Tulsa	Application	0053 - University of Oklahoma College of Pharmacy
Special Considerations in Pediatric Patients	0165-0000-10-008-L01-P	1 (0.1)	Tampa	Application	0165 - Florida Pharmacy Association



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Special Considerations in Pediatric Patients	0165-0000-10-008-L01-T	1 (0.1)	Tampa	Application	0165 - Florida Pharmacy Association
Statistical Process Control: What It Is and Why You Should Be Using It	0180-0000-12-133-L04-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
Symposium on Coagulation and Cardiovascular: Pediatric Hemostasis	0294-9999-11-044-L01-P	1 (0.1)	Newport Beach	Application	0294 - VCU School of Pharmacy, Office of Continuing Education
The Emergence of Adolescent and Young Adult Oncology	0465-9999-12-028-L01-P	1 (0.1)	Orlando	Application	0465 - Hematology/Oncology Pharmacy Association (HOPA)
The Pharmacotherapy Preparatory Review and Recertification Course -- Pediatrics, Geriatrics, and	0217-0000-11-013-L01-P	3 (0.3)	Columbus/ www.accp.com/ut	Application	0217 - American College of Clinical Pharmacy
The Pharmacotherapy Preparatory Review and Recertification Course -- Pediatrics, Geriatrics, and	0217-0000-12-019-L01-P	3 (0.3)	Reno/ www.accp.com	Application	0217 - American College of Clinical Pharmacy
The Ripple Effect: Systems-Level Interventions to Ameliorate Pediatric	0451-0000-12-010-L04-P	1.5 (0.15)	Honolulu	Application	0451 - American Pain Society
Treatment Controversies in Pediatric Pharmacotherapy: RSV, Antiepileptic Agents, and Dexmedetomidine	0204-0000-10-245-L04-P	2.5 (0.25)	Anaheim	Application	0204 - American Society of Health-System Pharmacists
Treatment of Gastrointestinal Infectious in the Pediatric Patient	0180-0000-12-104-L01-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
What Makes a Great Residency Program	0180-0000-12-129-L04-P	1.5 (0.15)	Houston	Application	0180 - Pediatric Pharmacy Advocacy Group
What's New in Pediatric Sepsis?	0236-0000-11-16-L04-P	1 (0.1)		Application	0236 - Society of Critical Care Medicine
Year in Review: Pediatrics	0236-0000-11-72-L01-P	1 (0.1)		Application	0236 - Society of Critical Care Medicine

Appendix G-5

ACPE PLAN Programming Home Study Knowledge Activity



P.L.A.N. Search Results

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Title	UAN	Hours (CEUs)	Activity Type	Provider Information
AAP: Big Jump in Knee Injuries in Kids (29069)	0052-9999-11-2293-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: CPR Yields Low in Hospitalized Kids With CVD (29053)	0052-9999-11-2301-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: Don't Use Sensory Disorder Diagnosis (33018)	0052-9999-12-1306-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: Guideline Calls for Pre-K ADHD Evaluation (29066)	0052-9999-11-2295-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: Gun Injuries in Kids Up Sharply (29103)	0052-9999-11-2328-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: Low Back Pain in Kids Rarely Serious (29064)	0052-9999-11-2297-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: More Kids Going to ED for Psych Care (29057)	0052-9999-11-2300-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: Need to Re-Do Circumcision Rises, Reasons Unclear (29075)	0052-9999-11-2315-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: New SIDS Guideline Says No to Bumper Pads (29091)	0052-9999-11-2318-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: One Course of Spinosad Exterminates Lice, Nits (29065)	0052-9999-11-2296-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: SIDS Messages Miss the Mark for Some Parents (29070)	0052-9999-11-2291-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
AAP: Urinary Stones in Kids on the Rise (29119)	0052-9999-11-2337-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Access: Enteral and Parenteral	0180-0000-10-100-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
ACNP: Mom's Baby Blues Linked to Child's Psych Issues (30110)	0052-9999-11-2871-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Active Video Games No Fix for Kids' Fitness (31374)	0052-9999-12-464-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Acupuncture Safe for Kids (29817)	0052-9999-11-2719-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Adolescent Issues	0180-0000-09-115-H04-P	1.5 (0.15)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Adults No Drain on Pediatric Heart Centers (29121)	0052-9999-11-2336-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



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Agents of Change: Systems and Strategies to Address Family, Social, and Developmental Needs in the Type 1 Pediatric Populations	0069-9999-11-207-H01-P	1.5 (0.15)	Knowledge	0069 - American Association of Diabetes Educators
Air Pollution Tied to Behavior Issues in Kids (31791)	0052-9999-12-682-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
ASBMR: Exercise Builds Kids' Bones, Insulin Sensitivity (28687)	0052-9999-11-2096-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Assessment and Diagnosis of Pediatric Pain	0530-0000-10-052-H01-P	1 (0.1)	Knowledge	0530 - Global Education Group
Autism Drags on Family's Earning Power (31708)	0052-9999-12-634-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Autism May Have Link to Low Birth Weight (29068)	0052-9999-11-2292-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Autistic Children Slower to Integrate Multiple Stimuli (21789)	0052-9999-10-1631-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Autistic Youth Face Hardship in Post-School Years (32661)	0052-9999-12-1096-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Baby-Led Weaning Improves Food Choices Later (31059)	0052-9999-12-310-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Baby's Flat Head Rarely Requires Helmet, Surgery (29948)	0052-9999-11-2783-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
BCPP Examination Review and Recertification Course-Pediatric Psychiatric Issues or Disorders Usually First Diagnosed in	0284-0000-12-037-H01-P	1.5 (0.15)	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Binky, Sippy Cup Can be Source of Trip to the ER (32662)	0052-9999-12-1095-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Birth Certificate Problematic With International Adoption (30373)	0052-9999-11-3018-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Birth Control and ADHD Meds Top Rx for Kids (33321)	0052-9999-12-1430-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Breast Diseases May Manifest in Young Drinkers (32080)	0052-9999-12-821-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
'Breastfeed Only' Goal Missed by Many New Moms (33029)	0052-9999-12-1310-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Breastfeeding Is 'Health, Not Lifestyle' Choice (31444)	0052-9999-12-499-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Breastfeeding Linked to Better Lung Function (31011)	0052-9999-12-296-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



