

Job Analysis

Infectious Diseases Pharmacy

October 2024



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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 2024 to develop the content outline and other specifications for the specialty certification examination for pharmacists who specialize in infectious diseases 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 infectious diseases pharmacy specialty practice area. The outcome of this study was the creation of an examination blueprint that will be used to construct the infectious diseases 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	Pathophysiology and Epidemiology of Infections	18%
1A	Causes of Infectious Diseases	9%
1B	Microbiology	9%
2	Therapeutics and Patient Management	60%
2A	Patient Assessment	15%
2B	Pharmacotherapy for Infection	27%
2C	Therapeutic Implementation, Outcomes, and Monitoring	18%
3	Professional Practice	22%
3A	Antimicrobial Stewardship	14%
3B	Practice Management	8%

Introduction

The Board of Pharmacy Specialties (BPS) performed a job analysis in 2024 to develop the content outline and other specifications for the specialty certification examination for pharmacists who specialize in infectious diseases pharmacy.

A job analysis¹, 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 validity² for an assessment³, 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 infectious diseases pharmacy
2. Development, administration, and analysis of a survey to other qualified pharmacists who are currently engaged in infectious diseases 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 Testing⁴ and applicable accreditation standards (NCCA⁵ and ISO/IEC 17024⁶). 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., Lazo, 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 infectious diseases 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 infectious diseases pharmacy were interviewed individually on a 1-hour teleconference. See Appendix A for the qualifications and professional characteristics of the job analysis panel and interviewees.

The interviews took place on 2, 3, and 9 of June 2024. 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 two occasions to develop, define, and update the tasks performed and knowledge required to practice as a specialist in infectious diseases pharmacy. The dates of the meetings were 24 July and 7 August 2024.

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 15 task statements that describe the work activities performed by an infectious diseases pharmacist.

- 1 Evaluate patient history, laboratory findings, presence and type of infection, risk factors, clinical status, social determinants of health, and/or other relevant patient characteristics
- 2 Establish treatment goals in collaboration with the patient, caregivers, and/or interprofessional healthcare team and in alignment with evidence-based medicine and practice guidelines
- 3 Design a targeted infectious diseases pharmacotherapeutic plan based on patient characteristics, pharmacology, treatment goals, and best available evidence
- 4 Develop a preventative, prophylactic, and/or post-exposure therapy plan based on patient characteristics, pharmacology, treatment goals, and best available evidence
- 5 Monitor and evaluate patient progress and response to care, and modify care plan accordingly
- 6 Utilize clinical decision support and other health information technology to optimize treatment decisions
- 7 Develop and implement plan for continuity of care, including procedures for discharge, transfers, outpatient parenteral antimicrobial therapy (OPAT), and/or complex outpatient oral antimicrobial therapy (COPAT)
- 8 Develop, implement, and manage an antimicrobial stewardship program, including the tracking, evaluation, and reporting of antimicrobial usage, susceptibility trends, and additional data pertinent to infectious diseases

9	Collaborate and participate in the development and compliance with infection prevention and microbiology policies
10	Develop and implement healthcare protocols, clinical decision support, medication formularies, and infectious diseases pharmacy services
11	Participate in healthcare quality improvement, safety, and/or public health initiatives
12	Evaluate, establish, and/or align policies and practices according to accreditation standards, regulatory requirements, and evidence-based practice
13	Develop and/or provide healthcare education to patients, caregivers, members of the general public, pharmacists, and/or other members of the interprofessional healthcare team
14	Engage in professional development in infectious diseases, such as professional advocacy, committee involvement, scholarly activities, and continuing education
15	Evaluate literature and other published information to determine the quality and applicability to infectious diseases

The panel identified three content domains that describe the key high-level components of infectious diseases pharmacy. Across the three content domains, the panel identified seven content sub-domains and developed 46 knowledge areas that describe specific job knowledge associated with the practice of infectious diseases 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	Pathophysiology and Epidemiology of Infections
1A	Causes of Infectious Diseases
1A1	Bacterial Infections
1A2	Viral Infections
1A3	Fungal Infections
1A4	Parasitic Infections
1A5	Other Infection Types (e.g., Prions, Amoebic)
1B	Microbiology
1B1	Microbiology Testing and Diagnostics
1B2	Pathogen Resistance
1B3	Virulence Factors (e.g., toxin production, biofilm)
1B4	Immunologic Response to Infection
2	Therapeutics and Patient Management
2A	Patient Assessment
2A1	Clinical Assessment and Screening
2A2	Laboratory and Diagnostic Testing
2A3	Pharmacokinetics and Pharmacodynamics
2A4	Social Determinants of Health
2A5	Risk Factors for Infection
2A6	Considerations for Special Populations (e.g., age group, obesity, pregnancy, critical illness, immunocompromised)

