Job Analysis

Pediatric Pharmacy Specialist (BCPPS)

September 2022

Board of Pharmacy Specialties®

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Executive Summary

The Board of Pharmacy Specialties (BPS) performed a job analysis, a multi-method approach into defining a job role or competency area in terms of the relevant tasks and associated knowledge areas, in 2022 to develop the content outline and other specifications for the specialty certification examination for pharmacists who specialize in pediatric pharmacy. In accordance with relevant professional and accreditation standards, the study consisted of three major phases:

1. Definition of tasks and knowledge areas
2. Development, administration, and analysis of a survey
3. Finalization of the exam content outline

This report provides evidence for the exam content outline developed and its applicability to the pediatric pharmacy specialty practice area. The outcome of this study was the creation of an examination blueprint that will be used to construct the pediatric pharmacy specialty certification examination such that it aligns with the competencies identified and in equal proportions across all forms (versions) of the examination.

Examination Content Domains and Subdomains		
1	**Pediatric Patient Population**	**26%**
1A	Pediatric Patient Characteristics	11%
1B	Pediatric Patient-Care Considerations	15%
2	**Therapeutics and Patient Management**	**50%**
2A	Treatment Planning	16%
2B	Therapeutic Implementation	18%
2C	Treatment Outcomes and Monitoring	16%
3	**Professional Practice**	**24%**
3A	Quality of Care	12%
3B	Practice Management	12%

Introduction

The Board of Pharmacy Specialties (BPS) performed a job analysis in 2022 to develop the content outline and other specifications for the specialty certification examination for pharmacists who specialize in pediatric pharmacy.

A job analysis[1], sometimes called a role delineation study or practice analysis in healthcare certification settings, is a multi-method approach to defining a job role or competency area in terms of the relevant tasks or work activities and the associated competencies (operationalized as knowledge, skills, and abilities) and/or other attributes. Indeed, job analysis can also be thought of as referring to a family of related approaches to establishing the foundations of content validity[2] for an assessment[3], in this case applied to the assessment of competencies associated with a specialty area in the licensed practice of pharmacy. A job analysis is considered a multi-method approach because it incorporates both qualitative and quantitative evidence in support of the definition of the practice area in question. The job analysis consisted of three major phases:

1. Definition of tasks and knowledge areas, organized in a content outline format and completed by an assembled panel of qualified pharmacists who are currently engaged in pediatric pharmacy
2. Development, administration, and analysis of a survey to other qualified pharmacists who are currently engaged in pediatric pharmacy, requesting their ratings either endorsing the inclusion or exclusion of each task and knowledge area identified by the committee
3. Finalization of the exam content outline, completed by the assembled panel and with consideration given to the survey results to help determine the retention, discard, or editing of knowledge and task lists, as well as the relative weights assigned to each content area

The study described in this report was conducted according to the Standards for Educational & Psychological Testing[4] and applicable accreditation standards (NCCA[5] and ISO/IEC 17024[6]). The subsequent sections describe the methods, results, and outcomes of the study, complemented by appendices which describe the qualifications and professional characteristics of the subject matter experts who contributed to this study, the actual text of the survey administered, and the final exam content outline produced by this study.

[1] Sackett, P.R., Laczo, R.M. (2003). Job and Work Analysis. Handbook of Psychology.
[2] Cronbach, L.J., Meehl, P.E. (1955). Construct Validity in Psychological Tests. Psychological Bulletin, 52(4), 281-302.
[3] Kane, M.T. (2013). Validating the Interpretations and Uses of Test Scores. Journal of Educational Measurement, 50(1), 1-73.
[4] American Educational Research Association, the American Psychological Association, National Council on Measurement in Education. (2014). Standards for Educational & Psychological Testing.
[5] National Commission for Certifying Agencies. (2014). Standards for the Accreditation of Certification Programs.
[6] International Organization for Standardization, International Electrotechnical Commission. (2012). Conformity Assessment: General Requirements for Bodies Operating Certification of Persons.

1. Definition of Tasks and Knowledge

BPS assembled a panel that consisted of 17 subject-matter experts in pediatric pharmacy, who were representative of the diversity of professional characteristics within the specialty with respect to practice setting, patient populations served, years of experience, and geographic dispersion within the United States. Three additional subject-matter experts in pediatric pharmacy were interviewed individually on a 45-minute teleconference. See Appendix A for the qualifications and professional characteristics of the job analysis panel and interviewees.

The interviews took place on 4 May 2022 and 6 May 2022. The interview questions focused on changes in the specialty area, key competency areas, and any limitations of the outgoing examination content outline that should be addressed by the job analysis.

The panel met via teleconference on three occasions to develop, define, and update the tasks performed and knowledge required to practice as a specialist in pediatric pharmacy. The dates of the meetings were 1 June 2022, 25 July 2022, and 27 July 2022.

On the first session, the panelists were oriented to the objectives of the study and the meeting, and then were presented a draft examination content outline and list of associated tasks that drew from the outgoing examination content outline and the interview notes. See Appendix B for the presentation used to orient the job analysis panelists.

The panel developed 22 task statements that describe the work activities performed by a pediatric pharmacist.

1	Collect and evaluate patient information
2	Identify and prioritize the management of disease state, medication, nutrition, and other health-related issues
3	Establish therapeutic goals in collaboration with healthcare team, patient, and family/caregivers
4	Design and recommend age-appropriate and developmentally appropriate therapeutic regimen and monitoring plan
5	Implement and document age-appropriate and developmentally appropriate therapeutic regimen and monitoring
6	Evaluate and modify age-appropriate and developmentally appropriate therapeutic regimen
7	Reconcile medications, as necessary, across the continuum of care
8	Identify and manage barriers to successful transitions of care (e.g., social barriers, prior authorization, payment considerations)
9	Identify patient situations for which a referral, specialist consult, and/or escalation of care is necessary
10	Participate in the development, implementation, and maintenance of systems, equipment, technology, and decision support involved in the medication use process for pediatric patients
11	Participate in the development, implementation, and maintenance of the pediatric considerations (e.g., dosage forms, dosing, preparation for administration, drug shortages) for a medication formulary
12	Collaborate with a multidisciplinary team in the development, implementation, and maintenance of evidence-based practice guidelines and protocols for the management of pediatric patients
13	Participate in medication safety reporting and risk mitigation efforts
14	Perform continuous quality improvement activities aimed at enhancing safety, efficacy, and cost-effectiveness of medication use
15	Document the clinical and financial impact of pediatric pharmacy services

16	Educate healthcare professionals, trainees, and students concerning safe and effective use of medications and other issues related to the care of the pediatric patient
17	Provide education and counseling to patients, family, and/or caregivers
18	Engage in professional development in the pediatric pharmacy specialty area, such as healthcare committee involvement, scholarly activities, and continuing education
19	Evaluate clinical literature and its applicability to pediatric pharmacy practice and the pediatric patient population
20	Advocate and/or provide support for the advancement of pediatric pharmaceutical care (e.g., age-appropriate formulations, safety and efficacy studies, product labeling)
21	Promote pediatric population health (e.g., poison prevention, immunization, antimicrobial stewardship, substance use)
22	Advocate for pediatric pharmacy practice and advanced training through professional organizations

The panel identified three content domains that describe the key high-level components of pediatric pharmacy. Across the three content domains, the panel identified seven content sub-domains and developed 43 knowledge areas that describe specific job knowledge associated with the practice of pediatric pharmacy. In some cases, the panelists wrote examples in parenthesis, which are meant to be non-exhaustive, to help better illustrate the intended scope of the knowledge area listed.