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Caffeine Benefits for Preemies Mostly Gone by Age 5 (30715)	0052-9999-12-152-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Chemotherapy Safety for You and the Patient	0180-0000-09-114-H01-P	1.5 (0.15)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Chewing Gum Cuts Ear Infection Risk in Kids (29564)	0052-9999-11-2573-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Child Abuse in One Year Costs Billions in Long Run (31002)	0052-9999-12-300-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Child Safety Takes a Back Seat During Carpooling (30910)	0052-9999-12-236-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Childhood Type 2 Diabetes:	0372-0000-11-009-H01-P	1 (0.1)	Knowledge	0372 - Rx School
Childhood Type 2 Diabetes:	0372-0000-11-009-H01-T	1 (0.1)	Knowledge	0372 - Rx School
Choking for Fun Tied to Other Dickey Teen Acts (32188)	0052-9999-12-872-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Clinical and Economic Considerations in the Use of Inhaled Anesthesia from the Perspective of Health-System Pharmacists and	0204-0000-10-414-H01-P	2 (0.2)	Knowledge	0204 - American Society of Health-System Pharmacists
Clinical Lecture 1: The Role of Biologics in Pediatric Rheumatology	0180-0000-09-107-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Clinical Lecture I: Medication Use during ECMO and Continuous Renal	0180-0000-09-119-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Clinical Lecture II: Management of Pediatric Chemical Casualties: Are We Prepared?	0180-0000-09-108-H04-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Combating Childhood Obesity	0826-9999-10-028-H01-P	3 (0.3)	Knowledge	0826 - MED2000, Inc.
Combating Childhood Obesity	0826-9999-10-028-H01-T	3 (0.3)	Knowledge	0826 - MED2000, Inc.
Combo Tx Checks Blood Sugar in Diabetic Kids (32412)	0052-9999-12-975-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Community Care Keeps Autistic Kids Out of Hospital (30483)	0052-9999-12-021-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Concussion Symptoms Linger in Kids (31501)	0052-9999-12-543-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



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Confronting the Challenges of Neonatal and Pediatric Medication Safety	0761-0000-12-006-H05-P	1 (0.1)	Knowledge	0761 - Educational Review Systems, Inc.
Confronting the Challenges of Neonatal and Pediatric Medication Safety	0761-0000-12-006-H05-T	1 (0.1)	Knowledge	0761 - Educational Review Systems, Inc.
Consequences in Not Treating Pain In Children	0530-0000-10-053-H01-P	1 (0.1)	Knowledge	0530 - Global Education Group
CPNP 2010 BCPP Literature Analysis: Childhood Anxiety and Generalized Anxiety	0284-0000-10-024-H01-P	1 (0.1)	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Current Best Evidence for Education in the Type 2 Pediatric Population	0069-0000-11-149-H01-P	1.5 (0.15)	Knowledge	0069 - American Association of Diabetes Educators
Current Issues in the Management of Pediatric patients with Cystic Fibrosis: Update 2009	0180-0000-09-126-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Deaf Kids Benefit from Implants in Both Ears (30709)	0052-9999-12-133-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Depressed Dads May Foster Troubled Kids (29473)	0052-9999-11-2510-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Diagnosis of Autism Hit or Miss Along the Spectrum (29490)	0052-9999-11-2527-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Dispensing Pediatric Antibiotic Suspensions	0422-0000-11-410-H01-T	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
DKA & HHS	0180-0000-09-100-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Drug May Protect Kids After Stem Cell Transplant (31333)	0052-9999-12-456-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Early Cochlear Implant Best for Deaf Kids (30498)	0052-9999-12-023-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Extreme Dosing in CF: Aminoglycosides	0180-0000-10-103-H04-P	0.25 (0.025)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group



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Extreme Dosing in Overweight/Obese Children - Focus on DVT Prophylaxis	0180-0000-10-105-H04-P	0.25 (0.025)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Extreme Dosing: Case Studies in Pediatric Transplantation	0180-0000-10-104-H04-P	0.25 (0.025)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Facebook Posts Can ID Problem Drinkers (28856)	0052-9999-11-2203-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Factors Predict Post-NICU Death in Tiniest Babies (31098)	0052-9999-12-341-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Fewer Drownings Among Kids, Teens (30673)	0052-9999-12-112-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Fewer Newborns Being Circumcised (28374)	0052-9999-11-1937-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Frequent Moves as Kid Take Toll Later (31135)	0052-9999-12-363-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Gender Uncertainty Risky for Kids (31268)	0052-9999-12-427-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Genetic Epidemiology of Early-Onset Depression and Alcohol Use Disorders	0284-0000-10-014-H01-P	1 (0.1)	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Global Infant Mortality Ranking Called Compromised (31250)	0052-9999-12-418-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Go Slow With Drug Tx for Addicted Newborns (30924)	0052-9999-12-249-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
H. Pylori Not a Factor in Adenoid Hyperplasia in Kids (29096)	0052-9999-11-2331-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Hard Times Lead to Hard Knocks for Kids (28587)	0052-9999-11-2028-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Health Risks as Kids High for 'Old' Preemies (31454)	0052-9999-12-507-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Helms Award	0180-0000-09-118-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
High School Kids Report Early Pain Pill Abuse (32557)	0052-9999-12-1042-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Hormone Effect May Be Why Boys Talk Later than Girls (30890)	0052-9999-12-230-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Hospital Volume Linked to Care of Stomach Flu in Kids (28364)	0052-9999-11-1917-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



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Hospitalized Kids Often Receive Multiple Meds (28362) Hot Topics	0052-9999-11-1921-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
HSV Drug Boosts Babies' Mental Progress (28896)	0180-0000-09-124-H04-P	2 (0.2)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Hypothermia Cut Deaths in Infant Encephalopathy (32990)	0052-9999-11-2222-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Idiopathic Chronic Pain Syndromes in Children	0052-9999-12-1283-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
In a World of Their Own: Diagnosis and Treatment of Autism	0530-0000-10-111-H01-P	1 (0.1)	Knowledge	0530 - Global Education Group
Infant Brain Yields Autism Clues (30875)	0284-0000-10-002-H01-P	1 (0.1)	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Infectious Disease - CAMRSA	0052-9999-12-226-H05-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Injury Rates from Stairs Tumble but Kids Still at Risk (31606)	0180-0000-09-120-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Iron in Formula No Help for Babies With High Hbg (29501)	0052-9999-12-612-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Irritability and Elation: The Consequences of Thinking about Pediatric Bipolar Disorder and Severe Mood Dysregulation	0052-9999-11-2538-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Keynote Address: National Commission on Children & Disasters	0284-9999-11-014-H04-P	1 (0.1)	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Kids' Cognition May be Harmed by Fired Up Cartoons (28455)	0180-0000-09-105-H04-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Kids' Language Skills Tied to Mom's Vitamin D (31145)	0052-9999-11-1967-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Kids Overlooked for Inclusion in Drug Trials (32406)	0052-9999-12-355-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Kids Still Getting Too Many Antibiotics (29470)	0052-9999-12-979-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Kids Who Survive Cancer at Risk Later, Too (33063)	0052-9999-11-2511-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
	0052-9999-12-1319-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



