

Job Analysis

Critical Care Pharmacy (BCCCP)

June 2022



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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 critical care pharmacy (BCCCP). 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 critical care pharmacy specialty practice area. The outcome of this study was the creation of an examination blueprint that will be used to construct the critical care 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	Critical Care	22.4%
1A	Critical Illness	12.5%
1B	Medical Therapies and Devices	9.9%
2	Patient Care and Therapeutics	57.0%
2A	Treatment Planning	14.1%
2B	Pharmacotherapy	32.4%
2C	Treatment Outcomes and Monitoring	10.5%
3	Professional Practice	20.6%
3A	Quality of Care	10.4%
3B	Practice Management	10.2%

Introduction

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

A job analysis, (often 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 attributes¹. 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. 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 critical care pharmacy
2. Development, administration, and analysis of a survey to other qualified pharmacists who are currently engaged in critical care 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., Laczko, 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 16 subject-matter experts in critical care 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. Two additional subject-matter experts in critical care pharmacy were interviewed individually on a 1-hour teleconference. See Appendix A for the qualifications and professional characteristics of the panel and interviewees.

The interviews took place on 25 February and 2 March 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 critical care pharmacy. The dates of the meetings were 14 March, 22 March, and 30 March 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 panelists.

The panel developed 17 task statements that describe the work activities performed by a critical care pharmacist.

- 1 Evaluate patient medical history, medication reconciliation, present illness, clinical status, and other pertinent patient characteristics
- 2 Prioritize patient care based on integration of clinical status, clinical assessment findings, advanced critical care monitoring, medication regimen complexity, and other pertinent information
- 3 Develop individualized therapeutic plans in alignment with evidence-based medicine, practice guidelines, and goals of treatment
- 4 Collaborate with the interprofessional healthcare team, the patient, and caregivers in the development of the goals of care
- 5 Facilitate the administration of medications to patients by assessing availability, route, compatibility, stability, and medication-delivery technology
- 6 Monitor and evaluate individual patient progress toward goals of care
- 7 Modify therapeutic plans in response to changes in patient clinical status
- 8 Develop and provide healthcare education to patients and caregivers
- 9 Participate in quality improvement and safety initiatives within critical care and pharmacy operations
- 10 Evaluate organizational policies and practices to ensure alignment with accreditation standards, regulatory requirements, and evidence-based medicine
- 11 Engage in professional critical care pharmacy advocacy by serving on interprofessional healthcare committees and contributing to healthcare initiatives
- 12 Develop formulary management strategies to improve cost effectiveness, resource utilization, and risk mitigation

13	Utilize health information technology and clinical informatics to optimize pharmacotherapeutic decision support
14	Engage in personal professional development, continuing education, and scholarly activities in the critical care pharmacy specialty area
15	Provide healthcare education, mentorship, and/or support to pharmacy learners and members of the inter-professional healthcare team
16	Establish and align operational and clinical pharmacy services
17	Promote the role and optimal use of critical care pharmacists to key stakeholders

The panel identified three content domains that describe the key high-level components of critical care pharmacy. Across the three content domains, the panel identified seven content sub-domains and developed 54 knowledge areas that describe specific job knowledge associated with the practice of critical care 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	Critical Care
1A	Critical Illness
1A1	Pathophysiology
1A2	Critical Care Disease States
1A3	Chronic Disease States
1A4	Risk Factors for Critical Illness
1A5	Post-ICU Syndrome (PICS)
1A6	Medical Emergencies
1B	Medical Therapies and Devices
1B1	Mechanical Circulatory Support
1B2	Mechanical/Assisted Ventilation
1B3	Extracorporeal Membrane Oxygenation (ECMO)
1B4	Renal Replacement Therapies
1B5	Lines, Tubes, and Drains
2	Therapeutics and Patient Management
2A	Treatment Planning
2A1	Diagnosis and Diagnostic Testing
2A2	Pharmacodynamics and Pharmacokinetics
2A3	Goals of Care
2A4	Perioperative Care
2A5	Transitions of Care (e.g., medication reconciliation, disposition, stepdown)
2A6	Medication Delivery (e.g., routes of administration, delivery devices, anatomic alterations)
2A7	Pharmacoeconomics
2A8	Social Determinants of Health
2B	Pharmacotherapy
2B1	Pulmonology
2B2	Cardiology
2B3	Nephrology
2B4	Neurology
2B5	Gastroenterology
2B6	Hepatology