1	**Pediatric Patient Population**
1A	Pediatric Patient Characteristics
1A1	Normal Growth and Development
1A2	Developmental Pharmacokinetics
1A3	Pathophysiology
1A4	Anthropometrics
1A5	Pregnancy and Lactation
1B	Pediatric Patient-Care Considerations
1B1	Common Health Issues in the Pediatric Population
1B2	Immunizations
1B3	Pediatric-Focused Nutrition and Hydration
1B4	Age and Developmentally Appropriate Interviewing Techniques
1B5	Laboratory Practices (e.g., blood conservation, timing)
1B6	Pediatric Calculations (e.g., fluid requirements, renal function estimates)
2	**Therapeutics and Patient Management**
2A	Treatment Planning
2A1	Patient History Evaluation
2A2	Diagnosis and Diagnostic Testing
2A3	Pharmacodynamics and Pharmacokinetics
2A4	Pharmacogenomics
2A5	Goals of Care and Treatment
2A6	Social Determinants of Health
2A7	Pediatric-Specific Doses and Dosage Forms
2B	Therapeutic Implementation
2B1	Pharmacotherapy (e.g., medications, supplements, herbals)
2B2	Non-Pharmacologic Treatments and Lifestyle Modification
2B3	Interprofessional Care Coordination
2B4	Medication Reconciliation and Optimization
2B5	Medication Delivery (e.g., formulations, routes of administration, delivery devices, anatomic alterations)
2B6	Education, Counseling, and Support Resources for Patients, Family, and Caregiver
2B7	Pediatric Emergency Response (e.g., NRP, PALS)

2C	Treatment Outcomes and Monitoring
2C1	Therapeutic Targets and Endpoints
2C2	Therapeutic and Physiological Monitoring
2C3	Adverse Drug Events
2C4	Drug Interactions
2C5	Laboratory Assessment for Pediatric Population
2C6	Pediatric-Specific Scoring Systems (e.g., CAPD, WAT-1)
3	**Professional Practice**
3A	Quality of Care
3A1	Population Health
3A2	Preventative Care
3A3	Continuity of Care
3A4	Clinical Practice Guidelines
3A5	Medication Safety
3B	Practice Management
3B1	Professional Practice Standards, Guidelines, and Regulations
3B2	Ethics and Patient Advocacy
3B3	Research Methods and Statistics
3B4	Pediatric Subjects Research (e.g., IRB/IEC, participant and caregiver consent)
3B5	Pharmacoeconomics
3B6	Clinical Informatics
3B7	Emergency Preparedness

The panel also helped create a definition of the pediatric pharmacist, the target population for the BCPPS credential, and a statement describing the purpose of the BCPPS credentialing program.

The BPS Board Certified Pediatric Pharmacist (BCPPS) program is a credential for pharmacists who have met the eligibility criteria and who design, implement, monitor, and modify pharmacotherapeutic treatments for pediatric patients.
The purpose of the BCPPS program is to validate that the pharmacist has the advanced knowledge, skills, and experience necessary to optimize safety and outcomes for the pediatric patient population.

The panel also refined a list of demographic questions to be provided to survey respondents which would help better understand the professional characteristics of the respondent sample, which is described in more detail in the next section.

Lastly, the panel engaged in a linkage analysis, which is an exercise to identify the inter-relationships among the knowledge areas and tasks. Each panelist was asked to individually develop a linkage matrix in which tasks are listed as columns and knowledge areas as rows, and an x-mark indicating that the knowledge area is required for performance of the task. Individual matrices were aggregated such that any proposed linkage (x-mark) by more than half of the panelists was counted in the final (consensus) linkage matrix. One knowledge area (3B7) was found to have no linkages with any tasks.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						
1A																						
1A1	x	x	x	x	x	x				x		x				x			x		x	
1A2	x	x	x	x	x	x					x	x				x			x			
1A3	x	x	x	x	x	x			x			x				x			x			
1A4	x	x	x	x		x				x						x			x			
1A5	x	x		x								x				x			x	x		
1B																						
1B1	x	x	x	x	x	x			x	x		x		x		x	x	x	x	x	x	
1B2	x	x	x	x	x	x				x		x				x	x			x	x	
1B3	x	x	x	x	x	x				x		x				x	x		x		x	
1B4	x		x		x	x	x									x	x					
1B5	x	x	x	x	x	x						x				x						
1B6	x	x	x	x	x	x				x		x				x			x			
2																						
2A																						
2A1	x	x	x	x	x	x	x		x							x	x					
2A2	x	x	x	x		x						x				x			x			
2A3	x	x	x	x	x	x						x				x			x			
2A4	x	x	x	x		x						x				x			x			
2A5	x	x	x	x	x	x		x	x	x		x		x		x	x		x			
2A6	x	x	x	x		x		x	x							x	x				x	
2A7	x	x	x	x	x	x	x			x	x	x	x	x		x	x		x	x		
2B																						
2B1	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	x	x		
2B2	x	x	x	x	x	x						x		x		x	x		x			
2B3			x		x			x	x	x		x				x	x					
2B4	x	x	x	x	x	x	x	x		x					x	x						
2B5	x	x	x	x	x	x				x	x	x	x	x		x			x	x		
2B6			x	x				x				x				x	x					
2B7		x								x						x						
2C																						
2C1	x	x	x	x	x	x				x		x		x		x	x		x			
2C2	x	x	x	x	x	x				x		x	x	x	x	x	x		x			
2C3	x	x	x	x	x	x				x		x	x	x	x	x	x		x			
2C4	x	x	x	x	x	x				x		x	x	x	x	x	x		x			
2C5	x	x	x	x	x	x				x		x			x	x			x			
2C6	x	x	x	x	x	x				x		x				x			x			
3																						
3A																						
3A1																		x			x	
3A2			x																		x	
3A3		x	x					x		x											x	
3A4	x	x	x	x	x	x				x	x	x		x	x	x		x	x	x	x	x
3A5	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x		x	x	x
3B																						
3B1		x								x		x	x	x	x	x		x	x	x	x	x
3B2								x					x					x		x	x	x
3B3																		x	x	x		
3B4																		x	x	x		
3B5								x		x	x			x	x				x	x		

3B6	x	x	x		x	x
3B7						

2. Survey Administration and Analysis

A survey was created for the purpose of soliciting ratings of endorsement from the larger practitioner population. Survey results are used to validate the appropriateness of the knowledge areas and tasks developed by the panelists and to inform content weighting decisions. The survey was developed with the following components:

- Description of the purpose of the survey
- Definition of the target population identified by the specialty practice area
- Respondent ratings of endorsement for the task statements
- Respondent ratings of endorsement for the knowledge areas
- Demographic questions that assess survey respondents' professional qualifications
- Open field for any additional comments

The ratings of endorsement from the survey respondents were solicited using two scales: Importance and Frequency. Each scale consists of a prompt for task statement, prompt for knowledge areas, and numerical responses with an associated text anchor (description).