2B	Pharmacotherapy for Infection
2B1	Pharmacotherapy related to Respiratory Infections
2B2	Pharmacotherapy related to Skin and Skin-Structure Infections
2B3	Pharmacotherapy related to Cardiovascular Infections
2B4	Pharmacotherapy related to Bone and Joint Infections
2B5	Pharmacotherapy related to Central Nervous System Infections
2B6	Pharmacotherapy related to Gastrointestinal, Intra-abdominal, and Hepatic Infections
2B7	Pharmacotherapy related to Urologic and Gynecologic Infections
2B8	Pharmacotherapy related to Sexually Transmitted Infections
2B9	Pharmacotherapy related to HIV and associated Opportunistic Infections
2B10	Pharmacotherapy related to Infections in Immunocompromised Patients
2B11	Pharmacotherapy related to Other Infections and Complications
2C	Therapeutic Implementation, Outcomes, and Monitoring
2C1	Medication Administration
2C2	Adjunctive Therapies and Interventions for Infection (e.g., biologic response modifiers, corticosteroids, anticoagulation, smoking cessation)
2C3	Therapeutic Outcomes (e.g., resolution of signs and symptoms, laboratory data, readmission, development of drug resistance)
2C4	Therapeutic and Pharmacokinetic Monitoring (e.g., dose optimization, penetration of antimicrobials, source control, immune status, organ dysfunction)
2C5	Adverse Drug Events and Drug Interactions
2C6	Antimicrobial De-escalation
2C7	Interprofessional Care Coordination and Continuity of Care (e.g., referrals, transitions of care, case management, OPAT, COPAT)
2C8	Patient and Caregiver Education and Counseling
2C9	Travel Medicine (e.g., immunization, prophylactic medication regimen)
3	Professional Practice
3A	Antimicrobial Stewardship
3A1	Professional Practice Standards and Regulations
3A2	Antimicrobial Stewardship Metrics and Reporting (e.g., DDD, DOT, SAAR)
3A3	Resistance Tracking
3A4	Antimicrobial Formulary Management
3A5	Antibiogram Design and Development
3A6	Public and Population Health (e.g., epidemiology, immunization, preventative therapy)
3A7	Infection Prevention
3B	Practice Management
3B1	Information Resources and Databases
3B2	Literature Evaluation (e.g., research methods, statistics, applicability)
3B3	Quality Management and Process Improvement
3B4	Clinical Informatics (e.g., clinical decision support, alerts, workflows)

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

The BPS Board-Certified Infectious Diseases Pharmacist program is a credential for pharmacists who lead and optimize antimicrobial stewardship and the prevention, assessment, treatment, and monitoring of patients who have or are at risk for infectious diseases.

The purpose of the BPS Board-Certified Infectious Diseases Pharmacist program is to validate that the pharmacist has the advanced knowledge, skills, and experience necessary to optimize outcomes for patients with infectious diseases, improve public health, and mitigate antimicrobial resistance.

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.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1A1	X	X	X	X	X	X	X	X							
1A2	X	X	X	X	X	X	X	X							
1A3	X	X	X	X	X	X	X	X							
1A4	X	X	X	X	X	X	X								
1A5	X	X	X	X	X	X	X								
1B1	X	X	X	X	X	X		X	X						
1B2	X	X	X	X	X	X		X	X						
1B3	X	X	X	X	X										
1B4	X	X	X	X	X		X								
2A1	X	X	X	X	X	X	X								
2A2	X	X	X	X	X	X	X								
2A3	X	X	X	X	X	X	X								
2A4	X	X	X	X	X		X								
2A5	X	X	X	X	X		X								
2A6	X	X	X	X	X	X	X								

[illegible]

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 infectious diseases pharmacy practice?
	How important is this knowledge area to infectious diseases 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 infectious diseases pharmacy practice?
	How frequently is this knowledge used in infectious diseases 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 8-13 August 2024. Pilot testers did not identify any necessary changes. See Appendix C for a copy of the final survey text.

The survey was open and available from 14 August to 23 September 2024. All pharmacists who hold the BCIDP credential were directly invited via email to complete the online survey. The survey was also disseminated through the following affiliate organizations: American Society of Health-System Pharmacists and American College of Clinical Pharmacy.

The survey yielded 155 usable responses. Responses were not used if the survey was not completed or if the respondent indicated spending less than 50% of their pharmacy practice in infectious diseases.

Responses to Demographic Questions	
Percentage of Time in Infectious Diseases Pharmacy	<i>n</i>
Mean = 92.22 SD = 14.39	
50 – 75	25
76 – 99	22
100	108
Post-Graduate Pharmacy Residency Programs	<i>n</i>
PGY1 Pharmacy	130
PGY1 Managed Care Pharmacy	1
PGY1 Community-Based Pharmacy	1
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	1
PGY2 Infectious Diseases Pharmacy	105
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 Pain Management and Palliative Care Pharmacy	0
PGY2 Pediatric Pharmacy	3
PGY2 Pharmacotherapy	3
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