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Lead Exposure High in Refugee Camps (30676)	0052-9999-12-111-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Lipitor No Help in Kids With SLE (30470)	0052-9999-12-016-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Long Pregnancy Tied to Kids' Behavior Issues (32488)	0052-9999-12-1019-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Long Term Effect of In-Utero Exposure to Psychotropic Medications	0284-0000-10-008-H05-P	1 (0.1)	Knowledge	0284 - College of Psychiatric and Neurologic Pharmacists
Management of Chronic Daily Headache in Children	0530-0000-10-110-H01-P	1 (0.1)	Knowledge	0530 - Global Education Group
Management of Diabetes, Type I	0180-0000-09-102-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Management of Diabetes, Type II	0180-0000-09-104-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Medical Home Model Serves Children Well (30290)	0052-9999-11-2958-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Mom's Meth Use May Affect Kids' Behavior (31704)	0052-9999-12-636-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Moms Often Blind to Toddler's Weight (32555)	0052-9999-12-1044-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Mortality High in Native Alaskan Infants (30646)	0052-9999-12-101-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Narcotics/Sedation/NAS, etc.	0180-0000-09-123-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Neuro Impairment Among Kids More Common (30751)	0052-9999-12-162-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
No Outdoor Play for Many Kids (31977)	0052-9999-12-782-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Older Dads Likely to Sire 'Couch Potato' Kids (33445)	0052-9999-12-1492-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
OTC Medications for Children with Allergies: A Review for Pharmacy Technicians	0422-0000-12-404-H01-T	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center



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OTC Options for Treating Pediatric Allergic Rhinitis	0422-0000-12-205-H01-P	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Pain Management in Babies and Children: Practical Considerations for Pharmacy Technicians	0422-0000-10-403-H01-T	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Pandemic Response Strategies	0022-0000-12-017-H04-P	1 (0.1)	Knowledge	0022 - University of Kentucky College of Pharmacy
Parasite Duo to Blame in Infant Toxoplasmosis (32184)	0052-9999-12-874-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Pediatric Aged-Based Competency: Anatomic and Physiologic Differences Between Children and	0180-0000-11-500-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Aged-Based Competency: Anatomic and Physiologic Differences Between Children and	0180-0000-11-500-H01-T	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Aged-Based Competency: Fluids, Electrolytes, and Dehydration in Children	0180-0000-11-502-H01-P	0.75 (0.075)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Aged-Based Competency: Fluids, Electrolytes, and Dehydration in Children	0180-0000-11-502-H01-T	0.75 (0.075)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Aged-based Competency: Pharmacokinetic Differences between Children and Adults	0180-0000-11-501-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Aged-based Competency: Pharmacokinetic Differences between Children and Adults	0180-0000-11-501-H01-T	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Aged-Based Competency: Physiologic and Pharmacokinetic Differences in Children, Fluids and	0180-0000-11-040-H01-P	2.5 (0.25)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Asthma: A Disease and Treatment Review for Technicians	0422-0000-11-407-H01-T	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center



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Pediatric Asthma: Disease Review and Treatment	0422-0000-11-209-H01-P	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Pediatric Medication Safety: The Physician and Pharmacist Perspective	0761-9999-11-081-H05-P	1.5 (0.15)	Knowledge	0761 - Educational Review Systems, Inc.
Pediatric Parental Nutrition	0180-0000-10-101-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Pediatric Pharmacy Practice: An Introduction for Pharmacists	0422-0000-11-205-H04-P	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Pediatric Pharmacy: An Introduction for Pharmacy Technicians	0422-0000-11-404-H04-T	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Peer Counseling Helps Parents and Kids (31679)	0052-9999-12-625-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Pharmacy's Role in the Fight Against Childhood Obesity	0422-0000-10-319-H04-P	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Pharmacy's Role in the Fight Against Childhood Obesity	0422-0000-10-319-H04-T	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Physical Child Abuse Sends Thousands to Hospitals (31022)	0052-9999-12-289-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Planning and Coordination for Child-Focused Pandemic Response	0022-0000-12-014-H04-P	1 (0.1)	Knowledge	0022 - University of Kentucky College of Pharmacy
Play Ball, but Be Safe, Say Pediatricians (31376)	0052-9999-12-463-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Playgrounds Too Safe to Keep Little Kids Active (30493)	0052-9999-12-026-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Playtime is More than Fun and Games (30390)	0052-9999-11-3017-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



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Practical Considerations for Pediatric Pain Management	0422-0000-10-225-H01-P	1 (0.1)	Knowledge	0422 - Pharmacist's Letter Therapeutic Research Center
Preemies Breathe Easier With Less Invasive Therapy (28827)	0052-9999-11-2191-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Preemies Have Higher Mortality Risk as Young Adults (28639)	0052-9999-11-2067-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Prevention and Management of RSV Bronchiolitis	0096-0000-09-033-H01-P	1 (0.1)	Knowledge	0096 - Texas Tech University Health Sciences Center School of Pharmacy
Program Puts Smackdown on Bullying (31040)	0052-9999-12-303-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Pulse-Ox Works as Heart Defect Screen (32460)	0052-9999-12-1003-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Pumps, Pens, & Other Devices	0180-0000-09-103-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Repeat Anesthesia for Tots May Lead to Learning Disabilities	0052-9999-11-2184-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Repeat UTI in Kids May Not Up Risk of Kidney Disease (28962)	0052-9999-11-2256-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Risk Communication for Child-Focused Pandemic Response	0022-0000-12-015-H04-P	1 (0.1)	Knowledge	0022 - University of Kentucky College of Pharmacy
Roaoke Carillion: Pediatric Advanced Life Support: What Pharmacists Need to Know	0294-9999-11-126-H04-P	1 (0.1)	Knowledge	0294 - VCU School of Pharmacy, Office of Continuing Education
Second-Hand Smoke Worsens Asthma in Kids (32430)	0052-9999-12-991-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Self Assessment Online Module V V.2: Considerations in Nutrition Support of the Pediatric Patient	0216-0000-10-075-H01-P	2 (0.2)	Knowledge	0216 - American Society for Parenteral and Enteral Nutrition, Inc.