2B7	Dermatology
2B8	Immunology
2B9	Endocrinology
2B10	Hematology
2B11	Toxicology
2B12	Infectious Diseases
2B13	Supportive Care
2B14	End-of-Life Care
2B15	Fluids, Electrolytes, and Nutrition
2B16	Trauma and Burns
2C	Treatment Outcomes and Monitoring
2C1	Therapeutic Targets and Endpoints
2C2	Therapeutic Drug Monitoring
2C3	Physiologic Response Monitoring
2C4	Drug Interactions and Adverse Reactions
2C5	Patient and Caregiver Education and Counseling
3	Professional Practice
3A	Quality of Care
3A1	Medication Safety (e.g., REMS, VAERS, barcodes)
3A2	Risk Mitigation (e.g., failure mode effects analysis, root cause analysis)
3A3	Healthcare Regulations and Standards (e.g., FDA, TJC, CMS, NIOSH, USP<800>)
3A4	Quality Management/Improvement
3A5	Formulary Management
3A6	Clinical Decision Support Systems
3A7	Development and Justification of Pharmacy Services
3B	Practice Management
3B1	Practice Standards and Guidelines
3B2	Scholarship (e.g., statistics, research methods, literature evaluation, publications)
3B3	Human Subjects Research (e.g., IRB/IEC, compassionate use, right-to-try)
3B4	Interprofessional Healthcare Collaboration
3B5	Pharmacist Preceptorship and Mentorship
3B6	Alternative Healthcare Delivery Modalities (e.g., telehealth, post-ICU clinic)
3B7	Disaster Healthcare Management

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

The BPS Board Certified Critical Care Pharmacist (BCCCP) program is a credential for pharmacists who have met the eligibility criteria and who design, implement, monitor, and modify pharmacotherapeutic treatments for critically ill patients across the continuum of care.

The purpose of the BCCCP program is to validate that the critical care pharmacist has the advanced knowledge, skills, and experience necessary to optimize safety and outcomes for critically ill patients across the continuum of care.

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	16	17
1																	
1A																	
1A1	x	x	x					x									
1A2	x	x	x	x	x	x	x	x									
1A3	x	x	x				x	x									
1A4	x	x	x														
1A5			x	x				x									
1A6	x	x	x	x	x	x	x	x									
1B																	
1B1	x	x	x		x		x										
1B2	x	x	x		x	x	x										
1B3	x	x	x		x		x										
1B4	x	x	x	x	x	x	x	x									
1B5		x	x	x	x	x											
2																	
2A																	
2A1	x	x	x				x										
2A2	x	x	x	x	x		x										
2A3	x	x	x	x		x	x										
2A4	x	x	x	x			x										
2A5	x		x	x			x										
2A6	x		x		x		x										
2A7												x					
2A8	x		x	x				x									
2B																	
2B1	x	x	x		x	x	x	x									
2B2	x	x	x		x	x	x	x									
2B3	x	x	x		x	x	x	x									
2B4	x	x	x		x	x	x	x									
2B5	x	x	x		x	x	x	x									
2B6	x	x	x		x	x	x	x									
2B7	x	x	x		x	x	x	x									
2B8	x	x	x		x	x	x	x									
2B9	x	x	x		x	x	x	x									
2B10	x	x	x		x	x	x	x									
2B11	x	x	x		x	x	x	x									
2B12	x	x	x		x	x	x	x									

2B13	x	x	x	x		x	x	x											
2B14	x	x	x	x	x	x	x	x											
2B15	x	x	x		x	x	x	x											
2B16	x	x	x		x	x	x	x											
2C																			
2C1		x	x	x		x	x												
2C2			x		x	x	x												
2C3		x	x			x	x												
2C4	x		x		x	x	x	x											
2C5				x					x										
3																			
3A																			
3A1					x			x	x	x		x	x						
3A2									x	x		x	x						
3A3									x	x		x	x					x	
3A4									x	x		x	x					x	x
3A5									x			x						x	
3A6									x			x	x					x	
3A7																		x	x
3B																			
3B1									x	x									x
3B2									x		x			x	x				
3B3														x					
3B4				x					x	x	x				x				x
3B5														x	x				
3B6																		x	x
3B7																		x	

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 critical care pharmacy practice?
	How important is this knowledge area to critical care 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 critical care pharmacy practice?
	How frequently is this knowledge used in critical care 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 panelists, the specialty examination council, and BPS staff persons. The pilot test was conducted during the dates of 11 to 18 April 2022. Pilot testers did not identify any necessary edits. See Appendix C for a copy of the final survey text.