Other	2	
BPS Certifications	<i>n</i>	
BCACP - Ambulatory Care	0	
BCCCP - Critical Care	2	
BCCP - Cardiology	0	
BCEMP - Emergency Medicine	0	
BCGP - Geriatric	1	
BCIDP - Infectious Diseases	151	
BCNP - Nuclear	0	
BCNSP - Nutrition Support	1	
BCOP - Oncology	1	
BCPP - Psychiatric	0	
BCPPS - Pediatric	0	
BCPS - Pharmacotherapy	46	
BCSCP - Compounded Sterile Preparations	0	
BCTXP - Solid Organ Transplantation	0	
Years of Experience as a Licensed Pharmacist	<i>n</i>	%
	Mean = 11.94 SD = 8.03	
0-5	36	23.23%
6-10	50	32.26%
11-15	29	18.71%
16-20	18	11.61%
20+	22	14.19%
Years of Experience as an Infectious Diseases Pharmacist	<i>n</i>	%
	Mean = 8.83 SD = 6.41	
0-5	54	34.84%
6-10	53	34.19%
11-15	30	19.35%
16-20	12	7.74%
20+	6	3.87%
Primary Practice Setting	<i>n</i>	%
Academic Institution / Educational Institution	15	9.68%
Academic Medical Center or Hospital	52	33.55%
Children's Hospital	4	2.58%
Community Hospital	53	34.19%
Community Pharmacy	0	0.00%
Home Infusion / Ambulatory Infusion	0	0.00%
Hybrid Academic-Community Hospital	11	7.10%
Integrated Health System / Accountable Care Organization	3	1.94%
Investigational Drug Service	0	0.00%
Long-Term Care Pharmacy	0	0.00%
Managed Care	0	0.00%

Outpatient Clinic / Ambulatory Clinic	3	1.94%
Regulatory or Accrediting Body (e.g., FDA, CDC)	0	0.00%
Pharmaceutical Industry	0	0.00%
Specialty Pharmacy	0	0.00%
Governmental Healthcare Facility / Veterans Affairs Hospital	8	5.16%
Other	6	3.87%
Location of Primary Practice	n	%
United States	144	93.5%
AL	3	2.0%
AZ	2	1.3%
CA	5	3.3%
CO	4	2.6%
CT	2	1.3%
FL	4	2.6%
GA	3	2.0%
HI	1	0.7%
IA	1	0.7%
ID	3	2.0%
IL	10	6.5%
IN	5	3.3%
KS	2	1.3%
KY	6	3.9%
LA	3	2.0%
MA	1	0.7%
MD	4	2.6%
MI	2	1.3%
MN	4	2.6%
MO	5	3.3%
MS	4	2.6%
NC	5	3.3%
NE	5	3.3%
NJ	5	3.3%
NV	1	0.7%
NY	14	9.1%
OH	7	4.6%
OK	3	2.0%
OR	1	0.7%
PA	6	3.9%
RI	1	0.7%
SC	3	2.0%
SD	1	0.7%

TN	6	3.9%
TX	5	3.3%
UT	1	0.7%
VA	3	2.0%
VT	1	0.7%
WA	1	0.7%
WV	1	0.7%
Outside of the United States	10	6.5%
Egypt	3	2.0%
Qatar	1	0.7%
Saudi Arabia	2	1.3%
Spain	2	1.3%
Taiwan	2	1.3%
Time Spent in Professional Role	<i>n</i> (>50%)	Average %
Direct Patient Care	24	29.63%
Antimicrobial Stewardship	29	36.54%
Administration / Management	2	11.83%
Teaching / Precepting	0	14.20%
Research / Scholarship	1	6.21%
Other	1	1.59%
Does your primary practice setting have any of the following programs? Select all that apply and leave blank if none or not applicable.	<i>n</i>	
OPAT	69	
COPAT	25	
Telehealth	35	

Mean Ratings for Task Statements		Importance	Frequency
1	Evaluate patient history, laboratory findings, presence and type of infection, risk factors, clinical status, social determinants of health, and/or other relevant patient characteristics	4.75	4.81
2	Establish treatment goals in collaboration with the patient, caregivers, and/or interprofessional healthcare team and in alignment with evidence-based medicine and practice guidelines	4.49	4.52
3	Design a targeted infectious diseases pharmacotherapeutic plan based on patient characteristics, pharmacology, treatment goals, and best available evidence	4.81	4.77
4	Develop a preventative, prophylactic, and/or post-exposure therapy plan based on patient characteristics, pharmacology, treatment goals, and best available evidence	3.81	3.49
5	Monitor and evaluate patient progress and response to care, and modify care plan accordingly	4.57	4.60
6	Utilize clinical decision support and other health information technology to optimize treatment decisions	3.83	4.01
7	Develop and implement plan for continuity of care, including procedures for discharge, transfers, outpatient parenteral antimicrobial therapy (OPAT), and/or complex outpatient oral antimicrobial therapy (COPAT)	3.90	3.60
8	Develop, implement, and manage an antimicrobial stewardship program, including the tracking, evaluation, and reporting of antimicrobial usage, susceptibility trends, and additional data pertinent to infectious diseases	4.66	4.45
9	Collaborate and participate in the development and compliance with infection prevention and microbiology policies	3.76	3.55
10	Develop and implement healthcare protocols, clinical decision support, medication formularies, and infectious diseases pharmacy services	4.34	4.11
11	Participate in healthcare quality improvement, safety, and/or public health initiatives	3.41	3.18
12	Evaluate, establish, and/or align policies and practices according to accreditation standards, regulatory requirements, and evidence-based practice	4.06	3.73
13	Develop and/or provide healthcare education to patients, caregivers, members of the general public, pharmacists, and/or other members of the interprofessional healthcare team	3.82	3.63
14	Engage in professional development in infectious diseases, such as professional advocacy, committee involvement, scholarly activities, and continuing education	3.32	3.26
15	Evaluate literature and other published information to determine the quality and applicability to infectious diseases	4.35	4.21