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'Sexting' Not Very Widespread Among Kids, Teens (30009)	0052-9999-11-2798-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Shhh! The Kids Need More Sleep -- Or Do They? (31143)	0052-9999-12-356-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Short or Long, Parents Like Well-Child Visits (28568)	0052-9999-11-2027-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Shy Teens May Be More than Wallflowers (29073)	0052-9999-11-2290-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Sids Risk Reduction: A Continuing Education Program for Pharmacists	0144-9999-11-027-H04-P	1.25 (0.125)	Knowledge	0144 - Maryland Pharmacy Continuing Education Coordinating Council
Signs of Autism Show Up on MRI at 6 Months of Age (31242)	0052-9999-12-409-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Ski Helmets Not Best for Sledding (30826)	0052-9999-12-196-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Snoring Tots More Likely to Turn into Troubled Kids (31477)	0052-9999-12-512-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Social Ties Move Kids to Exercise (32951)	0052-9999-12-1272-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Some Autistic Kids Make Gains as Late 'Bloomers' (31963)	0052-9999-12-770-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Soy Formula Has No Effect on Baby's Cognition (32960)	0052-9999-12-1280-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Spanking No Help in Child-Rearing (31030)	0052-9999-12-285-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Study Shows Even Little Kids Can Be Cutters (33184)	0052-9999-12-1382-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Teen Binging Tied to Drinking on Silver Screen (31484)	0052-9999-12-511-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Teens Drink, Smoke Less in 'Caring' Communities (28891)	0052-9999-11-2227-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Texting May Turn Teens Off Alcohol (30285)	0052-9999-11-2962-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
The ABCs of OTCs in Children	0096-0000-10-056-H04-P	1 (0.1)	Knowledge	0096 - Texas Tech University Health Sciences Center School of Pharmacy



P.L.A.N. Search Results

Accreditation Council for Pharmacy Education

20 North Clark Street, Suite 2500 Chicago, Illinois 60602-5109

Phone (312) 664-3575 Fax (312) 664-7008 <http://www.acpe-accredit.org>

The Prevention and Treatment of Whooping Cough	0430-0000-11-006-H01-P	2 (0.2)	Knowledge	0430 - Postgraduate Healthcare Education, LLC
The Terrible Twos: Type 2 Diabetes in Children	0096-0000-10-069-H01-P	1 (0.1)	Knowledge	0096 - Texas Tech University Health Sciences Center School of Pharmacy
Title: Over-the-counter Treatment of Pediatric Allergic Rhinitis: Review of Traditional and Natural Approaches	0430-0000-11-021-H01-P	2 (0.2)	Knowledge	0430 - Postgraduate Healthcare Education, LLC
Transitioning Points in Students Lives - Navigating the Journey with Diabetes	0069-0000-11-140-H01-P	1.5 (0.15)	Knowledge	0069 - American Association of Diabetes Educators
Treatment of Otitis Media	0430-0000-10-042-H01-P	2 (0.2)	Knowledge	0430 - Postgraduate Healthcare Education, LLC
Truancy Signals Depression in Kids (30364)	0052-9999-11-3006-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
TV Ads Linked to Unhealthy Diets in Young Adults (32408)	0052-9999-12-977-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
UPdated Clinical Practice Guideline on the Management of Head Lice Infestation in Children	0144-9999-11-075-H01-P	1 (0.1)	Knowledge	0144 - Maryland Pharmacy Continuing Education Coordinating Council
Urine Odor Signals UTI in Infants (31966)	0052-9999-12-768-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Vitamin D Not Tied to School Performance (32142)	0052-9999-12-852-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.
Workforce Development and Care in Pandemic Planning	0022-0000-12-016-H04-P	1 (0.1)	Knowledge	0022 - University of Kentucky College of Pharmacy
World's Smallest Newborns Still Small, but Fine (30185)	0052-9999-11-2899-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.



P.L.A.N. Search Results

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Yaffe Award Lecture:	0180-0000-09-106-H01-P	1 (0.1)	Knowledge	0180 - Pediatric Pharmacy Advocacy Group
Yanking Adenoids Won't Cut Colds in Kids (28379)	0052-9999-11-1941-H04-P	0.25 (0.025)	Knowledge	0052 - Projects In Knowledge, Inc.

Appendix G-6

ACPE PLAN Programming Home Study Application Activity



P.L.A.N. Search Results

Accreditation Council for Pharmacy Education

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Phone (312) 664-3575 Fax (312) 664-7008 <http://www.acpe-accredit.org>

Title	UAN	Hours (CEUs)	Activity Type	Provider Information
2011 Oncology Pharmacy Preparatory Review Course for Home Study and Other Cancers	0217-9999-11-042-H01-P	6.75 (0.675)	Application	0217 - American College of Clinical Pharmacy
2012 BCPP Recertification Literature Analysis	0284-0000-12-053-H01-P	1.5 (0.15)	Application	0284 - College of Psychiatric and Neurologic Pharmacists
2012 Oncology Pharmacy Preparatory Review Course for Home Study and Other Cancers	0217-9999-12-035-H01-P	7.25 (0.725)	Application	0217 - American College of Clinical Pharmacy
Approach to the Pediatric Prescription in a Community Pharmacy	0180-0000-12-001-H01-P	1 (0.1)	Application	0180 - Pediatric Pharmacy Advocacy Group
Medication Treatment Alternatives for Autism Spectrum Disorders	0798-0000-10-006-H01-P	1.25 (0.125)	Application	0798 - PharmCon, Inc.
Medication Treatment Alternatives for Autism Spectrum Disorders	0798-0000-10-006-H01-T	1.25 (0.125)	Application	0798 - PharmCon, Inc.
PSAP VII -- Pediatrics, I	0217-0000-10-010-H01-P	5 (0.5)	Application	0217 - American College of Clinical Pharmacy
PSAP VII -- Pediatrics, II	0217-0000-10-011-H01-P	6 (0.6)	Application	0217 - American College of Clinical Pharmacy
PSAP VII -- Pediatrics, III	0217-0000-10-012-H01-P	5 (0.5)	Application	0217 - American College of Clinical Pharmacy
The Pharmacotherapy Preparatory Review and Recertification Course -- Pediatrics, Geriatrics, and	0217-0000-11-013-H01-P	3 (0.3)	Application	0217 - American College of Clinical Pharmacy
The Pharmacotherapy Preparatory Review and Recertification Course -- Pediatrics, Geriatrics, and	0217-0000-12-019-H01-P	3 (0.3)	Application	0217 - American College of Clinical Pharmacy

Appendix G-7

Sample Educational Program Materials

18th Pediatric Pharmacy Conference Educational Handouts

The 18th Pediatric Pharmacy Conference and PPAG Annual Meeting is a paper-lite conference. We encourage you to bring your laptop computers to view your handouts during each lecture. "Re-charging" stations will be available through-out the lecture ballroom. We also encourage you to print any materials you need PRIOR to coming to the Conference.

