

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

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Definition of Critical Care Pharmacy Practice

Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

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Executive Summary

Definition of Critical Care Pharmacy Practice

Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

—ACCP/APhA/ASHP Critical Care Task Group

Background

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

Petition Overview

Each year in the United States, five million people of all ages become critically ill or are critically injured and require intensive care through medical, surgical, or specialty intensive care units (ICUs) in hospitals, trauma centers, and health systems. The care provided has life-and-death consequences. To accurately, safely, and skillfully manage and deliver care to these patients, pharmacists, physicians, nurses, and others with specialized knowledge and experience work in

interprofessional teams to assimilate clinical and technological information and develop and refine treatment plans. Medication therapy is a central component to the care of critically ill and injured patients who sometimes require specialized pharmacologic or technological interventions to maintain blood pressure, respiration, nutrition, and other homeostatic functions, in addition to the patient's primary condition. Critical care clinical pharmacists bring a deep understanding of how drugs function and interact in critically ill patients and can adeptly interpret and apply clinical and technological data. Their specialized skills and expertise are central to interprofessional critical care teams.

Within the current health care system, there are substantial shortcomings in the safe and effective management of critically ill patients. Adverse drug events (ADEs) have been found to occur at a rate of 81 per 1,000 patient days in the ICU, and serious medical errors occur at a rate of 150 per 1,000 patient days. The complexity of critical illnesses and required treatment regimens also requires that patients have access to knowledgeable health professionals who can help manage medication therapy and prevent, identify, and solve medication-related problems.

Health care employers, health professionals, and society need a mechanism for identifying, recognizing, and providing access to pharmacists with the expertise to provide the specialized care required by those who are critically ill or injured. Specialty recognition of critical care pharmacy by BPS would meet this need and provide a mechanism through which pharmacists could attain voluntary certification that measures and recognizes achievement of distinct knowledge, experience, and skill in meeting the unique needs of critically ill and injured patients.

BPS Petition Process

The *BPS Petitioner's Guide for Recognition of a Pharmacy Practice Specialty* outlines seven criteria, each with a list of supporting guidelines, to be addressed in a petition for specialty recognition. The petitioning organizations conducted a comprehensive literature review, examined in detail the 2012 *BPS Report of the Role Delineation Study of Critical Care Pharmacy*, and conducted web-based surveys of critical care pharmacists and their employers to amass evidence to support the development of this petition. The evidence presented in the petition for each of the BPS criteria is summarized below.

Criterion A: Need

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

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

More than five million Americans become critically ill or injured each year. The pharmacological management of the critically ill patient requires the application of specialized knowledge and skills across a wide range of disease states, which often present at the most extreme end of the spectrum. Critical care pharmacy specialists must couple these skills with an in-depth understanding of the differences between critically and non-critically ill patients, as well as the management of common disease states under uncommon circumstances. The most notable differences influencing pharmacotherapy and predicted responses in critically ill and injured patients include temporary alterations in pharmacodynamics and pharmacokinetics secondary to organ system dysfunction (e.g., fluid retention/loss, decreased perfusion to liver and kidneys, decreased albumin, malnutrition). These issues are compounded by the complex medication regimens often required for their care, which can lead to medication errors, drug-drug interactions, drug-disease interactions, and other critical challenges.

As the potential for negative outcomes increases in the fast-paced critical care environment, preventable errors secondary to medication use and misuse continue to occur. Despite the growing body of knowledge related to the prevention and detection of such errors, there is still a tremendous need to improve patient care by addressing the preventable causes of negative outcomes in critically ill patients. In specialized practice, critical care pharmacists meet these needs by contributing to the appropriate team-based management of critically ill patients; preventing and detecting medication errors and ADEs; ensuring appropriate and thorough medication reconciliation; preventing antimicrobial resistance by optimizing antimicrobial selection; serving as the primary source of complex drug information, knowledge, and current research on the multidisciplinary care team; and conducting clinical research.

Critical care clinical pharmacists serve as vital members of the multidisciplinary critical care team. They have in-depth knowledge about managing medication therapy in critically ill patients and contribute to the care and monitoring of these patients as well as perform functions that cannot be adequately performed by pharmacists in general practice, other health professionals, or by pharmacists in other BPS-recognized specialties. Similar to the overlap seen among medical specialties, some overlap in domains exist between the proposed critical care specialty and other BPS-recognized specialties, particularly pharmacotherapy. The differences, however, are significant in the specificity for critical illness and the effects on drug distribution and actions; the breadth of disease states, ages, and the extremes of conditions that present in critical care pharmacy; the depth of knowledge and skills in assessing and monitoring critically

ill patients; and the techniques, devices, and specialized technology and medications utilized in the care and management of critically ill and injured patients.