Importance	How important is this task to pediatric pharmacy practice? How important is this knowledge area to pediatric pharmacy practice?
0	not at all / not applicable
1	of very little importance
2	somewhat important
3	moderately important
4	very important
5	critically important
Frequency	How frequently is this task performed in pediatric pharmacy practice? How frequently is this knowledge used in pediatric pharmacy practice?
0	not at all / not applicable
1	very rarely
2	rarely
3	occasionally
4	often
5	very often

The survey was pilot tested with a sample that consisted of the job analysis panelists, the specialty examination council, and BPS staff persons. The pilot test was conducted during the dates of 10 August 2022 to 21 August 2022. Pilot testers identified one typographic error, which was corrected. See Appendix C for a copy of the final survey text.

The survey was open and available from 26 August 2022 to 15 September 2022. All pharmacists who hold the BCPPS credential were directly invited via email to complete the online survey. The survey was

also disseminated through the following affiliate organizations: American College of Clinical Pharmacy (ACCP), American Society of Health-System Pharmacists (ASHP).

The survey yielded 133 usable responses, with 122 coming from those who responded to the BPS call for survey respondents, 8 coming from the ACCP call for survey respondents, and 3 coming from the ASHP call for survey respondents. Responses were not used if the survey was not completed or if the respondent indicated spending less than 50% of their pharmacy practice in pediatric pharmacy.

Responses to Demographic Questions			
Percentage of Time in Pediatric Pharmacy	**Mean = 95.9 | SD = 10.9**	***n***	%
50 – 75		10	7.52%
76 – 99		17	12.78%
100		106	79.70%
Hours Per Week in Pediatric Pharmacy	**Mean = 40.7 | SD = 11.5**	***n***	%
0 – 10		0	0%
11 – 20		6	4.51%
21 – 30		10	7.52%
31 – 40		84	63.16%
41+		33	24.81%
Residency		***n***	
PGY1 Pharmacy		90	
PGY1 Managed Care Pharmacy		0	
PGY1 Community-Based Pharmacy		0	
PGY2 Ambulatory Care Pharmacy		1	
PGY2 Cardiology Pharmacy		0	
PGY2 Clinical Pharmacogenomics		0	
PGY2 Community-Based Pharmacy Administration and Leadership		0	
PGY2 Corporate Pharmacy Administration and Leadership		0	
PGY2 Critical Care Pharmacy		1	
PGY2 Emergency Medicine Pharmacy		1	
PGY2 Geriatric Pharmacy		0	
PGY2 Health System Pharmacy Administration and Leadership		0	
PGY2 Infectious Diseases Pharmacy		0	
PGY2 Internal Medicine Pharmacy		0	
PGY2 Investigational Drugs and Research		0	
PGY2 Medication Use Safety and Policy		0	
PGY2 Neurology		0	
PGY2 Oncology Pharmacy		1	
PGY2 Palliative Care / Pain Management Pharmacy		0	
PGY2 Pediatric Pharmacy		50	
PGY2 Pharmacotherapy		0	
PGY2 Pharmacy Informatics		0	
PGY2 Population Health Management and Data Analytics Pharmacy		0	
PGY2 Psychiatric Pharmacy		0	
PGY2 Solid Organ Transplant Pharmacy		0	
PGY2 Specialty Pharmacy Administration and Leadership		0	

BPS Certifications	*n*	
BCACP – Ambulatory Care	1	
BCCCP – Critical Care	2	
BCCP – Cardiology	0	
BCGP – Geriatric	0	
BCIDP – Infectious Diseases	0	
BCNP – Nuclear	0	
BCNSP – Nutrition Support	4	
BCOP – Oncology	2	
BCPP – Psychiatric	0	
BCPPS – Pediatric	128	
BCPS – Pharmacotherapy	29	
BCSCP – Compounded Sterile Preparations	0	
BCTXP – Solid Organ Transplantation	0	
Years of Experience in Pharmacy **Mean = 14.7 | SD = 9.1**	***n***	**%**
0-5	19	13.99%
6-10	36	27.27%
11-15	27	18.88%
16-20	21	15.38%
20+	30	24.48%
Years of Experience in Pediatric Pharmacy **Mean = 13.3 | SD = 8.4**	***n***	**%**
0-5	26	18.18%
6-10	37	27.27%
11-15	25	19.58%
16-20	24	18.18%
20+	21	16.78%
Primary Practice Setting	***n***	**%**
Academic Institution / Educational Institution	11	7.69%
Academic Medical Center or Hospital	42	29.37%
Children's Hospital	58	40.56%
Community Hospital	23	16.08%
Community Pharmacy	0	0.00%
Home Infusion / Ambulatory Infusion	0	0.00%
Hospice	0	0.00%
Hybrid Academic-Community Hospital	3	2.10%
Integrated Health System / Accountable Care Organization	1	0.70%
Investigational Drug Service	0	0.00%
Long-Term Care Pharmacy	0	0.00%
Managed Care	0	0.00%
Outpatient Clinic / Ambulatory Clinic	1	0.70%
Pharmaceutical Industry	0	0.00%
Specialty Pharmacy	0	0.00%
Governmental Healthcare Facility / Veterans Affairs Hospital	1	0.70%
Other	3	2.10%
Time Spent in Professional Role	***n* (>50%)**	**Mean %**
DIRECT PATIENT CARE	**69**	**71.30%**
Direct Patient Care: Acute (e.g., general pediatrics, oncology, infectious diseases)	26	27.17%
Direct Patient Care: Ambulatory	8	8.10%

Direct Patient Care: Critical Care (e.g., PICU, CICU) / Emergency Medicine	16	18.93%
Direct Patient Care: Neonatology (e.g., NICU)	19	17.10%
NOT DIRECT PATIENT CARE	**11**	**28.68%**
Administration / Management	10	11.20%
Teaching / Precepting	0	10.98%
Research / Scholarship	1	4.42%
Other	0	2.08%
Location of Primary Practice	***n***	**%**
UNITED STATES	**126**	**94.73%**
AL	4	3.01%
AR	1	0.75%
AZ	3	2.26%
CA	8	6.02%
CO	5	3.76%
DE	1	0.75%
FL	7	5.26%
GA	1	0.75%
IA	2	1.50%
ID	1	0.75%
IL	6	4.51%
IN	3	2.26%
KS	1	0.75%
KY	4	3.01%
LA	1	0.75%
MA	1	0.75%
MD	4	3.01%
ME	1	0.75%
MI	2	1.50%
MN	3	2.26%
MO	8	6.02%
NC	4	3.01%
ND	2	1.50%
NE	1	0.75%
NH	2	1.50%
NJ	1	0.75%
NY	7	5.26%
OH	10	7.52%
OK	3	2.26%
OR	2	1.50%
PA	5	3.76%
RI	1	0.75%
SC	1	0.75%
SD	1	0.75%
TN	2	1.50%
TX	4	3.01%
UT	2	1.50%
VA	4	3.01%
WA	4	3.01%