Important Conference Downloads:

- [Session Learning Objectives](#)
- [Printable Agenda with Room Assignments](#)
- [Document of Attendance and Conference evaluation](#)
- Below, session handouts are linked to the Presentation title. Please note: If there is no link, we have not yet received materials from the speaker.

Thursday, September 24, 2009			
Pre-Conference Symposium: Diabetes, Aged-based Competencies for Pediatric Pharmacists			
Time	Presentation Type	Presentation Title	Presentation Speaker
12:30-1:30 pm	Lecture	DKA & HHS	Mark Haase, PharmD
1:30-2:30 pm	Lecture	Management of Diabetes, Type I	Michelle Condren, PharmD
2:30-2:45 pm	Break		
2:45-3:45 pm	Lecture	Pumps, Pens, and other Devices	Thomas Parker, PharmD
3:45-4:45 pm	Lecture	Management of Diabetes, Type II	Allison Blackmer, PharmD
18th Pediatric Pharmacy Conference and PPAG Annual Meeting			
Time	Presentation Type	Presentation Title	Presentation Speaker
4:45-5:00 pm	Moderator and Planning Committee Meeting		
5:00-6:00 pm	Keynote	Pediatric Emergency Planning	Michael Anderson, MD
6:00-6:30 pm	1 st Annual Fellows Class Recognition		
6:30-8:00 pm	Opening Reception		
Friday, September 25, 2009			
Time	Presentation Type	Presentation Title	Presentation Speaker
7:00am-5:00pm	Registration Desk Open		
7:00-8:00am	Breakfast Symposium: Current Issues in the Management of Pediatric Patients with CF. Robert J. Kuhn, PharmD		
8:00-9:00am	Sumner J. Yaffe Lifetime Achievement Award		Stephen Speilberg, MD
9:00-10:00am	Best Practice Award Lectures 1. Emma Tillman 2. Jared Cash 3. Kimberly Le		
10:00-10:15am	Break		
10:15-11:15am	Lecture	The Role of Biologics in Pediatric Rheumatology	Stephen Spalding
11:15am-12:15pm	Lecture	Management of Pediatric Chemical Casualties: Are we Prepared?	Elora Hilmas, PharmD

10:15am-12:15pm	Workshops	Research: Grant Writing	Michael Reed, PharmD
		Advocacy: Vancomycin Dosing & Monitoring: Applying the IDSA Guidelines to Pediatric Patients	Kristin Klein, PharmD & Jennifer Giroto, PharmD
		Leadership: Simplifying Leadership Complexities in Pediatric Pharmacy Patient Care	John Clark, PharmD
2:00-3:30 pm	Clinical Workshops	PK/PD	Marc Scheetz, PharmD
		Neuro/Vaccine Safety Handout 1 Handout 2	Lizbeth Hansen, PharmD & Johanna Goldfarb, PharmD
		Oncology/Chemo Safety	William Humphrey, PharmD
3:30-3:45 pm	Break		
3:45-5:15 pm	Super Session	Adolescent Issues	Veenod Chulani, MD
6:00-7:30 pm	Dinner Symposium	What's New with RSV and Palivizumab Usage (Funded by MedImmune)	James Dice, PharmD
7:45-9:30 pm	Exhibition and Dessert Reception		
Saturday, September 26, 2009			
Time	Presentation Type	Presentation Title	Presentation Speaker
7:00am-5:00 pm	Registration Open		
7:00-8:00 am	Breakfast Pearls	Extreme Dosing (CF, Renal, Obesity, ELBW) Handout 1 Handout 2 Handout 3	Peter Johnson, PharmD William McGhee, PharmD Heidi Hoopingarner, PharmD
8:00-9:00 pm	Scientific Platform Presentations 1. Marcia Buck 2. Jared Cash 3. Ralph Lugo		
9:00-11:30 am	Scientific and Practice Poster Sessions		
11:30am-1:00 pm	PPAG Town Hall Lunch		
1:00-2:00 pm	Helms Award Lecture		Milap Nahata, PharmD
2:00-2:15 pm	Research Awards Presentations		
2:15-2:30 pm	Break		
2:30-3:30 pm	Lecture	ECMO	Brenda Dodson, PharmD
3:30-4:30 pm	Lecture	Infectious Disease- CAMRSA	Kristin Klein, PharmD
2:30-4:30 pm	Workshops	Research: Meta-Analysis	Craig Coleman, PharmD
		Advocacy: Vancomycin Dosing & Monitoring: Applying the IDSA Guidelines to Pediatric Patients	Kristin Klein, PharmD
		Leadership: Pharmacists in ED	Christoper Shaffer, PharmD

Sunday, September 27, 2009			
Time	Presentation Type	Presentation Title	Presentation Speaker
7:00-10:00 am	Breakfast Pearls	Narcotics/Sedation/NAS	Mary Temple Cooper, PharmD
8:00-9:30 am	Clinical Workshops (Repeat)	PK/PD	Marc Scheetz, PharmD
		Neuro/Vaccine Safety Handout 1 Handout 2	Elizabeth Hanson, PharmD & Johanna Goldfarb, PharmD
		Oncology/Chemo Safety	William Humphrey, PharmD
9:40-11:40 am	Super Session	Hot Topics Handout 1 Handout 2 Handout 3	Jeffrey Ceis, PharmD and Betsy Walters, PharmD



2010 Pediatric Pharmacy Conference | 19th PPAG Annual Meeting
 Agenda and Schedule
 St. Charles Convention Center
 October 7-10, 2010