The survey was open and available from 22 April 2022 to 23 May 2022. All pharmacists who hold the BCCCP 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 103 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 critical care pharmacy

Responses to Demographic Questions		
Percentage of Time in Critical Care Pharmacy	Mean = 87.2 SD = 16.1	<i>n</i>
50	9	
51 – 75	16	
76 – 99	31	
100	47	
Hours Per Week in Critical Care Pharmacy	Mean = 37.7 SD = 13.9	<i>n</i>
0 – 10	3	
11 – 20	9	
21 – 30	17	
31 – 40	58	
41+	16	
Post-graduate Pharmacy Training Programs	<i>n</i>	
PGY - 1 Pharmacy (f.k.a. Pharmacy Practice)	71	
PGY - 1 Other	3	
PGY - 2 Critical Care Pharmacy	45	
PGY - 2 Other	7	
Pharmacy Fellowship - Critical Care	1	
Pharmacy Fellowship - Other	1	
Primary Source of Critical Care Pharmacy Training	<i>n</i>	%
Pharmacy School Curriculum	0	0.0%
Post-Graduate Program (e.g., residency, fellowship)	59	57.3%
Practice-Based Continuing Education (e.g., certificate program, exam preparation)	11	10.7%
Corporate-Sponsored Training (e.g., pharmaceutical industry, proprietary training)	0	0.0%
On-the-Job Training	32	31.1%
Other	1	1.0%
BPS Certifications	<i>n</i>	
BCACP - Ambulatory Care	0	
BCCCP - Critical Care	99	

BCCP - Cardiology	1	
BCEMP - Emergency Medicine	0	
BCGP - Geriatric	0	
BCIDP - Infectious Diseases	2	
BCNP - Nuclear	0	
BCNSP- Nutrition Support	1	
BCOP - Oncology	0	
BCPP - Psychiatric	0	
BCPPS - Pediatric	1	
BCPS - Pharmacotherapy	41	
BCSCP - Compounded Sterile Preparations	0	
BCTXP - Solid Organ Transplantation	0	
Years of Experience in Pharmacy Mean = 12.6 SD = 9.4	n	%
0 to 5	23	22.3%
6 to 10	35	34.0%
11 to 15	22	21.4%
16 to 20	7	6.8%
> 20	16	15.5%
Years of Experience in Critical Care Pharmacy Mean = 9.9 SD = 7.8	n	%
0 to 5	32	31.1%
6 to 10	33	32.0%
11 to 15	21	20.4%
16 to 20	9	8.7%
> 20	8	7.8%
Time Spent in Professional Role	n (>50%)	Mean %
Direct Patient Care	79	67.0%
Administration / Management	0	10.5%
Teaching / Precepting	2	15.6%
Research / Scholarship	1	7.5%
Other	1	4.9%
Primary Practice Setting	n	%
Academic Institution / Educational Institution	11	10.7%
Academic Medical Center or Hospital	42	40.8%
Children's Hospital	2	1.9%
Community Hospital	35	34.0%
Community Pharmacy	0	0.0%
Home Infusion / Ambulatory Infusion	0	0.0%

Hospice	0	0.0%
Hybrid Academic-Community Hospital	6	5.8%
Integrated Health System / Accountable Care Organization	0	0.0%
Investigational Drug Service	0	0.0%
Long-Term Care Pharmacy	0	0.0%
Managed Care	0	0.0%
Outpatient Clinic / Ambulatory Clinic	0	0.0%
Pharmaceutical Industry	0	0.0%
Specialty Pharmacy	1	1.0%
Governmental Healthcare Facility / Veterans Affairs Hospital	4	3.9%
Other	2	1.9%
Primary Critical Care Setting	<i>n</i>	%
Burn ICU	0	0.0%
Cardiac ICU	1	1.0%
Cardiothoracic ICU	3	2.9%
Medical ICU	34	33.0%
Mixed Medical/Surgical ICU	26	25.2%
Neonatal ICU	0	0.0%
Neurosciences/Stroke ICU	2	1.9%
Oncology/Immunocompromised/Transplant ICU	1	1.0%
Pediatric ICU	2	1.9%
Surgical ICU	6	5.8%
Telehealth ICU	0	0.0%
Trauma ICU	3	2.9%
Emergency Department	6	5.8%
Float / Multidisciplinary	10	9.7%
Other	9	8.7%
Location of Primary Practice	<i>n</i>	%
United States	95	91.3%
AL	1	1.0%
AR	1	1.0%
AZ	2	1.9%
CA	6	5.8%
CO	1	1.0%
DC	1	1.0%
FL	7	6.8%
GA	3	2.9%
IA	1	1.0%