WI	3	2.26%
OUTSIDE OF THE UNITED STATES	**8**	**5.59%**
Hong Kong	2	1.40%
Lebanon	1	0.70%
Saudi Arabia	1	0.70%
Singapore	1	0.70%
Spain	1	0.70%
Sweden	1	0.70%

Mean Ratings for Task Statements		Importance	Frequency
1	Collect and evaluate patient information	4.71	4.85
2	Identify and prioritize the management of disease state, medication, nutrition, and other health-related issues	4.56	4.72
3	Establish therapeutic goals in collaboration with healthcare team, patient, and family/caregivers	4.46	4.57
4	Design and recommend age-appropriate and developmentally appropriate therapeutic regimen and monitoring plan	4.71	4.68
5	Implement and document age-appropriate and developmentally appropriate therapeutic regimen and monitoring	4.50	4.47
6	Evaluate and modify age-appropriate and developmentally appropriate therapeutic regimen	4.57	4.57
7	Reconcile medications, as necessary, across the continuum of care	4.22	4.09
8	Identify and manage barriers to successful transitions of care (e.g., social barriers, prior authorization, payment considerations)	3.61	3.35
9	Identify patient situations for which a referral, specialist consult, and/or escalation of care is necessary	3.03	2.76
10	Participate in the development, implementation, and maintenance of systems, equipment, technology, and decision support involved in the medication use process for pediatric patients	4.02	3.64
11	Participate in the development, implementation, and maintenance of the pediatric considerations (e.g., dosage forms, dosing, preparation for administration, drug shortages) for a medication formulary	4.26	3.74
12	Collaborate with a multidisciplinary team in the development, implementation, and maintenance of evidence-based practice guidelines and protocols for the management of pediatric patients	4.35	4.02
13	Participate in medication safety reporting and risk mitigation efforts	4.26	3.78
14	Perform continuous quality improvement activities aimed at enhancing safety, efficacy, and cost-effectiveness of medication use	3.66	3.36
15	Document the clinical and financial impact of pediatric pharmacy services	3.38	3.01
16	Educate healthcare professionals, trainees, and students concerning safe and effective use of medications and other issues related to the care of the pediatric patient	4.14	3.92
17	Provide education and counseling to patients, family, and/or caregivers	4.12	3.65
18	Engage in professional development in the pediatric pharmacy specialty area, such as healthcare committee involvement, scholarly activities, and continuing education	3.57	3.36
19	Evaluate clinical literature and its applicability to pediatric pharmacy practice and the pediatric patient population	4.26	3.89
20	Advocate and/or provide support for the advancement of pediatric pharmaceutical care (e.g., age-appropriate formulations, safety and efficacy studies, product labeling)	3.71	2.85
21	Promote pediatric population health (e.g., poison prevention, immunization, antimicrobial stewardship, substance use)	3.77	3.16
22	Advocate for pediatric pharmacy practice and advanced training through professional organizations	3.46	2.86

Mean Ratings for Knowledge Areas		IMP	FRE
1A1	Normal Growth and Development	3.71	3.92
1A2	Developmental Pharmacokinetics	4.43	4.37
1A3	Pathophysiology	4.14	4.18
1A4	Anthropometrics	3.06	3.14
1A5	Pregnancy and Lactation	3.34	3.02
1B1	Common Health Issues in the Pediatric Population	4.14	4.05

1B2	Immunizations	4.26	4.12
1B3	Pediatric-Focused Nutrition and Hydration	4.20	4.24
1B4	Age and Developmentally Appropriate Interviewing Techniques	3.31	3.03
1B5	Laboratory Practices (e.g., blood conservation, timing)	3.41	3.40
1B6	Pediatric Calculations (e.g., fluid requirements, renal function estimates)	4.77	4.79
2A1	Patient History Evaluation	3.92	4.00
2A2	Diagnosis and Diagnostic Testing	3.44	3.56
2A3	Pharmacodynamics and Pharmacokinetics	4.59	4.55
2A4	Pharmacogenomics	3.15	2.53
2A5	Goals of Care and Treatment	4.30	4.21
2A6	Social Determinants of Health	3.41	3.14
2A7	Pediatric-Specific Doses and Dosage Forms	4.67	4.75
2B1	Pharmacotherapy (e.g., medications, supplements, herbals)	4.62	4.62
2B2	Non-Pharmacologic Treatments and Lifestyle Modification	3.50	3.14
2B3	Interprofessional Care Coordination	4.02	4.07
2B4	Medication Reconciliation and Optimization	4.26	4.06
2B5	Medication Delivery (e.g., formulations, routes of admin, delivery devices, anatomic alterations)	4.39	4.41
2B6	Education, Counseling, and Support Resources for Patients, Family, and Caregiver	3.94	3.62
2B7	Pediatric Emergency Response (e.g., NRP, PALS)	4.47	3.59
2C1	Therapeutic Targets and Endpoints	4.31	4.22
2C2	Therapeutic and Physiological Monitoring	4.38	4.29
2C3	Adverse Drug Events	4.41	4.00
2C4	Drug Interactions	4.50	4.17
2C5	Laboratory Assessment for Pediatric Population	4.11	4.24
2C6	Pediatric-Specific Scoring Systems (e.g., CAPD, WAT-1)	3.91	3.86
3A1	Population Health	3.19	2.89
3A2	Preventative Care	3.68	3.30
3A3	Continuity of Care	4.02	3.67
3A4	Clinical Practice Guidelines	4.50	4.33
3A5	Medication Safety	4.66	4.46
3B1	Professional Practice Standards, Guidelines, and Regulations	4.10	3.98
3B2	Ethics and Patient Advocacy	3.80	3.35
3B3	Research Methods and Statistics	3.46	3.16
3B4	Pediatric Subjects Research (e.g., IRB/IEC, participant and caregiver consent)	3.35	2.80
3B5	Pharmacoeconomics	3.16	2.70
3B6	Clinical Informatics	3.74	3.53
3B7	Emergency Preparedness	3.52	2.77

An exploratory factor analysis[7] using maximum likelihood extraction and varimax rotation[8] was performed on the importance ratings provided for the knowledge areas. One factor emerged as the primary factor explaining 29.63% of the variability in importance ratings. The eigenvalue for the first factor was 12.74 and all subsequent factors had eigenvalues of 2.81 or less, and each explained less than 6.53% of the variability in importance ratings. This provides additional evidence for the consistency of the knowledge areas developed and their applicability to the intended measurement construct.