Thursday, October 7, 2010			
Time	Topic and Speaker	Room Location	
6:30am-7:00pm	Registration Desk Open	Grand Ballroom D Foyer	
7:00 am-1:00 pm	Pre-Conference Symposium Beyond the Basics Funded in part by: Abbott Pharmaceutical Products Division and Gilead Healthcare		
7:00-7:30 am	Preconference Breakfast (for preconference participants only)	Grand Ballroom AB	
7:30-7:35 am	Overview and Introduction Robert Kuhn, PharmD	Grand Ballroom AB	
7:35-8:05 am	CF: Current Challenges and Implications for Drug Therapy Lisa Lubsch, PharmD	Grand Ballroom AB	
8:05-8:40 am	Pancreatic Enzymes, Vitamins and the Liver Kim Novak, PharmD	Grand Ballroom AB	
8:40-9:15 am	Selection of Antibiotics, Dosing and Length of Therapy Robert Kuhn, PharmD	Grand Ballroom AB	
9:15-9:30 am	Break	Grand Ballroom AB	
9:30-10:15 am	How To Do Continuous Infusion Antibiotics: Lessons Learned Jeff Zobell, PharmD	Grand Ballroom AB	
10:15-10:50 am	Aerosol Drug Therapy in CF; Current Status Alison Grisso, PharmD	Grand Ballroom AB	
10:50-11:30 am	Case Reviews; Panel Question and Answer	Grand Ballroom AB	
11:30 am-1:00 pm	Lunch (for Preconference participants only)	Grand Ballroom D2-D3	
11:30am -1:00pm	New Practitioner Networking Lunch	Meeting Room 103	
19 th Pediatric Pharmacy Conference and Annual Meeting Begins			
1:30-3:00pm	Level 1 – PICU	Resuscitation and RSI Pharmacotherapy Melissa Hunt, PharmD	Junior Ballroom B
	Level 2 – NICU	Neonatal Abstinence Syndrome Peter Gal, PharmD	Junior Ballroom C
	General Wrkshp	Anticoagulation in Pediatric Patients Cyrine Haidar, PharmD	Junior Ballroom D
3:00-3:15pm	Break		
3:15-4:45pm	Level 1 – PICU	Pediatric ICU: An Approach to the Complicated Patient Kelly Kopec, PharmD	Junior Ballroom B
	Level 2 – NICU	Neonatal Circulatory Support Christopher McPherson, PharmD	Junior Ballroom C
	General Wrkshp	Management of Pediatric Pulmonary Hypertension Cortney Rogers, PharmD	Junior Ballroom D
4:45-5:00 pm	Break		
5:00-6:00pm	Keynote Address James Broselow, MD	Grand Ballroom AB	
6:00-6:30pm	PPAG Fellows in Pediatric Pharmacy Advocacy Group (FPPAG) Ceremony Richard Helms, PharmD, FPPAG Robert Kuhn, PharmD, FPPAG Robert Poole, PharmD, FPPAG	Grand Ballroom AB	
6:30-7:30pm	Opening Reception in honor of Fellows	Grand Ballroom CD	

Level 1 programs provide a review of current practices in the topic identified and are appropriate for both new practitioners and those seeking to update their knowledge base.

Level 2 programs provide an advanced review of the identified topic and new developments in the field. Level 2 programs are appropriate for the advanced level practitioner.

2010 Pediatric Pharmacy Conference | 19th PPAG Annual Meeting

Friday, October 8, 2010		
Time	Topic and Speaker	Room Location
7:30am-7:30pm	Registration Desk Open	Grand Ballroom D Foyer
7:30am-9:30am	Continental Breakfast Snacks	Grand Ballroom AB Foyer
8:00-9:00am	Sumner J. Yaffe Award Lecture Michael Reed, PharmD	Grand Ballroom AB
9:00-10:00am	Best Practice Award Presentation The Impact of a Pharmacist-Managed RSV Prevention Clinic on Palivizumab Compliance and RSV Associated Hospitalization Jennifer Chow, PharmD	Grand Ballroom AB
10:00-10:15am	Break	Grand Ballroom AB Foyer
10:15-11:45am	Research Wrkshp Pharmacogenomics Impact on Pediatric Pharmacy Practice Mary Kennedy, PharmD	Junior Ballroom B
	Advocacy Wrkshp Healthcare Reform: Pharmacy and Advocacy John McGlew, MA	Junior Ballroom C
	Academia Wrkshp The Changing Face of the Pediatric Faculty Member – Faculty Panel Discussion Lea Eiland, PharmD; Sherry Luedtke, PharmD; Timothy Todd, PharmD; and Rachel Meyers, PharmD	Junior Ballroom D
12:00-2:00pm	Lunch and Committee Meetings	Grand Ballroom CD
2:00-3:00pm	Super Session Fetal Care Ed Yang, MD	Grand Ballroom AB
3:15-4:00pm	PPAG Special Interest Group (SIG) Interest Meeting	Grand Ballroom AB
4:30-7:30pm	Hospital Tours (must be preregistered to participate) St. Johns Mercy Children's Hospital Ranken Jordan Children's Rehabilitation Hospital	Meet in Hotel Lobby
	Exhibits and PPAG Celebration! Reception	Grand Ballroom CD and Foyer