IL	5	4.9%
IN	2	1.9%
KS	1	1.0%
KY	2	1.9%
MA	1	1.0%
MD	5	4.9%
MI	5	4.9%
MN	3	2.9%
MO	1	1.0%
MS	2	1.9%
NC	2	1.9%
NH	1	1.0%
NJ	1	1.0%
NV	1	1.0%
NY	8	7.8%
OH	11	10.7%
PA	5	4.9%
SC	1	1.0%
TN	1	1.0%
TX	5	4.9%
UT	1	1.0%
VA	1	1.0%
WA	2	1.9%
WI	2	1.9%
WV	2	1.9%
WY	1	1.0%
Outside of the United States	8	7.8%
Australia	2	1.9%
Canada	1	1.0%
Egypt	1	1.0%
Qatar	2	1.9%
Saudi Arabia	1	1.0%
Spain	1	1.0%

Mean Ratings for Task Statements		Importance	Frequency
1	Evaluate patient medical history, medication reconciliation, present illness, clinical status, and other pertinent patient characteristics	4.65	4.80
2	Prioritize patient care based on integration of clinical status, clinical assessment findings, advanced critical care monitoring, medication regimen complexity, and other pertinent information	4.68	4.79
3	Develop individualized therapeutic plans in alignment with evidence-based medicine, practice guidelines, and goals of treatment	4.76	4.80
4	Collaborate with the interprofessional healthcare team, the patient, and caregivers in the development of the goals of care	4.61	4.76
5	Facilitate the administration of medications to patients by assessing availability, route, compatibility, stability, and medication-delivery technology	4.30	4.50
6	Monitor and evaluate individual patient progress toward goals of care	4.28	4.45
7	Modify therapeutic plans in response to changes in patient clinical status	4.66	4.71
8	Develop and provide healthcare education to patients and caregivers	3.26	3.09
9	Participate in quality improvement and safety initiatives within critical care and pharmacy operations	3.75	3.49
10	Evaluate organizational policies and practices to ensure alignment with accreditation standards, regulatory requirements, and evidence-based medicine	3.58	3.19
11	Engage in professional critical care pharmacy advocacy by serving on interprofessional healthcare committees and contributing to healthcare initiatives	3.31	3.21
12	Develop formulary management strategies to improve cost effectiveness, resource utilization, and risk mitigation	3.29	3.15
13	Utilize health information technology and clinical informatics to optimize pharmacotherapeutic decision support	3.41	3.20
14	Engage in personal professional development, continuing education, and scholarly activities in the critical care pharmacy specialty area	3.92	3.73
15	Provide healthcare education, mentorship, and/or support to pharmacy learners and members of the inter-professional healthcare team	3.83	4.03
16	Establish and align operational and clinical pharmacy services	3.56	3.37
17	Promote the role and optimal use of critical care pharmacists to key stakeholders	3.95	3.01

Mean Ratings for Knowledge Areas		Importance	Frequency
1	Critical Care		
1A	Critical Illness		
1A1	Pathophysiology	4.17	4.36
1A2	Critical Care Disease States	4.83	4.85
1A3	Chronic Disease States	3.63	3.96
1A4	Risk Factors for Critical Illness	3.63	3.76
1A5	Post-ICU Syndrome (PICS)	3.37	2.78
1A6	Medical Emergencies	4.77	4.41
1B	Medical Therapies and Devices		
1B1	Mechanical Circulatory Support	3.82	3.36