[7] Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. American Psychological Association: Washington DC.
[8] Kaiser, H. (1958). The varimax criterion for analytic rotation in factor analysis. Psychometrika, 23(3).

3. Finalization of Exam Content Outline

The job analysis panel reconvened on 28 September 2022 via teleconference to review the results of the survey and to finalize the exam content outline.

The panelists reviewed the results of the survey demographic questions and deemed the respondent sample to be representative of the target population, which are pharmacists specializing in pediatric pharmacy.

The panelists agreed to retain all the task statements developed. Task 9 (Identify patient situations for which a referral, specialist consult, and/or escalation of care is necessary) was discussed for its low ratings; the panel agreed to retain citing that in different jurisdictions and practice settings, this is performed by the pharmacist or another healthcare professional, such as a physician, but all pharmacists should possess competencies that can facilitate this process.

The panelists agreed to retain all the knowledge statements developed but made the following text changes: Examples were added to 1A4 (Anthropometrics) in parenthesis: "(e.g., growth curves, BSA)." Examples were added to 3B5 (Pharmacoeconomics) in parenthesis: "(e.g., cost-containment, formulary management)." The following text was added to 3B7 (Emergency Preparedness) so that it reflected the original intent and the wording found in the 2017 examination content outline: "and Drug Shortage Resources." The panelists noted that 2A4 (Pharmacogenomics) yielded lower ratings but should be retained, citing that many pharmacists are limited in their ability to put pharmacogenomics into practice due to a lack of research and resources. The panelists noted that 3A1 (Population Health) yielded lower ratings but should be retained, citing that pharmacists in different practice settings have more or less interaction with population health, but it is something all pharmacists should know about.

Lastly, the panelists were tasked with determining the content weighting, the proportion of examination content to be distributed to each content domain and sub-domain. The sum of the mean criticality ratings for the knowledge areas in each domain was tabulated and compared against the sum of the mean criticality ratings for all knowledge areas.

	Content Domains and Subdomains of ECO	Criticality	Final Weight
1	**Pediatric Patient Population**	**167.47**	**26%**
1A	Pediatric Patient Characteristics	70.92	11%
1B	Pediatric Patient-Care Considerations	96.55	15%
2	**Therapeutics and Patient Management**	**329.29**	**50%**
2A	Treatment Planning	107.76	16%
2B	Therapeutic Implementation	115.66	18%
2C	Treatment Outcomes and Monitoring	105.87	16%
3	**Professional Practice**	**157.26**	**24%**
3A	Quality of Care	76.39	12%
3B	Practice Management	80.88	12%

See Appendix D for the final Examination Content Outline.

Appendix A – Subject Matter Experts

Job Analysis Panel

Name	Credentials	Post-Licensure Experience	Job Title	Employer/ Affiliation	Location
Lawrence Alejandro	PharmD, BCPPS	14 Years	Clinical Transplant Pharmacist	Rady Children's Hospital San Diego	USA - CA
Muneera Rashid Al-Jelaify	MSc, BCPPS	13 Years	Pediatric Clinical Pharmacist	King Saud University	KSA
Elizabeth Beckman	PharmD, BCCCP, BCPPS, BCPS	14 Years	Clinical Pharmacy Specialist	UK HealthCare	USA - KY
Kelly Bobo	PharmD, MBA, BCPPS, BCPS	26 Years	Clinical Pharmacy Manager	Le Bonheur Children's Hospital	USA - TN
Tyler Bosley	PharmD, BCPPS	4 Years	Pediatric Clinical Pharmacist	University of Kentucky HealthCare, Kentucky Children's Hospital	USA - KY
Kelly J. Burch	PharmD, BCPPS	40 Years	Principal Consultant	Your Child's Pharmacist	USA - MO
Jon Cokley	PharmD, BCPPS	11 Years	Clinical Pharmacy Specialist	Texas Children's Hospital/Baylor College of Medicine	USA - TX
Kelli Covington	PharmD, BCPPS, BCPS	10 Years	Neonatal ICU and Women's Health Clinical Pharmacy Specialist	Northwestern Medicine	USA - IL
Lea S. Eiland	PharmD, BCPPS, BCPS, FASHP, FPPA	21 Years	Clinical Professor and Associate Department Head of Pharmacy Practice	Auburn University Harrison College of Pharmacy	USA - AL
Benjamin Hammer	PharmD, BCPPS	9 Years	Director of Clinical Pharmacy	Ann & Robert H Lurie Children's Hospital of Chicago	USA - IL
John Brock Harris	PharmD, BCPPS, BCPS, FCCP	15 Years	Assistant Dean of Assessment and Accreditation, Associate Professor of Pharmacy	Wingate University	USA - NC

Harlan Matthew Husted	PharmD, MBA, BCPPS, BCPS	16 Years	Pediatric Clinical Pharmacist	Community Medical Centers	USA - CA
Courtney Kain	PharmD, BCPPS	10 Years	General Pediatrics/Solid Organ Transplant Clinical Pharmacy Specialist	Nemours Children's Hospital	USA - DE
Julie C. Miller	PharmD, BCPPS	30 Years	Advanced Patient Care Pharmacist, Cardiothoracic Intensive Care	Nationwide Children's Hospital	USA - OH
Cassandra Ann Ruggles	PharmD, BCCCP, BCPPS	9 Years	Clinical Pharmacy Coordinator Pediatric Intensive Care Unit	Akron Children's Hospital	USA - OH
Marla Tanski	PharmD, MPH, BCPPS	27 Years	Clinical Pharmacy Manager	Johns Hopkins All Children's Hospital	USA - FL
Susan Villegas	PharmD, BCPPS	20 Years	Associate Professor of Pharmacy Practice; and Clinical Pharmacy Manager of Pediatrics	Arnold & Marie Schwartz College of Pharmacy and Health Sciences, Long Island University	USA - NY

Job Analysis Interviewees

Name	Credentials	Post-Licensure Experience	Job Title	Employer/ Affiliation	Location
Sabrina Boehme	PharmD, MBA, BCPPS, BCPS	19 Years	Pediatric Medication Safety Manager	Intermountain Healthcare Primary Children’s Hospital	USA - UT
Beth Deen	PharmD, BCNSP, BCPPS	28 Years	Senior Clinical Pharmacy Specialist	Cook Children’s Medical Center	USA - TX
Jamelee Huntley	PharmD, BCPPS	18 Years	Director of Pharmacy	Arkansas Children’s Northwest	USA - AR

Job Analysis

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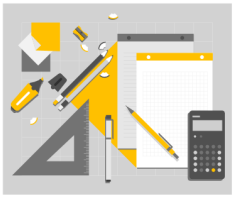
Job Analysis

A job analysis is often called a role delineation study or practice analysis in healthcare certification settings

The key points of inquiry in a Job Analysis are:

- ✓ **Definition of Target Population**
- ✓ **Tasks Performed**
- ✓ **Competencies Required**