Our Sponsors and Exhibitors



2010 Pediatric Pharmacy Conference | 19th PPAG Annual Meeting

Saturday, October 9, 2010			
Time	Topic and Speaker		Room Location
7:00am-5:00pm	Registration Desk Open		Grand Ballroom D Foyer
7:30-9:30am	Continental Breakfast Snacks		Grand Ballroom AB Foyer
8:00-9:00am	Exhibits Open Grand Ballroom D Foyer	Clinical Pearls: Changing Times: Updates from the World of Poisonings Rebecca Tominack, MD	Grand Ballroom AB
9:00-10:00am		Scientific Platform Presentations	Grand Ballroom AB
		Evaluation of Vancomycin Dosing for Complicated Infections in Pediatric Patients Spencer Durham, PharmD	
		Validation of a Set of Asthma Illustrations in Children with Chronic Asthma in the Emergency Department Danica Irwin, B.Sc.PhM	
	Argatroban and Iepirudin Utilization in a Pediatric Population: A Five Year Experience Emma Thone, PharmD Candidate		
	Eicosapentaenoic Acid Attenuates Bile Acid-Induced Apoptosis Via the Fas and TRAIL-R2 Death Receptors in HepG2 Cells Emma Tillman, PharmD		
10:00-12:00pm	Scientific and Practice Poster Session		Grand Ballroom ABCD Foyer
12:00-2:00pm	PPAG Town Hall Lunch		Grand Ballroom CD
2:00-3:00pm	Richard A. Helms Award Lecture Bob Kuhn, PharmD		Grand Ballroom AB
3:00-3:15pm	Research Awards Presentations		Grand Ballroom AB
3:15-3:30pm	Break		Grand Ballroom AB Foyer
3:30-5:00pm	Level 1 – NICU	Kendall's Journey: A Case Approach to Fluid, Electrolyte, Nutrition Management in a Premie Rita Chrivia, RD	Junior Ballroom B
	Level 2 – PICU	Dosing in ECMO and CRRT Rita Jew, PharmD and Morgan Cole, PharmD	Junior Ballroom C
	General Wrkshp	Cerebral Palsy Mary Worthington, PharmD	Junior Ballroom D
5:00-5:15pm	Break		Grand Ballroom AB Foyer
5:15-6:45pm	Level 1 – NICU	Warning: Pregnant or Nursing Mom Carla Christensen, PharmD and Kay Kyllonen, PharmD	Junior Ballroom B
	Level 2 – PICU	Management of Pediatric Septic Shock Kara Kniska, PharmD	Junior Ballroom C
	General Wrkshp	Pharmacist Development Melissa Heigham, PharmD	Junior Ballroom D
Sunday, October 10, 2010			
Time	Topic		Speaker
7:30am-12:00pm	Registration Desk Open		Grand Ballroom D Foyer
8:00-9:00am	Clinical Pearls	Neonatal and Pediatric Hot Topics Kathy Pharm, PharmD and Miranda Nelson, PharmD	Grand Ballroom AB
9:00-9:15am	Break		Grand Ballroom AB
9:15-10:45am	Research Wrkshp	How to get Your Residency Research Project Done in One Year Elizabeth Farrington, PharmD; Bob Kuhn, PharmD; and Emma Tillman, PharmD	Junior Ballroom B
	Advocacy Wrkshp	Getting Involved in Child Health Initiatives at the Local and International Levels Tracy Hagemann, PharmD; Brooke Honey, PharmD; and Peter Johnson, PharmD	Junior Ballroom C
	Management Wrkshp	Pediatric Electronic Medical Record Beth Carberry, MBA	Junior Ballroom D
11:00am-12:00pm	Super Session	Pediatric Clinical Microbiology Update David Hunstad, MD and Carey-Ann Burnham, PhD	Grand Ballroom AB



PPAG CELEBRATION 2010

In honor of our members, donors, and volunteers

October 8, 2010

4:30 pm

St. Charles Convention Center

Grand Ballroom Foyer

Pediatric Chronic Disease Specialty Conference Schedule

Friday, April 16 2010		
Time	Topic	Speaker
Pre-Conference Symposium: Pediatric Core Competencies		
1:00-2:00pm	General Overview of Epilepsy	Kim Tallian, PharmD
2:00-3:00pm	Treatment of Status Epilepticus	Elizabeth Farrington, PharmD
3:00-3:15pm	Break	
3:15-4:15pm	Adverse Effects of Antiepileptic Medications	Stephanie Phelps, PharmD
4:15-5:15pm	Application of Pharmacogenomics to the Treatment of the Patient with Epilepsy	Collin Hovinga, PharmD
Pediatric Chronic Diseases Conference Begins Now		
6:00-7:30pm	Keynote Address	Stephen Covey
7:30-9:00pm	Opening Reception	
Saturday, April 17 2010		
Time	Topic	Speaker
7:00-8:00am	Antidepressants and Antipsychotics in Youth: do the Benefits Outweigh the Risks?	Julie Dopheide, PharmD
8:00-9:00am	Our Patients Can't Afford Their Medications - What Happens Now?	Kristin Fox-Smith, PharmD
9:00-9:15am	Break	
9:15-10:15am	Cultural Diversity and Me References	Helen Fiechtner, PharmD
10:15-11:15am	Chronic Dermatology	Kim Benner, PharmD
11:15-12:30pm	Lunch	
12:30-2:00pm	Sickle Cell Workshop	Tracy Hagemann, PharmD
12:30-2:00pm	Medication Adherence Workshop	Jim Thigpen, PharmD
2:00-2:15pm	Break	
2:15-4:00pm	Residency Project Presentations	Various
4:00-5:30pm	Sickle Cell Workshop	Tracy Hagemann, PharmD
4:00-5:30pm	Medication Adherence Workshop	Jim Thigpen, PharmD
Sunday, April 18 2010		
Time	Topic	Speaker
8:00-9:00am	Hemophilia Workshop	Hassan Yaish, MD
9:00-10:30am	Incorporating Pharmaceutical Care into Pediatric HIV	Leslie Briars, PharmD
9:00-10:30am	Solid Organ Transplant – Long Term Considerations	Sabrina Boehme, PharmD
10:30-10:45am	Break	
10:45-12:15pm	Incorporating Pharmaceutical Care into Pediatric HIV	Leslie Briars, PharmD
10:45-12:15pm	Solid Organ Transplant – Long Term Considerations	Sabrina Boehme, PharmD

20th Pediatric Pharmacy Conference HANDOUTS

Wednesday, March 16, 2011 Handouts

8:00 am – 4:00 pm	Registration	
9:00 am – 10:00 am	General Session Pharmacogenomics-Applications in Pediatric Oncology 0180-0000-11-002-L04-P; 0.1 CEU	
10:00 am - 11:30 pm	Level 1 Small Session/Workshop A Review of Antiemetic Therapy used for Chemotherapy Induced Nausea and Vomiting 0180-0000-11-003-L01-P; 0.15 CEU	Level 2 Small Session/Workshop The Childhood Cancer Survivor Study: Defining Risks Among Long-term Survivors 0180-0000-11-004-L04-P
11:30 pm – 1:00 pm	Break	
1:00 pm – 2:30 pm	Level 1 Small Session/Workshop Basics of Bone Marrow Transplant 0180-0000-11-005-L04-P; 0.15 CEU	Level 2 Small Session/Workshop Anti-fungal Prophylaxis and Treatment Considerations in Neutropenic Patients 0180-0000-11-006-L01-P; 0.15 CEU