Criterion B: Demand

The criterion establishes that there exists a significant and clear health demand to provide the necessary public reason for certification. This is demonstrated through employer survey data, assessment of employment opportunities for critical care pharmacy specialists, and letters and statements by individuals in specific areas within the health care system. Demand is viewed as a willingness and ability to purchase the services of a Board Certified Pharmacist

The demand for critical care pharmacy specialists has been increasing consistently for many years. Society's shift to improve health care quality, reduce preventable medication-related problems, and reduce health care costs has driven this increase.

The demand for critical care pharmacy specialists is demonstrated through sustained growth in employer demand and the increase in specialty training programs for critical care pharmacists. The Critical Care Pharmacist Employer Survey fielded by the petitioning organizations to directors of pharmacy in hospitals and health systems and critical care pharmacists with direct responsibility for hiring pharmacists for critical care practice yielded 204 responses.

Responding critical care pharmacist employers indicated that they collectively employ 1,034 full-time equivalent (FTE) pharmacists to care for critically ill patients in their institutions. This sample of employers has collectively recruited for 256 critical care pharmacists over the past 3 years and filled 95.8 percent of these positions. In making hiring decisions, 86.7 percent of responding employers desire specialty experience through completion of a postgraduate year two (PGY2) critical care residency training in critical care. Twenty-nine percent require BPS or other certification.

Responding employers report 39 currently vacant positions for critical care pharmacists and estimate hiring an additional 234 to 243 critical care pharmacists over the next 3 years. Looking ahead, 99.5 percent of employers who responded estimate their demand for critical care pharmacists will remain stable or grow over the next 5 years.

Of 204 employers who responded to the Critical Care Pharmacist Employer Survey, 66 percent indicated that if BPS approves the proposed specialty in critical care pharmacy practice, they would be "highly likely," "likely," or "somewhat likely" to require the specialty credential for the critical care clinical pharmacists who work in their institutions. In addition, 113 employers of critical care pharmacists voluntarily signed in support of the petition to recognize critical care pharmacy practice as a specialty.

Criterion C: Number and Time

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

To accurately estimate the number of practitioners and the time spent in critical care pharmacy practice, the petitioning organizations developed a web-based survey and fielded it to 2,928 pharmacists in critical care practice. Names were identified through membership records within ACCP and ASHP, and the lists were deduplicated. Of 504 respondents, 476 were practicing critical care pharmacists. More than 91 percent of practicing critical care pharmacist respondents indicated they are practicing at a specialty level as defined in this petition.

Based on the membership statistics of the petitioning organizations, with 2,928 unique critical care pharmacist member records, the 1,500 pharmacist members of the Society of Critical Care Medicine (SCCM), and results of the surveys conducted by the petitioning organizations, we estimate that 6,000 to 7,000 pharmacists are currently engaged in specialized critical care pharmacy practice. This number is reasonably underestimated because not all pharmacists practicing in critical care pharmacy are members of professional organizations; however, we believe that pharmacists who are professionally engaged as members of associations are more likely than others to pursue specialty recognition.

The *Report of the Role Delineation Study of Critical Care Pharmacy* and the Critical Care Pharmacists Survey quantified the percentage of time in an average week that responding critical care pharmacists spent engaged in direct patient care activities. Through the role delineation study, pharmacists reported spending an average of 72 percent of their work time providing pharmacy services to critically ill patients. The Critical Care Pharmacists Survey results showed that more than 74 percent of critical care pharmacists who responded to the survey spend at least 50 percent of their time engaged in direct patient care.

The growth in residency training programs further demonstrates increasing demand for and numbers of pharmacists with specialty training in critical care pharmacy. In only 4 years, the number of PGY2 critical care residency graduates has increased more than 50 percent from 58 PGY2 critical care residency programs and 79 positions in 2008, to 99 programs with 122 available positions in 2012.

More than 80 percent of critical care pharmacists who responded to the Critical Care Pharmacists Survey have completed advanced clinical training through residencies and fellowships. Nearly 28 percent have more than 10 years of experience practicing in critical care

pharmacy. Through this *survey*, 87.1 percent of responding pharmacists reported they would be “likely,” “highly likely,” or “somewhat likely” to pursue specialty certification if the petition to recognize critical care pharmacy as a specialty is approved.