The outcome is an exam content outline, which is used for creation of exams that reflect current practice and to identify to other stakeholders the scope of the exam



Multi-Method Approach

Both quantitative and qualitative methods are used in an RDS, which helps bolster the defensibility of the process and outcomes

Qualitative
- Interviews with Practitioners
- Focus Group with Practitioners

Quantitative
- Survey Administration and Analysis

Here is what the process looks like in sequence

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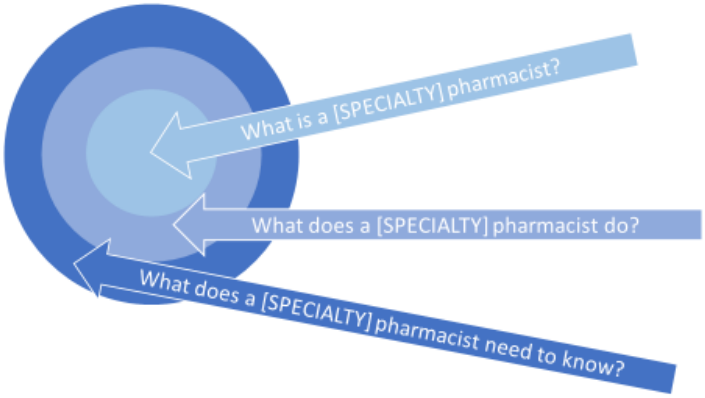
Multiple Levels of Analysis

Consider how you would describe a job role to someone

All three levels help define the scope

But only the outer layer is the level at which an examinee is assessed



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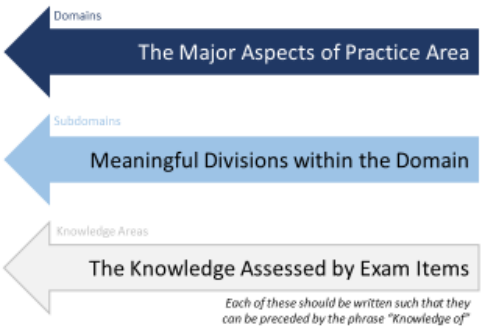
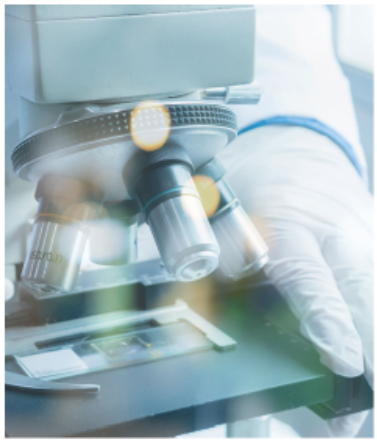
Exam Content Outline

An ECO is a grouping of examination content areas in a hierarchical list

Exam Content Outline Structure and Components		*(Somewhat Silly) Example*
1	Content Domain	Chocolate
1A	Content Subdomain	History
1A1	Knowledge Area	Mesoamerican Usage
1A2	Knowledge Area	European Adaptation
1A3	Knowledge Area	Modern Production
1B	Content Subdomain	Types
1B1	Knowledge Area	Milk Chocolate
1B2	Knowledge Area	Dark Chocolate
1B3	Knowledge Area	White Chocolate



Context Is Key



In addition to creation of an ECO, we will develop an inventory of **task statements**.

- These tasks identify the objectives and responsibilities of the role.
- These tasks provide the context in which the knowledge is applied.
- Tasks need not be grouped into content domains.
- Tasks will not be used to classify exam items nor determine what is tested.

Linkage Analysis

A linkage matrix looks something like this

	1	2	3	4	5	6	7	8	9
1A1						x		x	
1A2					x				
1A3				x					x
1B1			x	x					
1B2			x				x		
1C1	x	x							
1C2		x					x		x

Purpose of the Linkage Matrix

- demonstrate which knowledge areas are required for each task
- demonstrate that the knowledge areas are indeed practice-based
- help identify gaps in either inventory
- help identify tasks or knowledge that are superfluous or out-of-scope

Helpful Hints

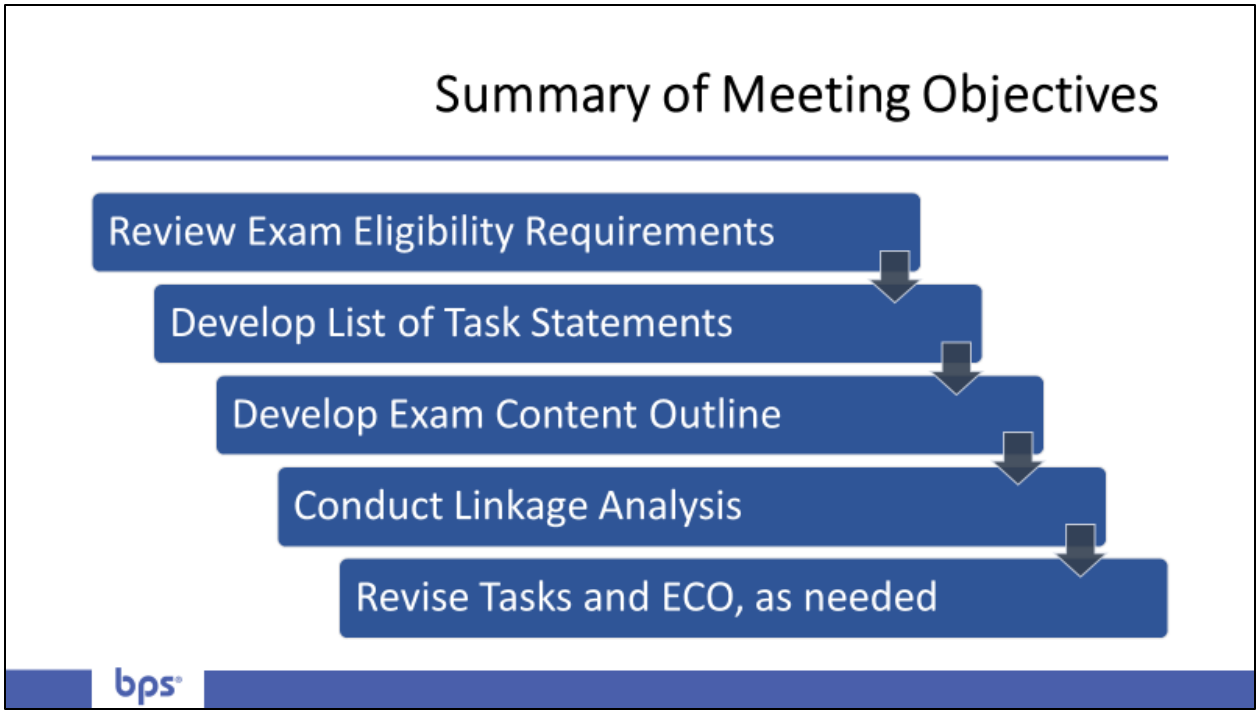
- An x-mark means that the specific knowledge is needed to perform that specific task.
- For example, knowledge of different types of chocolate is needed to *Develop Chocolate Recipes* but history of chocolate is not needed for that same task.