1B2	Mechanical/Assisted Ventilation	4.18	4.43
1B3	Extracorporeal Membrane Oxygenation (ECMO)	3.49	2.79
1B4	Renal Replacement Therapies	4.46	4.37
1B5	Lines, Tubes, and Drains	4.09	4.42
2	Therapeutics and Patient Management		
2A	Treatment Planning		
2A1	Diagnosis and Diagnostic Testing	3.56	4.05
2A2	Pharmacodynamics and Pharmacokinetics	4.74	4.77
2A3	Goals of Care	3.68	3.89
2A4	Perioperative Care	3.35	3.36
2A5	Transitions of Care (e.g., medication reconciliation, disposition, stepdown)	3.79	3.89
2A6	Medication Delivery (e.g., routes of admin., delivery devices, anatomic alterations)	4.38	4.52
2A7	Pharmacoeconomics	2.75	2.92
2A8	Social Determinants of Health	2.69	2.63
2B	Pharmacotherapy		
2B1	Pulmonology	4.47	4.53
2B2	Cardiology	4.56	4.58
2B3	Nephrology	4.45	4.53
2B4	Neurology	4.34	4.20
2B5	Gastroenterology	3.97	4.03
2B6	Hepatology	3.96	3.81
2B7	Dermatology	2.33	2.38
2B8	Immunology	3.29	3.13
2B9	Endocrinology	4.02	4.14
2B10	Hematology	3.82	3.75
2B11	Toxicology	4.11	3.48
2B12	Infectious Diseases	4.81	4.91
2B13	Supportive Care	4.06	4.30
2B14	End-of-Life Care	3.63	3.70
2B15	Fluids, Electrolytes, and Nutrition	4.50	4.62
2B16	Trauma and Burns	3.77	3.07
2C	Treatment Outcomes and Monitoring		
2C1	Therapeutic Targets and Endpoints	4.25	4.32
2C2	Therapeutic Drug Monitoring	4.57	4.64
2C3	Physiologic Response Monitoring	3.89	4.01
2C4	Drug Interactions and Adverse Reactions	4.54	4.49
2C5	Patient and Caregiver Education and Counseling	2.95	2.74
3	Professional Practice		
3A	Quality of Care		
3A1	Medication Safety (e.g., REMS, VAERS, barcodes)	3.96	3.66
3A2	Risk Mitigation (e.g., failure mode effects analysis, root cause analysis)	3.60	2.99
3A3	Healthcare Regulations and Standards (e.g., FDA, TJC, CMS, NIOSH, USP<800>)	3.24	3.13
3A4	Quality Management/Improvement	3.83	3.50
3A5	Formulary Management	3.45	3.35
3A6	Clinical Decision Support Systems	3.50	3.28
3A7	Development and Justification of Pharmacy Services	3.82	2.94
3B	Practice Management		
3B1	Practice Standards and Guidelines	4.02	4.00
3B2	Scholarship (e.g., statistics, research methods, literature evaluation, publications)	3.29	3.18
3B3	Human Subjects Research (e.g., IRB/IEC, compassionate use, right-to-try)	2.88	2.43
3B4	Interprofessional Healthcare Collaboration	4.36	4.48
3B5	Pharmacist Preceptorship and Mentorship	4.14	4.10

3B6	Alternative Healthcare Delivery Modalities (e.g., telehealth, post-ICU clinic)	2.55	1.98
3B7	Disaster Healthcare Management	3.03	1.94

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 as the primary factor explaining 27.6% of the variability in importance ratings. The eigenvalue for the first factor was 14.91 and all subsequent factors had eigenvalues of 3.44 or less, and each explained less than 6.4% 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 panel reconvened on 9 June 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 critical care pharmacy.

The panelists agreed to retain all the task statements. No task statement achieved a rating less than 3.0.

The panelists agreed to retain all the knowledge statements developed. In 3B6 (Alternative Healthcare Delivery Modalities), the example of “telehealth” in the parenthesis was changed to “tele-ICU.” Eleven knowledge areas achieved a rating lower than 3.0 in either Importance or Frequency. The panel reviewed each of these knowledge areas and agreed that lower ratings were expected and their inclusion was still needed for a comprehensive description of the knowledge areas within the scope of a critical care pharmacist.

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. The panel agreed to apply the survey-derived weights as is, citing an appropriate emphasis on the therapeutics and patient management process and in turn the wide diversity of pharmacotherapies associated with treatment of critically ill patients.

Content Domains and Subdomains of ECO		Criticality	Final Weight
1	Critical Care	178.64	22.41%
1A	Critical Illness	100.06	12.55%
1B	Medical Therapies and Devices	78.58	9.86%
2	Therapeutics and Patient Management	454.45	57.01%
2A	Treatment Planning	112.24	14.08%
2B	Pharmacotherapy	258.54	32.43%
2C	Treatment Outcomes and Monitoring	83.67	10.50%
3	Professional Practice	164.04	20.58%
3A	Quality of Care	83.09	10.42%
3B	Practice Management	80.95	10.16%