Mean Ratings for Knowledge Areas		Importance	Frequency
1	Pathophysiology and Epidemiology of Infections		
1A	Causes of Infectious Diseases		
1A1	Bacterial Infections	4.95	4.97
1A2	Viral Infections	4.28	4.12
1A3	Fungal Infections	4.41	3.97
1A4	Parasitic Infections	3.06	2.32
1A5	Other Infection Types (e.g., Prions, Amoebic)	2.39	1.53
1B	Microbiology		
1B1	Microbiology Testing and Diagnostics	4.63	4.70
1B2	Pathogen Resistance	4.73	4.67
1B3	Virulence Factors (e.g., toxin production, biofilm)	3.55	3.49
1B4	Immunologic Response to Infection	3.39	3.26
2	Therapeutics and Patient Management		
2A	Patient Assessment		
2A1	Clinical Assessment and Screening	4.37	4.46
2A2	Laboratory and Diagnostic Testing	4.52	4.67
2A3	Pharmacokinetics and Pharmacodynamics	4.57	4.61
2A4	Social Determinants of Health	3.21	3.26
2A5	Risk Factors for Infection	3.94	4.10
2A6	Considerations for Special Populations (e.g., age group, obesity, pregnancy, critical illness, immunocompromised)	4.34	4.39
2B	Pharmacotherapy for Infection		
2B1	Pharmacotherapy related to Respiratory Infections	4.76	4.89
2B2	Pharmacotherapy related to Skin and Skin-Structure Infections	4.63	4.80
2B3	Pharmacotherapy related to Cardiovascular Infections	4.42	4.17
2B4	Pharmacotherapy related to Bone and Joint Infections	4.54	4.55
2B5	Pharmacotherapy related to Central Nervous System Infections	4.45	3.85
2B6	Pharmacotherapy related to Gastrointestinal, Intra-abdominal, and Hepatic Infections	4.48	4.47
2B7	Pharmacotherapy related to Urologic and Gynecologic Infections	4.46	4.55
2B8	Pharmacotherapy related to Sexually Transmitted Infections	3.92	3.51
2B9	Pharmacotherapy related to HIV and associated Opportunistic Infections	4.06	3.56
2B10	Pharmacotherapy related to Infections in Immunocompromised Patients	4.26	3.90
2B11	Pharmacotherapy related to Other Infections and Complications	3.53	3.37
2C	Therapeutic Implementation, Outcomes, and Monitoring		
2C1	Medication Administration	3.72	3.92
2C2	Adjunctive Therapies and Interventions for Infection (e.g., biologic response modifiers, corticosteroids, anticoagulation, smoking cessation)	2.96	2.93
2C3	Therapeutic Outcomes (e.g., resolution of signs and symptoms, laboratory data, readmission, development of drug resistance)	4.35	4.41

2C4	Therapeutic and Pharmacokinetic Monitoring (e.g., dose optimization, penetration of antimicrobials, source control, immune status, organ dysfunction)	4.70	4.71
2C5	Adverse Drug Events and Drug Interactions	4.51	4.48
2C6	Antimicrobial De-escalation	4.66	4.76
2C7	Interprofessional Care Coordination and Continuity of Care (e.g., referrals, transitions of care, case management, OPAT, COPAT)	3.83	3.62
2C8	Patient and Caregiver Education and Counseling	3.23	2.78
2C9	Travel Medicine (e.g., immunization, prophylactic medication regimen)	2.59	2.04
3	Professional Practice		
3A	Antimicrobial Stewardship		
3A1	Professional Practice Standards and Regulations	3.92	3.81
3A2	Antimicrobial Stewardship Metrics and Reporting (e.g., DDD, DOT, SAAR)	4.23	4.08
3A3	Resistance Tracking	4.22	3.92
3A4	Antimicrobial Formulary Management	4.19	3.96
3A5	Antibiogram Design and Development	4.13	3.69
3A6	Public and Population Health (e.g., epidemiology, immunization, preventative therapy)	3.26	2.83
3A7	Infection Prevention	3.43	3.05
3B	Practice Management		
3B1	Information Resources and Databases	3.98	4.15
3B2	Literature Evaluation (e.g., research methods, statistics, applicability)	4.32	4.30
3B3	Quality Management and Process Improvement	3.82	3.72
3B4	Clinical Informatics (e.g., clinical decision support, alerts, workflows)	3.75	3.75

An exploratory factor analysis⁷ using maximum likelihood extraction and varimax rotation⁸ was performed on the importance ratings provided for the knowledge areas. One factor emerged, with an eigenvalue of 12.37, as the primary factor explaining 26.90% of the variability in importance ratings. All subsequent factors had eigenvalues of 3.79 or less and each explained less than 8.24% 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 7 October 2024 via teleconference to review the results of the survey and to finalize the exam content outline. First, 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 infectious diseases pharmacy.