Thursday, March 17, 2011 Handouts

8:00 am – 4:00 pm	Registration	
8:00 am – 9:00 am	Clinical Pearls with Continental Breakfast <ol style="list-style-type: none"> Glucarpidase for Methotrexate Toxicity 0180-0000-11-007-L01-P; 0.025 CEU Drug Adherence in Adolescents 0180-000-11-008-L04-P; 0.025 CEU Eculizumab in Paroxysmal Nocturnal Hemoglobinuria 0180-000-11-009-L01-P; 0.025 CEU 	
9:00 am – 10:30 am	Level 1 Small Session/Workshop Palliative Care Advances in Pediatric Oncology 0180-0000-11-010-L04-P; 0.15 CEU	Level 2 Small Session/Workshop New Therapies in Neuroblastoma 0180-0000-11-011-L01-P; 0.15 CEU
10:30 am - 12:00 pm	Level 1 Small Session/Workshop Venous Thromboembolism in Children with Cancer 0180-0000-012-L01-P; 0.15 CEU	Level 2 Small Session/Workshop CPOE and chemotherapy, The Implementation Process NEW 0180-0000-013-L04-P; 0.15 CEU
12:00 pm – 1:30 pm	Exhibits Open Break	
1:30 pm – 2:30 pm	General Session Chemotherapy Safety-Processes and Technology 0180-0000-014-L04-P; 0.1 CEU	
2:30 pm - 3:30 pm	General Session Pharmacology of New Agents in Pediatric Oncology 0180-0000-015-L01-P; 0.1 CEU	
3:30 pm - 4:30 pm	Keynote Address <i>How a Tennessee Pharmacist Became CEO of the World's #1 Pediatric Cancer Hospital</i> 0180-0000-016-L04-P; 0.1 CEU	
4:30 pm - 6:30 pm	Live at St. Jude Children's Research Hospital (and Reception) 0180-0000-017-L04-P; 0.1 CEU	

Friday, March 18, 2011 Handouts

7:00 am – 4:00 pm	Registration
7:00 am – 8:00 am	Continental Breakfast
8:00 am – 9:00 am	<p>Sumner J. Yaffe Award Lecture and Presentation 0180-0000-11-018-L04-P</p>
9:00am - 10:00am	<p>Scientific Platform Presentations</p> <p>Use of subcutaneous catheters for enoxaparin administration 0180-0000-11-019-L04-P (0.025 CEU)</p> <p>Relationship of caffeine dosing with serum alkaline phosphatase levels in extremely low birth-weight infants 0180-0000-11-020-L01-P</p>
	<p>Exhibits Open</p> <p>Evaluation of the Incidence of Parenteral Nutrition-Associated Liver Disease in Infants Requiring Long-term Parenteral Nutrition 0180-0000-11-021-L01-P</p>
10:00 am - 12:00pm	<p>Scientific and Best Practice Poster Session Sponsored by Lexi-Comp</p>
12:00 pm – 1:30 pm	<p>PPAG Fellows Program and Lunch PPAG Town Hall</p>
1:30pm - 2:30pm	<p>Helms Award Lecture and Presentation 0180-0000-11-022-L04-P</p>
2:30pm – 3:30 pm	Committee Meetings
3:45 pm – 5:30 pm	Pediatric Pharmacy Resident Presentations NEW
5:30pm – 6:45 pm	<p>Advocacy Workshop Cultural Considerations in Clinical Practice 0180-0000-11-023-L04-P (0.015 CEU)</p>
	<p>Research Workshop Pharmacist's involvement in Multi-Centered, Clinical Trials in a Pediatric Hospital Handout 1</p> <p>Pharmacist's involvement in Multi-Centered, Clinical Trials in a Pediatric Hospital Handout 2 NEW</p> <p>0180-0000-11-024-L04-P</p>
6:45pm – 7:45 pm	<p>Teaching Leadership Workshop Preceptor Development: Mentorship 0180-0000-11-025-L04-P</p>
	Networking Reception and Exhibition

Saturday, March 19, 2011 Handouts

8:00 am – 4:00 pm	Registration	
8:00 am– 9:00 am	General Session Off-Label Drug Use in Pediatric Patients: How Can We Change the System? 0180-0000-11-026-L04-P (0.1 CEU)	
9:00 am – 10:00 am	General Session Turning your clinical observations into publications 018-0000-11-027-L04-P	
10:00 am - 11:30 pm	Level 1 Small Session/Workshop Infant and Pediatric Formulas: History, Content and Indications 0180-0000-11-028-L01-P (0.15 CEU)	Level 2 Small Session/Workshop Adverse Events Associated with Parenteral Nutrition 0180-000-11-029-L01-P (0.15 CEU)
11:30 pm – 1:00 pm	Exhibits Open Lunch Break	
1:00 pm – 2:30 pm	Level 1 Small Session/Workshop Blood Thinners in Babies: Anticoagulation in infants < 1 year of age NEW 0180-0000-11-030-L01-P (0.15 CEU)	Level 2 Small Session/Workshop PK/PD differences in infants and children with Acyanotic and Cyanotic Congenital Heart Disease 0180-0000-11-031-L01-P (0.15 CEU)
3:30pm - 4:30 pm	Keynote Address: <i>Development of Novel Therapies for the Treatment of RSV Infection</i> 0180-0000-11-032-L01-P (0.1 CEU)	
4:30 pm - 6:30 pm	Live at LeBonheur Children's Hospital (and Reception) 0180-0000-11-033-L04-P	

Sunday, March 20, 2011 Handouts

7:00 am – 11:15 pm	Registration	
7:00 am – 7:30 am	Continental Breakfast	
7:30 am – 9:00 am	Level 1 Pediatric Septic Shock 0180-0000-11-034-L01-P (0.15 CEU)	Level 2 Community Acquired Pneumonia in the Critical Care Setting 0180-0000-11-035-L01-P (0.15 CEU)
9:00 am - 10:30 pm	Level 1 Pediatric Procedural sedation 0180-0000-11-036-L01-P (0.15 CEU) (Handout with cases)	Level 2 Mama Said Knock You Out: Innovative Sedation 0180-0000-11-037-L01-P (0.15 CEU)
10:45 pm – 11:45 pm	General Session Immunization update/Management of Pandemics 0180-0000-11-038-L01-P (0.1 CEU)	
11:45pm - 12:45 pm	General Session H2 blocker use and late onset sepsis in the neonate 0180-0000-11-039-L01-P (0.1 CEU)	

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