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
Ohoud Aljuhani	BCCCP, PharmD	8 Years	Assistant Professor and Critical Care Pharmacist	King Abdulaziz University	KSA
Jennifer Cole	BCCCP, BCPS, PharmD, FCCP, FCCM	19 Years	Clinical Pharmacist Provider	Veterans Healthcare System of the Ozarks	AR
Cain Doucet	BCCCP, BCPS, PharmD	13 Years	ICU Clinical Pharmacist	Steward Health	LA
Roxana Dumitru	BCCCP, BCPS, PharmD	12 Years	Clinical Pharmacist - Trauma/Surgery Intensive Care Unit	Harborview Medical Center	NY
Christy Forehand	BCCCP, PharmD, FCCM	12 Years	Critical Care Clinical Pharmacist / PGY2 Critical Care Program Director	Augusta University Medical Center	SC
Rebecca Hilton	BCCCP, PharmD	4 Years	Critical Care Pharmacy Specialist	Southeast Hospital	MO
Gavin Howington	BCCCP, BCPS, PharmD,	8 Years	Assistant Clinic Professor and Emergency Medicine Clinical Pharmacy Specialist	University of Kentucky HealthCare	KY
Miranda Howland	BCCCP, PharmD	13 Years	Pharmacy Manager	Habersham Medical Center	GA
Heather Johnson	BCCCP, BCCP, PharmD, ABLS, ASHP-ASPEN Nutrition	8 Years	Clinical Pharmacy Manager	Methodist Hospital	TX
Michael Kenes	BCCCP, BCPS, PharmD	9 Years	Clinical Assistant Professor and Clinical Pharmacy Specialist	University of Michigan College of Pharmacy and Michigan Medicine	MI

Tyree Kiser	BCCCP, BCPS, PharmD	20 Years	Professor	University of Colorado	CO
Kirstin Kooda	BCCCP, BCCP, PharmD	10 Years	Medical and Surgical/Trauma ICU Clinical Pharmacist; ICU/ED Antimicrobial Stewardship Pharmacist	Mayo Clinic	MN
Russel Roberts	BCCCP, PharmD	20 Years	Clinical Pharmacy Manager - Cardiology, Critical Care, Neurosciences and Transplant Services	Massachusetts General Hospital	MA
Ahmed Shible	BCCCP, BCPS, PharmD, ENLS, ACLS, FCCS	13 Years	Critical Care Clinical Pharmacist Team Lead	Cape Fear Valley Health System	NC
Stephanie Tchen	BCCCP, PharmD	4 Years	Clinical Transplant ICU Pharmacist	Froedtert Hospital	WI
Antonia Vilella	BCCCP, BCPS, PharmD, ACLS, PALS	10 Years	ICU Clinical Pharmacy Specialist	Sarasota Memorial Hospital	FL

Interviewees

Name	Credentials	Post- Licensure Experience	Job Title	Employer/ Affiliation	Location
Carrie Griffiths	BCCCP, PharmD, FCCM	12 Years	Associate Professor and Clinical Pharmacist	Wingate University Atrium Health Virtual Critical Care	NC
Ashley Selby	BCCCP, BCPS, PharmD	9 Years	Assistant Professor of Pharmacy Practice	Texas Tech University Health Sciences Center Jerry H. Hodge School of Pharmacy	TX

Role Delineation Study

CREDENTIAL NAME



Role Delineation Study

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

The key points of inquiry in a JA (or RDS) 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



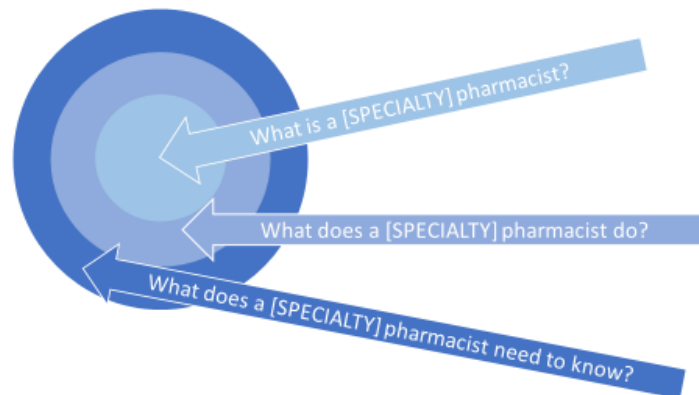
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Multiple Levels of Analysis

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	Domains
1	Content Domain	Chocolate	The Major Aspects of Practice Area
1A	Content Subdomain	History	
1A1	Knowledge Area	Mesoamerican Usage	Subdomains Meaningful Divisions within the Domain
1A2	Knowledge Area	European Adaptation	
1A3	Knowledge Area	Modern Production	
1B	Content Subdomain	Types	Knowledge Areas 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.

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

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 Critical Care Pharmacy (BCCCP) 2022 Role Delineation Study Survey Survey Introduction

The Board of Pharmacy Specialties (BPS) is conducting a Role Delineation Study for the Board-Certified Critical Care Pharmacist (BCCCP) 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 Role Delineation Study, 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 critical care pharmacy.

Survey respondents will be prompted to rate each task and knowledge area on its importance to critical care 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 Role Delineation Study.