The panelists agreed to retain all the task statements. The panelists agreed to retain all but one of the knowledge statements. 1A5 (Other Infection Types) yielded the lowest importance and frequency ratings so it was combined with 1A4 (Parasitic Infections), which had somewhat lower ratings as well such that 1A4 now reads: Parasitic and Other Infections. The few other knowledge areas that had relatively lower ratings were discussed by the panel and they agreed that they are indeed part of the scope and perhaps deserved more attention from infectious diseases pharmacists.

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. See Appendix D for the final Examination Content Outline.

Exam Content Outline		Criticality	% Weight
1	Pathophysiology and Epidemiology of Infections		18%
1A	Causes of Infectious Diseases		9%
1A1	Bacterial Infections	24.61	3.3%
1A2	Viral Infections	17.66	2.4%
1A3	Fungal Infections	17.54	2.4%
1A4	Parasitic and Other Infections	7.12	1.0%
1B	Microbiology		9%
1B1	Microbiology Testing and Diagnostics	21.73	2.9%
1B2	Pathogen Resistance	22.09	3.0%
1B3	Virulence Factors (e.g., toxin production, biofilm)	12.41	1.7%
1B4	Immunologic Response to Infection	11.08	1.5%
2	Therapeutics and Patient Management		60%
2A	Patient Assessment		15%
2A1	Clinical Assessment and Screening	19.50	2.6%
2A2	Laboratory and Diagnostic Testing	21.12	2.9%
2A3	Pharmacokinetics and Pharmacodynamics	21.10	2.9%
2A4	Social Determinants of Health	10.45	1.4%
2A5	Risk Factors for Infection	16.12	2.2%
2A6	Considerations for Special Populations (e.g., age group, obesity, pregnancy, critical illness, immunocompromised)	19.05	2.6%

2B	Pharmacotherapy for Infection		27%
2B1	Pharmacotherapy related to Respiratory Infections	23.28	3.2%
2B2	Pharmacotherapy related to Skin and Skin-Structure Infections	22.20	3.0%
2B3	Pharmacotherapy related to Cardiovascular Infections	18.45	2.5%
2B4	Pharmacotherapy related to Bone and Joint Infections	20.69	2.8%
2B5	Pharmacotherapy related to Central Nervous System Infections	17.12	2.3%
2B6	Pharmacotherapy related to Gastrointestinal, Intra-abdominal, and Hepatic Infections	20.02	2.7%
2B7	Pharmacotherapy related to Urologic and Gynecologic Infections	20.31	2.7%
2B8	Pharmacotherapy related to Sexually Transmitted Infections	13.77	1.9%
2B9	Pharmacotherapy related to HIV and associated Opportunistic Infections	14.47	2.0%
2B10	Pharmacotherapy related to Infections in Immunocompromised Patients	16.62	2.2%
2B11	Pharmacotherapy related to Other Infections and Complications	11.91	1.6%
2C	Therapeutic Implementation, Outcomes, and Monitoring		18%
2C1	Medication Administration	14.60	2.0%
2C2	Adjunctive Therapies and Interventions for Infection (e.g., biologic response modifiers, corticosteroids, anticoagulation, smoking cessation)	8.67	1.2%
2C3	Therapeutic Outcomes (e.g., resolution of signs and symptoms, laboratory data, readmission, development of drug resistance)	19.16	2.6%
2C4	Therapeutic and Pharmacokinetic Monitoring (e.g., dose optimization, penetration of antimicrobials, source control, immune status, organ dysfunction)	22.15	3.0%
2C5	Adverse Drug Events and Drug Interactions	20.19	2.7%
2C6	Antimicrobial De-escalation	22.21	3.0%
2C7	Interprofessional Care Coordination and Continuity of Care (e.g., referrals, transitions of care, case management, OPAT, COPAT)	13.87	1.9%
2C8	Patient and Caregiver Education and Counseling	8.99	1.2%
2C9	Travel Medicine (e.g., immunization, prophylactic medication regimen)	5.27	0.7%
3	Professional Practice		22%
3A	Antimicrobial Stewardship		14%
3A1	Professional Practice Standards and Regulations	14.91	2.0%
3A2	Antimicrobial Stewardship Metrics and Reporting (e.g., DDD, DOT, SAAR)	17.23	2.3%
3A3	Resistance Tracking	16.55	2.2%
3A4	Antimicrobial Formulary Management	16.61	2.2%
3A5	Antibiogram Design and Development	15.24	2.1%
3A6	Public and Population Health (e.g., epidemiology, immunization, preventative therapy)	9.21	1.2%
3A7	Infection Prevention	10.43	1.4%
3B	Practice Management		8%
3B1	Information Resources and Databases	16.54	2.2%
3B2	Literature Evaluation (e.g., research methods, statistics, applicability)	18.57	2.5%
3B3	Quality Management and Process Improvement	14.19	1.9%
3B4	Clinical Informatics (e.g., clinical decision support, alerts, workflows)	14.05	1.9%