Confidentiality

Although the outcomes of the RDS will eventually be summarized in a public-facing document, please do not disclose information about our deliberations or work in progress

Any information other than that provided by BPS can give an unfair advantage or disadvantage to examinees, thereby threatening the validity of the exam

When asked about your involvement, simply direct prospective examinees and other stakeholders to official channels (BPS website) for information about the certification program



Appendix C – Survey Text

BPS 2022 Pediatric Pharmacy (BCPPS) Job Analysis Survey

Survey Introduction

The Board of Pharmacy Specialties (BPS) is conducting a Job Analysis (aka Role Delineation Study) for the Board-Certified Pediatric Pharmacy Specialist (BCPPS) certification program to develop an updated examination content outline, which serves as a definition of the scope of practice in the specialty area and a blueprint for the BCPPS certification and recertification examinations.

As part of this Job Analysis, we request your participation in this survey to provide ratings and feedback for the tasks and knowledge areas identified as representing current pharmacy practice in pediatric pharmacy.

Survey respondents will be prompted to rate each task and knowledge area on its importance to pediatric pharmacy practice and its frequency of use or performance.

Additionally, respondents will be asked a few demographic questions to better understand the respondent sample's professional qualifications - but no personally identifiable information will be solicited.

Responses will only be reviewed in aggregate and will not be used for any other purpose than the Job Analysis.

Your participation is expected to take 15 to 30 minutes in total.

If you have any questions about this survey or the Job Analysis, please feel free to contact rds@aphanet.org.

BPS Privacy Disclaimer: This survey is published and managed by the Board of Pharmacy Specialties (BPS). Please be aware that we take your concerns about privacy seriously and we make every reasonable effort to respect it. Click here to review our **Privacy Policy** and **Terms of Use**.

Are you willing to participate in this survey and provide your responses to BPS?

- ◯ Yes
- ◯ No

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BPS 2022 Pediatric Pharmacy (BCPPS) Job Analysis Survey

Task Statements

Please rate each task statement according to its importance to pediatric pharmacy practice and the frequency of its performance in pediatric pharmacy practice.

	Importance	Frequency
Collect and evaluate patient information		
Identify and prioritize the management of disease state, medication, nutrition, and other health-related issues		
Establish therapeutic goals in collaboration with healthcare team, patient, and family/caregivers		
Design and recommend age-appropriate and developmentally appropriate therapeutic regimen and monitoring plan		
Implement and document age-appropriate and developmentally appropriate therapeutic regimen and monitoring		
Evaluate and modify age-		

appropriate and developmentally appropriate therapeutic regimen		
Reconcile medications, as necessary, across the continuum of care		
Identify and manage barriers to successful transitions of care (e.g., social barriers, prior authorization, payment considerations)		
Identify patient situations for which a referral, specialist consult, and/or escalation of care is necessary		
Participate in the development, implementation, and maintenance of systems, equipment, technology, and decision support involved in the medication use process for pediatric patients		
Participate in the development, implementation, and maintenance of the pediatric considerations (e.g., dosage forms, dosing, preparation for administration, drug shortages) for a medication formulary		
Collaborate with a multidisciplinary team in the development, implementation, and maintenance of evidence-		

based practice guidelines and protocols for the management of pediatric patients		
Participate in medication safety reporting and risk mitigation efforts		
Perform continuous quality improvement activities aimed at enhancing safety, efficacy, and cost-effectiveness of medication use		
Document the clinical and financial impact of pediatric pharmacy services		
Educate healthcare professionals, trainees, and students concerning safe and effective use of medications and other issues related to the care of the pediatric patient		
Provide education and counseling to patients, family, and/or caregivers		
Engage in professional development in the pediatric pharmacy specialty area, such as healthcare committee involvement, scholarly activities, and continuing education		
Evaluate clinical literature and its applicability to		

pediatric pharmacy practice and the pediatric patient population		
Advocate and/or provide support for the advancement of pediatric pharmaceutical care (e.g., age-appropriate formulations, safety and efficacy studies, product labeling)		
Promote pediatric population health (e.g., poison prevention, immunization, antimicrobial stewardship, substance use)		
Advocate for pediatric pharmacy practice and advanced training through professional organizations		

What task associated with pediatric pharmacy is missing from this list, if any?

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BPS 2022 Pediatric Pharmacy (BCPPS) Job Analysis Survey

Knowledge Areas

Please rate each knowledge area in the Pediatric Patient Population content domain according to its importance to pediatric pharmacy practice and the frequency of its use in pediatric pharmacy practice.

	Importance	Frequency
Normal Growth and Development		
Developmental Pharmacokinetics		
Pathophysiology		
Anthropometrics		
Pregnancy and Lactation		
Common Health Issues in the Pediatric Population		
Immunizations		
Pediatric-Focused Nutrition and Hydration		
Age and Developmentally Appropriate Interviewing Techniques		
Laboratory Practices (e.g., blood conservation, timing)		
Pediatric Calculations (e.g., fluid requirements, renal function estimates)		

Please rate each knowledge area in the Therapeutics and Patient Management content domain according to its importance to pediatric pharmacy practice and the frequency of its use in pediatric pharmacy practice.

	Importance	Frequency
Patient History Evaluation		
Diagnosis and Diagnostic Testing		

Pharmacodynamics and Pharmacokinetics		
Pharmacogenomics		
Goals of Care and Treatment		
Social Determinants of Health		
Pediatric-Specific Doses and Dosage Forms		
Pharmacotherapy (e.g., medications, supplements, herbals)		
Non-Pharmacologic Treatments and Lifestyle Modification		
Interprofessional Care Coordination		
Medication Reconciliation and Optimization		
Medication Delivery (e.g., formulations, routes of administration, delivery devices, anatomic alterations)		
Education, Counseling, and Support Resources for Patients, Family, and Caregiver		
Pediatric Emergency Response (e.g., NRP, PALS)		
Therapeutic Targets and Endpoints		
Therapeutic and Physiological Monitoring		
Adverse Drug Events		
Drug Interactions		
Laboratory		

Assessment for Pediatric Population		
Pediatric-Specific Scoring Systems (e.g., CAPD, WAT-1)		

Please rate each knowledge area in the Professional Practice content domain according to its importance to pediatric pharmacy practice and the frequency of its use in pediatric pharmacy practice.

	Importance	Frequency
Population Health		
Preventative Care		
Continuity of Care		
Clinical Practice Guidelines		
Medication Safety		
Professional Practice Standards, Guidelines, and Regulations		
Ethics and Patient Advocacy		
Research Methods and Statistics		
Pediatric Subjects Research (e.g., IRB/IEC, participant and caregiver consent)		
Pharmacoeconomics		
Clinical Informatics		
Emergency Preparedness		

What knowledge area associated with pediatric pharmacy is missing from this list, if any?