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

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

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

☐ Yes

☐ No

BPS Critical Care Pharmacy (BCCCP) 2022 Role Delineation Study Survey

Task Statements

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

	Importance	Frequency
Evaluate patient medical history, medication reconciliation, present illness, clinical status, and other pertinent patient characteristics		
Prioritize patient care based on integration of clinical status, clinical assessment findings, advanced critical care monitoring, medication regimen complexity, and other pertinent information		
Develop individualized therapeutic plans in alignment with evidence-based medicine, practice guidelines, and goals of treatment		
Collaborate with the interprofessional healthcare team, the patient, and caregivers in the development of the goals of care		

Facilitate the administration of medications to patients by assessing availability, route, compatibility, stability, and medication-delivery technology		
Monitor and evaluate individual patient progress toward goals of care		
Modify therapeutic plans in response to changes in patient clinical status		
Develop and provide healthcare education to patients and caregivers		
Participate in quality improvement and safety initiatives within critical care and pharmacy operations		
Evaluate organizational policies and practices to ensure alignment with accreditation standards, regulatory requirements, and evidence-based medicine		
Engage in professional critical care pharmacy advocacy by serving on interprofessional healthcare committees and contributing to healthcare initiatives		
Develop formulary management strategies to improve cost effectiveness, resource utilization, and risk mitigation		
Utilize health information technology and clinical informatics to optimize		

pharmacotherapeutic decision support		
Engage in personal professional development, continuing education, and scholarly activities in the critical care pharmacy specialty area		
Provide healthcare education, mentorship, and/or support to pharmacy learners and members of the inter-professional healthcare team		
Establish and align operational and clinical pharmacy services		
Promote the role and optimal use of critical care pharmacists to key stakeholders		

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

BPS Critical Care Pharmacy (BCCCP) 2022 Role Delineation Study Survey

Knowledge Areas

Please rate each knowledge area in the Critical Care content domain according to its importance to critical care pharmacy practice and the frequency of its use in critical care pharmacy practice.

	Importance	Frequency
Pathophysiology		
Critical Care Disease States		
Chronic Disease States		
Risk Factors for Critical Illness		
Post-ICU Syndrome (PICS)		
Medical Emergencies		
Mechanical Circulatory Support		
Mechanical/Assisted Ventilation		
Extracorporeal Membrane Oxygenation (ECMO)		
Renal Replacement Therapies		
Lines, Tubes, and Drains		

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

	Importance	Frequency
Diagnosis and Diagnostic Testing		
Pharmacodynamics and Pharmacokinetics		
Goals of Care		
Perioperative Care		
Transitions of Care (e.g., medication reconciliation, disposition, stepdown)		
Medication Delivery (e.g., routes of administration, delivery devices, anatomic alterations)		
Pharmacoeconomics		
Social Determinants of Health		
Pulmonology Pharmacotherapy		
Cardiology Pharmacotherapy		
Nephrology Pharmacotherapy		
Neurology Pharmacotherapy		
Gastroenterology Pharmacotherapy		
Hepatology Pharmacotherapy		
Dermatology Pharmacotherapy		
Immunology Pharmacotherapy		
Endocrinology Pharmacotherapy		
Hematology Pharmacotherapy		
Toxicology Pharmacotherapy		
Infectious Diseases Pharmacotherapy		
Supportive Care Pharmacotherapy		
End-of-Life Care		

Pharmacotherapy		
Fluids, Electrolytes, and Nutrition Pharmacotherapy		
Trauma and Burns Pharmacotherapy		
Therapeutic Targets and Endpoints		
Therapeutic Drug Monitoring		
Physiologic Response Monitoring		
Drug Interactions and Adverse Reactions		
Patient and Caregiver Education and Counseling		

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

	Importance	Frequency
Medication Safety (e.g., REMS, VAERS, barcodes)		
Risk Mitigation (e.g., failure mode effects analysis, root cause analysis)		
Healthcare Regulations and Standards (e.g., FDA, TJC, CMS, NIOSH, USP<800>)		
Quality Management/Improvement		
Formulary Management		
Clinical Decision Support Systems		
Development and Justification of Pharmacy Services		
Practice Standards and Guidelines		
Scholarship (e.g., statistics, research methods, literature evaluation, publications)		
Human Subjects Research (e.g., IRB/IEC, compassionate use, right-to-try)		
Interprofessional Healthcare Collaboration		
Pharmacist Preceptorship and Mentorship		
Alternative Healthcare Delivery Modalities (e.g., telehealth, post-ICU clinic)		
Disaster Healthcare Management		

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

**BPS Critical Care Pharmacy (BCCCP) 2022 Role Delineation
Study Survey**
Survey Respondent Demographics

What percentage of your professional practice is spent in critical care pharmacy?