Appendix A – Subject Matter Experts

Name	Credentials	Years Post-Licensure Experience	Job Title	Employer/Affiliation	Practice Setting	Location
Sharon Blum	PharmD, BCIDP	17	Chair Department of Pharmacy Practice	Touro University	Academic Institution	NY
Lauren Bricker	PharmD, BCIDP	7	Clinical Pharmacy Specialist - Infectious Diseases	Ascension Via Christi	Community Hospital	KS
Hubert Chua	PharmD, BCIDP, BCPS	3	Assistant Professor of Pharmacy Practice	Long Island University	Academic Institution Academic Medical Center/ Hospital	NY
Krutika Hornback	PharmD, BCIDP	6	System Pharmacy Coordinator	MUSC Health	Academic Medical Center/ Hospital	SC
Bruce Jones	PharmD, BCPS	15	Infectious Diseases Clinical Pharmacy Specialist	St Joseph's Candler Health System	Community Hospital	GA
Shin-Pung Polly Jen	PharmD, BCIDP, BCPS	15	Assistant Director of Clinical Services	Newark Beth Israel Medical Center	Academic Medical Center/ Hospital	NJ
Wesley Kufel	PharmD, BCIDP, BCPS	8	Clinical Associate Professor	Binghamton University	Academic Institution Academic Medical Center/ Hospital	NY
Yousef Lafi	PharmD, BCIDP	6	Clinical Pharmacist Practitioner- Infectious Diseases	UNC Health Infectious Diseases Clinic	Academic Medical Center/ Hospital	NC
Erica Little	PharmD, BCIDP	6	Infectious Disease Pharmacist Specialist	HSHS St. John's Hospital	Community Hospital	IL

Christopher McCoy	PharmD, BCIDP, BCPS	22	Associate Director	Beth Israel Deaconess Medical Center	Academic Medical Center/ Hospital	MA
Meera Mehta	PharmD, BCIDP	9	Infectious Diseases Clinical Specialist	West Virginia University Hospitals	Academic Medical Center/ Hospital	WV
Matthew Miller	PharmD, BCIDP	11	Clinical Pharmacist Specialist, Infectious Diseases and Antimicrobial Stewardship	Children's Hospital Colorado	Academic Medical Center/ Hospital	CO
Radhika Polisetty	PharmD, BCIDP	16	Associate Professor	Midwestern University	Academic Institution	IL
Tim Schulta	PharmD, BCIDP, BCPS	8	EClinical Pharmacist; AMS Co-Lead	OSF Healthcare	Academic Institution	IL
Ashley Selby	PharmD, BCCCP, BCIDP, BCPS	5	Assistant Professor of Pharmacy Practice	Texas Tech University Health Sciences Center	Academic Institution Other	TX
Mitchell Snyder	PharmD, BCIDP	8	Clinical Pharmacist Practitioner - Infectious Disease	VA New Jersey Healthcare System	Governmental Healthcare Facility	NJ
Alexander Stumphauzer	PharmD, BCIDP	4	Transitions of Care Clinical Pharmacist/ Assistant Clinical Professor	MultiCare Deaconess Hospital/ Washington State University	Academic Institution Community Hospital	WA

Job Analysis



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



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	← Domains The Major Aspects of Practice Area
1A	Content Subdomain	History	
1A1	Knowledge Area	Mesoamerican Usage	← Meaningful Divisions within the Domain
1A2	Knowledge Area	European Adaptation	
1A3	Knowledge Area	Modern Production	
1B	Content Subdomain	Types	← The Knowledge Assessed by Exam Items Each of these should be written such that they can be preceded by the phrase "Knowledge of"
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

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

	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

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.

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Confidentiality



Although the outcomes of the Job Analysis 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

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Summary of Meeting Objectives

Review Exam Eligibility Requirements

Develop List of Task Statements

Develop Exam Content Outline

Conduct Linkage Analysis

Revise Tasks and ECO, as needed

Appendix C – Survey Text



BPS Infectious Diseases Pharmacy (BCIDP) 2024 Job Analysis Survey

Survey Introduction

The Board of Pharmacy Specialties (BPS) is conducting a Job Analysis for the Board-Certified Infectious Diseases Pharmacy (BCIDP) certification program to develop an updated examination content outline, which serves as a blueprint for the certification exam and the scope for recertification and eligibility purposes.

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 infectious diseases pharmacy.

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

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.

Those who complete the survey are eligible for entry into a raffle for one of ten \$25 Amazon gift cards.

If you have any questions about this survey, please feel free to contact ja@aphanet.org.