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BPS 2022 Pediatric Pharmacy (BCPPS) Job Analysis Survey

Survey Respondent Demographics

What percentage of your professional practice is spent in pediatric pharmacy?

On average, how many hours per week do you spend in pediatric pharmacy?

Which post-graduate pharmacy residency programs have you completed? Select all that apply and leave blank if none.

- [ ] PGY1 Pharmacy
- [ ] PGY1 Managed Care Pharmacy
- [ ] PGY1 Community-Based Pharmacy
- [ ] PGY2 Ambulatory Care Pharmacy
- [ ] PGY2 Cardiology Pharmacy
- [ ] PGY2 Clinical Pharmacogenomics
- [ ] PGY2 Community-Based Pharmacy Administration and Leadership
- [ ] PGY2 Corporate Pharmacy Administration and Leadership
- [ ] PGY2 Critical Care Pharmacy
- [ ] PGY2 Emergency Medicine Pharmacy
- [ ] PGY2 Geriatric Pharmacy

- [ ] PGY2 Health System Pharmacy Administration and Leadership
- [ ] PGY2 Infectious Diseases Pharmacy
- [ ] PGY2 Internal Medicine Pharmacy
- [ ] PGY2 Investigational Drugs and Research
- [ ] PGY2 Medication Use Safety and Policy
- [ ] PGY2 Neurology
- [ ] PGY2 Oncology Pharmacy
- [ ] PGY2 Palliative Care / Pain Management Pharmacy
- [ ] PGY2 Pediatric Pharmacy
- [ ] PGY2 Pharmacotherapy
- [ ] PGY2 Pharmacy Informatics
- [ ] PGY2 Population Health Management and Data Analytics Pharmacy
- [ ] PGY2 Psychiatric Pharmacy
- [ ] PGY2 Solid Organ Transplant Pharmacy
- [ ] PGY2 Specialty Pharmacy Administration and Leadership
- [ ] Other: please specify

Which BPS certifications do you currently hold? Select all that apply and leave blank if none.

- [ ] BCACP - Ambulatory Care
- [ ] BCCCP - Critical Care
- [ ] BCCP - Cardiology
- [ ] BCGP - Geriatric
- [ ] BCIDP - Infectious Diseases
- [ ] BCNP - Nuclear
- [ ] BCNSP- Nutrition Support
- [ ] BCOP - Oncology
- [ ] BCPP - Psychiatric
- [ ] BCPPS - Pediatric
- [ ] BCPS - Pharmacotherapy
- [ ] BCSCP - Compounded Sterile Preparations
- [ ] BCTXP - Solid Organ Transplantation

How many years of experience do you have as a pharmacist?

How many years of experience do you have in pediatric pharmacy?

What percentage of your time do you spend in each area?

Direct Patient Care: Acute (e.g., general pediatrics, oncology, infectious diseases)

Direct Patient Care: Ambulatory

Direct Patient Care: Critical Care (e.g., PICU, CICU) / Emergency Medicine

Direct Patient Care: Neonatology (e.g., NICU)

Administration / Management

Teaching / Precepting

Research / Scholarship

Other

Where is your primary practice located?

State or Territory (if in United States) -- select state --

Nation/Country

What is your primary practice setting?

- ◯ Academic Institution / Educational Institution
- ◯ Academic Medical Center or Hospital
- ◯ Children's Hospital
- ◯ Community Hospital
- ◯ Community Pharmacy
- ◯ Home Infusion / Ambulatory Infusion
- ◯ Hospice
- ◯ Hybrid Academic-Community Hospital
- ◯ Integrated Health System / Accountable Care Organization
- ◯ Investigational Drug Service
- ◯ Long-Term Care Pharmacy
- ◯ Managed Care
- ◯ Outpatient Clinic / Ambulatory Clinic
- ◯ Pharmaceutical Industry
- ◯ Specialty Pharmacy
- ◯ Governmental Healthcare Facility / Veterans Affairs Hospital
- ◯ Other (please specify)

BPS 2022 Pediatric Pharmacy (BCPPS) Job Analysis Survey

Thank You

Please provide any feedback or comments about the survey here.

Those who complete the survey are eligible for entry into a raffle for one of ten $25 Amazon gift cards. If you would like to be entered into the raffle, please enter your email address below. Your email address will be used for the sole purpose of sending your gift card if you win.

Thank you very much for your interest and participation!

Appendix D – Exam Content Outline

1	**Pediatric Patient Population**
1A	Pediatric Patient Characteristics
1A1	Normal Growth and Development
1A2	Developmental Pharmacokinetics
1A3	Pathophysiology
1A4	Anthropometrics (e.g., growth curves, BSA)
1A5	Pregnancy and Lactation
1B	Pediatric Patient-Care Considerations
1B1	Common Health Issues in the Pediatric Population
1B2	Immunizations
1B3	Pediatric-Focused Nutrition and Hydration
1B4	Age and Developmentally Appropriate Interviewing Techniques
1B5	Laboratory Practices (e.g., blood conservation, timing)
1B6	Pediatric Calculations (e.g., fluid requirements, renal function estimates)
2	**Therapeutics and Patient Management**
2A	Treatment Planning
2A1	Patient History Evaluation
2A2	Diagnosis and Diagnostic Testing
2A3	Pharmacodynamics and Pharmacokinetics
2A4	Pharmacogenomics
2A5	Goals of Care and Treatment
2A6	Social Determinants of Health
2A7	Pediatric-Specific Doses and Dosage Forms
2B	Therapeutic Implementation
2B1	Pharmacotherapy (e.g., medications, supplements, herbals)
2B2	Non-Pharmacologic Treatments and Lifestyle Modification
2B3	Interprofessional Care Coordination
2B4	Medication Reconciliation and Optimization
2B5	Medication Delivery (e.g., formulations, routes of administration, delivery devices, anatomic alterations)
2B6	Education, Counseling, and Support Resources for Patients, Family, and Caregiver
2B7	Pediatric Emergency Response (e.g., NRP, PALS)
2C	Treatment Outcomes and Monitoring
2C1	Therapeutic Targets and Endpoints
2C2	Therapeutic and Physiological Monitoring
2C3	Adverse Drug Events
2C4	Drug Interactions
2C5	Laboratory Assessment for Pediatric Population

2C6	Pediatric-Specific Scoring Systems (e.g., CAPD, WAT-1)
3	**Professional Practice**
3A	Quality of Care
3A1	Population Health
3A2	Preventative Care
3A3	Continuity of Care
3A4	Clinical Practice Guidelines
3A5	Medication Safety
3B	Practice Management
3B1	Professional Practice Standards, Guidelines, and Regulations
3B2	Ethics and Patient Advocacy
3B3	Research Methods and Statistics
3B4	Pediatric Subjects Research (e.g., IRB/IEC, participant and caregiver consent)
3B5	Pharmacoeconomics (e.g., cost-containment, formulary management)
3B6	Clinical Informatics
3B7	Emergency Preparedness and Drug Shortage Resources