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

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

- ☐ PGY-1 Pharmacy (fka Pharmacy Practice)
- ☐ PGY-1 Other (please specify below)
- ☐ PGY-2 Critical Care Pharmacy
- ☐ PGY-2 Other (please specify below)
- ☐ Pharmacy Fellowship - Critical Care
- ☐ Pharmacy Fellowship - Other (please specify below)

If you selected an "Other" please specify here

What was the primary source of your critical care pharmacy training?

- ☐ Pharmacy School Curriculum
- ☐ Post-Graduate Program (e.g., residency, fellowship)
- ☐ Practice-Based Continuing Education (e.g., certificate program, exam preparation)
- ☐ Corporate-Sponsored Training (e.g., pharmaceutical industry, proprietary training)
- ☐ On-the-Job Training
- ☐ 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 pharmacist?

How many years of experience do you have in critical care pharmacy?

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

Direct Patient Care	
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)

What is the primary critical care setting in which you provide clinical services?

- ☐ Burn ICU
- ☐ Cardiac ICU
- ☐ Cardiothoracic ICU
- ☐ Medical ICU
- ☐ Mixed Medical/Surgical ICU
- ☐ Neonatal ICU
- ☐ Neurosciences/Stroke ICU
- ☐ Oncology/Immunocompromised/Transplant ICU
- ☐ Pediatric ICU
- ☐ Surgical ICU
- ☐ Telehealth ICU
- ☐ Trauma ICU
- ☐ Emergency Department
- ☐ Float / Multidisciplinary
- ☐ Other (please specify)



BPS Critical Care Pharmacy (BCCCP) 2022 Role Delineation Study 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	Critical Care
1A	Critical Illness
1A1	Pathophysiology
1A2	Critical Care Disease States
1A3	Chronic Disease States
1A4	Risk Factors for Critical Illness
1A5	Post-ICU Syndrome (PICS)
1A6	Medical Emergencies
1B	Medical Therapies and Devices
1B1	Mechanical Circulatory Support
1B2	Mechanical/Assisted Ventilation
1B3	Extracorporeal Membrane Oxygenation (ECMO)
1B4	Renal Replacement Therapies
1B5	Lines, Tubes, and Drains
2	Therapeutics and Patient Management
2A	Treatment Planning
2A1	Diagnosis and Diagnostic Testing
2A2	Pharmacodynamics and Pharmacokinetics
2A3	Goals of Care
2A4	Perioperative Care
2A5	Transitions of Care (e.g., medication reconciliation, disposition, stepdown)
2A6	Medication Delivery (e.g., routes of administration, delivery devices, anatomic alterations)
2A7	Pharmacoeconomics
2A8	Social Determinants of Health
2B	Pharmacotherapy
2B1	Pulmonology
2B2	Cardiology
2B3	Nephrology
2B4	Neurology
2B5	Gastroenterology
2B6	Hepatology
2B7	Dermatology
2B8	Immunology
2B9	Endocrinology
2B10	Hematology
2B11	Toxicology

2B12	Infectious Diseases
2B13	Supportive Care
2B14	End-of-Life Care
2B15	Fluids, Electrolytes, and Nutrition
2B16	Trauma and Burns
2C	Treatment Outcomes and Monitoring
2C1	Therapeutic Targets and Endpoints
2C2	Therapeutic Drug Monitoring
2C3	Physiologic Response Monitoring
2C4	Drug Interactions and Adverse Reactions
2C5	Patient and Caregiver Education and Counseling
3	Professional Practice
3A	Quality of Care
3A1	Medication Safety (e.g., REMS, VAERS, barcodes)
3A2	Risk Mitigation (e.g., failure mode effects analysis, root cause analysis)
3A3	Healthcare Regulations and Standards (e.g., FDA, TJC, CMS, NIOSH, USP<800>)
3A4	Quality Management/Improvement
3A5	Formulary Management
3A6	Clinical Decision Support Systems
3A7	Development and Justification of Pharmacy Services
3B	Practice Management
3B1	Practice Standards and Guidelines
3B2	Scholarship (e.g., statistics, research methods, literature evaluation, publications)
3B3	Human Subjects Research (e.g., IRB/IEC, compassionate use, right-to-try)
3B4	Interprofessional Healthcare Collaboration
3B5	Pharmacist Preceptorship and Mentorship
3B6	Alternative Healthcare Delivery Modalities (e.g., tele-ICU, post-ICU clinic)
3B7	Disaster Healthcare Management