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

☐ Yes

☐ No

BPS Infectious Diseases Pharmacy (BCIDP) 2024 Job Analysis Survey

Task Statements

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

	Importance	Frequency
Evaluate patient history, laboratory findings, presence and type of infection, risk factors, clinical status, social determinants of health, and/or other relevant patient characteristics		
Establish treatment goals in collaboration with the patient, caregivers, and/or interprofessional healthcare team and in alignment with evidence-based medicine and practice guidelines		
Design a targeted infectious diseases pharmacotherapeutic plan based on patient characteristics, pharmacology, treatment goals, and best available evidence		
Develop a preventative, prophylactic, and/or post-exposure therapy plan based		

on patient characteristics, pharmacology, treatment goals, and best available evidence		
Monitor and evaluate patient progress and response to care, and modify care plan accordingly		
Utilize clinical decision support and other health information technology to optimize treatment decisions		
Develop and implement plan for continuity of care, including procedures for discharge, transfers, outpatient parenteral antimicrobial therapy (OPAT), and/or complex outpatient oral antimicrobial therapy (COPAT)		
Develop, implement, and manage an antimicrobial stewardship program, including the tracking, evaluation, and reporting of antimicrobial usage, susceptibility trends, and additional data pertinent to infectious diseases		
Collaborate and participate in the development and compliance with infection prevention and microbiology policies		
Develop and implement healthcare protocols, clinical decision support, medication formularies, and infectious diseases pharmacy services		

Participate in healthcare quality improvement, safety, and/or public health initiatives		
Evaluate, establish, and/or align policies and practices according to accreditation standards, regulatory requirements, and evidence-based practice		
Develop and/or provide healthcare education to patients, caregivers, members of the general public, pharmacists, and/or other members of the interprofessional healthcare team		
Engage in professional development in infectious diseases, such as professional advocacy, committee involvement, scholarly activities, and continuing education		
Evaluate literature and other published information to determine the quality and applicability to infectious diseases		

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

BPS Infectious Diseases Pharmacy (BCIDP) 2024 Job Analysis Survey

Knowledge Areas

Please rate each knowledge area in the Pathophysiology and Epidemiology of Infections: Causes of Infectious Diseases content domain according to its importance to infectious diseases pharmacy practice and the frequency of its use in infectious diseases pharmacy practice.

	Importance	Frequency
Bacterial Infections		
Viral Infections		
Fungal Infections		
Parasitic Infections		
Other Infection Types (e.g., Prions, Amoebic)		

Please rate each knowledge area in the Pathophysiology and Epidemiology of Infections: Microbiology content domain according to its importance to infectious diseases pharmacy practice and the frequency of its use in infectious diseases pharmacy practice.

	Importance	Frequency
Microbiology Testing and Diagnostics		
Pathogen Resistance		
Virulence Factors (e.g., toxin production, biofilm)		
Immunologic Response to Infection		

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

	Importance	Frequency
Clinical Assessment and Screening		
Laboratory and Diagnostic Testing		
Pharmacokinetics and Pharmacodynamics		
Social Determinants of Health		
Risk Factors for Infection		
Considerations for Special Populations (e.g., age group, obesity, pregnancy, critical illness, immunocompromised)		

Please rate each knowledge area in the Therapeutics and Patient Management: Pharmacotherapy for Infection content domain according to its importance to infectious diseases pharmacy practice and the frequency of its use in infectious diseases pharmacy practice.

	Importance	Frequency
Pharmacotherapy related to Respiratory Infections		
Pharmacotherapy related to Skin and Skin-Structure Infections		
Pharmacotherapy related to Cardiovascular Infections		
Pharmacotherapy related to Bone and Joint Infections		
Pharmacotherapy related to Central Nervous System Infections		
Pharmacotherapy related to Gastrointestinal, Intra-abdominal, and Hepatic Infections		
Pharmacotherapy related to Urologic and Gynecologic Infections		
Pharmacotherapy related to Sexually Transmitted Infections		
Pharmacotherapy related to HIV and associated Opportunistic Infections		
Pharmacotherapy related to Infections in Immunocompromised Patients		
Pharmacotherapy related to Other Infections and Complications		

Please rate each knowledge area in the Therapeutics and Patient Management: Therapeutic Implementation, Outcomes, and Monitoring content domain according to its importance to infectious diseases pharmacy practice and the frequency of its use in infectious diseases pharmacy practice.

	Importance	Frequency
Medication Administration		
Adjunctive Therapies and Interventions for Infection (e.g., biologic response modifiers, corticosteroids, anticoagulation, smoking cessation)		
Therapeutic Outcomes (e.g., resolution of signs and symptoms, laboratory data, readmission, development of drug resistance)		
Therapeutic and Pharmacokinetic Monitoring (e.g., dose optimization, penetration of antimicrobials, source control, immune status, organ dysfunction)		
Adverse Drug Events and Drug Interactions		
Antimicrobial De-escalation		
Interprofessional Care Coordination and Continuity of Care (e.g., referrals, transitions of care, case management, OPAT, COPAT)		
Patient and Caregiver Education and Counseling		

Travel Medicine
(e.g.,
immunization,
prophylactic
medication
regimen)

Please rate each knowledge area in the Professional Practice: Antimicrobial Stewardship content domain according to its importance to infectious diseases pharmacy practice and the frequency of its use in infectious diseases pharmacy practice.

	Importance	Frequency
Professional Practice Standards and Regulations		
Antimicrobial Stewardship Metrics and Reporting (e.g., DDD, DOT, SAAR)		
Resistance Tracking		
Antimicrobial Formulary Management		
Antibiogram Design and Development		
Public and Population Health (e.g., epidemiology, immunization, preventative therapy)		
Infection Prevention		

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

	Importance	Frequency
Information Resources and Databases		
Literature Evaluation (e.g., research methods, statistics, applicability)		
Quality Management and Process Improvement		
Clinical Informatics (e.g., clinical decision support, alerts, workflows)		

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

BPS Infectious Diseases Pharmacy (BCIDP) 2024 Job Analysis Survey

Survey Respondent Demographics

What percentage of your professional practice is spent in infectious diseases 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
- ☐ BCEMP - Emergency Medicine
- ☐ 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 licensed pharmacist?

How many years of experience do you have in infectious diseases pharmacy?

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
- ☐ Hybrid Academic-Community Hospital
- ☐ Integrated Health System / Accountable Care Organization
- ☐ Investigational Drug Service
- ☐ Long-Term Care Pharmacy
- ☐ Managed Care
- ☐ Outpatient Clinic / Ambulatory Clinic
- ☐ Regulatory or Accrediting Body (e.g., FDA, CDC)
- ☐ Pharmaceutical Industry
- ☐ Specialty Pharmacy
- ☐ Governmental Healthcare Facility / Veterans Affairs Hospital
- ☐ Other (please specify)

Where is your primary practice located?

State or Territory (if in United States)

Nation/Country

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

Direct Patient Care

Antimicrobial Stewardship

Administration / Management

Teaching / Precepting

Research / Scholarship

Other

Does your primary practice setting have any of the following programs? Select all that apply and leave blank if none or not applicable.

☐ OPAT

☐ COPAT

☐ Telehealth



BPS Infectious Diseases Pharmacy (BCIDP) 2024 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	Pathophysiology and Epidemiology of Infections	18%
1A	Causes of Infectious Diseases	9%
1A1	Bacterial Infections	
1A2	Viral Infections	
1A3	Fungal Infections	
1A4	Parasitic and Other Infections	
1B	Microbiology	9%
1B1	Microbiology Testing and Diagnostics	
1B2	Pathogen Resistance	
1B3	Virulence Factors (e.g., toxin production, biofilm)	
1B4	Immunologic Response to Infection	
2	Therapeutics and Patient Management	60%
2A	Patient Assessment	15%
2A1	Clinical Assessment and Screening	
2A2	Laboratory and Diagnostic Testing	
2A3	Pharmacokinetics and Pharmacodynamics	
2A4	Social Determinants of Health	
2A5	Risk Factors for Infection	
2A6	Considerations for Special Populations (e.g., age group, obesity, pregnancy, critical illness, immunocompromised)	
2B	Pharmacotherapy for Infection	27%
2B1	Pharmacotherapy related to Respiratory Infections	
2B2	Pharmacotherapy related to Skin and Skin-Structure Infections	
2B3	Pharmacotherapy related to Cardiovascular Infections	
2B4	Pharmacotherapy related to Bone and Joint Infections	
2B5	Pharmacotherapy related to Central Nervous System Infections	
2B6	Pharmacotherapy related to Gastrointestinal, Intra-abdominal, and Hepatic Infections	
2B7	Pharmacotherapy related to Urologic and Gynecologic Infections	
2B8	Pharmacotherapy related to Sexually Transmitted Infections	
2B9	Pharmacotherapy related to HIV and associated Opportunistic Infections	
2B10	Pharmacotherapy related to Infections in Immunocompromised Patients	
2B11	Pharmacotherapy related to Other Infections and Complications	
2C	Therapeutic Implementation, Outcomes, and Monitoring	18%
2C1	Medication Administration	
2C2	Adjunctive Therapies and Interventions for Infection (e.g., biologic response modifiers, corticosteroids, anticoagulation, smoking cessation)	
2C3	Therapeutic Outcomes (e.g., resolution of signs and symptoms, laboratory data, readmission, development of drug resistance)	

2C4	Therapeutic and Pharmacokinetic Monitoring (e.g., dose optimization, penetration of antimicrobials, source control, immune status, organ dysfunction)	
2C5	Adverse Drug Events and Drug Interactions	
2C6	Antimicrobial De-escalation	
2C7	Interprofessional Care Coordination and Continuity of Care (e.g., referrals, transitions of care, case management, OPAT, COPAT)	
2C8	Patient and Caregiver Education and Counseling	
2C9	Travel Medicine (e.g., immunization, prophylactic medication regimen)	
3	Professional Practice	22%
3A	Antimicrobial Stewardship	14%
3A1	Professional Practice Standards and Regulations	
3A2	Antimicrobial Stewardship Metrics and Reporting (e.g., DDD, DOT, SAAR)	
3A3	Resistance Tracking	
3A4	Antimicrobial Formulary Management	
3A5	Antibiogram Design and Development	
3A6	Public and Population Health (e.g., epidemiology, immunization, preventative therapy)	
3A7	Infection Prevention	
3B	Practice Management	8%
3B1	Information Resources and Databases	
3B2	Literature Evaluation (e.g., research methods, statistics, applicability)	
3B3	Quality Management and Process Improvement	
3B4	Clinical Informatics (e.g., clinical decision support, alerts, workflows)	