Criterion D: Specialized Knowledge

Criterion E: Specialized Functions

These criteria outline the specialized knowledge of one or more of the pharmaceutical sciences and the biological, physical, behavioral, and administrative sciences that underlie them required by critical care pharmacy specialists and define the specialized functions of critical care pharmacy, which are distinct from other BPS-recognized pharmacy specialties.

Critical care pharmacists in specialized practice possess a unique body of knowledge and skills that enable them to perform specialized functions that fulfill unmet patient care needs. Functions performed by critical care clinical pharmacists, and the specialized knowledge that support these functions, are qualitatively different from those provided by pharmacists in general practice. However, compared with generalist practice, pharmacists in critical care pharmacy routinely perform many unique functions and additional functions at greater depth or with greater emphasis.

BPS analyzed these functions early in 2012 in the role delineation study, which describes and empirically validates the domains, tasks, and knowledge that comprise critical care pharmacy practice. According to the task analysis performed for that study, the following domains of critical care pharmacy specialty practice are performed regardless of practice site:

- **Domain 1: Clinical Skills and Therapeutic Management**
Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the health care team.
- **Domain 2: Practice Administration and Development**
Tasks related to advancing critical care pharmacy practice establishing, implementing, and monitoring systems and policies to optimize the care of critically ill patients.
- **Domain 3: Information Management and Education**
Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of health care providers and trainees.

The clinical management of critically ill and injured patients requires an in-depth knowledge of the drugs used in the treatment of conditions in the following therapeutic areas: pulmonary,

cardiovascular, neurology and neurological injuries, renal, hepato-gastrointestinal, immunology, endocrine, hematology, infectious diseases, toxicology, psychiatry, trauma, and surgery. In-depth understanding of the diagnosis, monitoring, and management of conditions in these therapeutic areas, along with sedation, analgesia, neuromuscular blockade, and the management of delirium also are required.

Building on this foundation, the practice of critical care pharmacy requires a substantial depth and breadth of knowledge regarding alterations in the pharmacodynamic responses to and pharmacokinetics properties of critically ill and injured patients, coupled with understanding of the impact of alterations in anatomy and physiology from trauma, surgery, or congenital causes on medication therapy decisions. Further, this knowledge must include an in-depth understanding of disease progression, in order to be proactive and minimize the negative outcomes that may occur prior to disease resolution. Knowledge of integrated pharmacotherapeutic principles associated with medications and diseases managed in critical care—and the interplay of each with underlying conditions and dynamic clinical parameters—is required.

Medication-specific knowledge emphasized to a greater extent in critical care pharmacy, compared with generalized or other specialty practices, includes renal replacement therapy, routes of administration, and compatibility of medications and nutrition (e.g., enteral versus parenteral), and alterations in absorption and drug distribution in critically ill patients. Critical care clinical pharmacists must also stay abreast of the latest information and technology, drug interactions and ADEs common in critical care, and pharmacoeconomic data regarding alternative treatment strategies. Knowledge related to antimicrobial selection and local pathogens and resistance patterns provide an important foundation for antimicrobial stewardship functions.

Other areas of specialized knowledge required in critical care pharmacy are parenteral vasoactive and inotropic agents; fluid, electrolyte, and acid/base management; agents used for acute volume resuscitation, hemostasis, and advanced cardiac life support; and nutrition, preventive, and supportive care measures used in the care of critically ill patients. Knowledge regarding monitoring techniques to assess hemodynamic, neurologic, pulmonary, and cardiovascular parameters is important for understanding and assessing clinical response and status. Critical care clinical pharmacists must also possess specialized knowledge regarding medical devices commonly utilized in critical care, mechanical ventilation principles and monitoring, and procedures commonly performed in critically ill or injured patients (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia).

Finally, knowledge is required regarding end-of-life care, advance directives, and evidence-based critical care literature and clinical practice guidelines, and outcome indicators for pharmacotherapy of disease states common to patients cared for in the ICU. Implementation and management of critical care pharmacy services requires additional knowledge regarding the processes for developing and documenting critical care pharmacy services.

The specialized functions of critical care pharmacy include clinical skills and therapeutic management; practice administration and development; and information management and education. The specialized skills required to perform functions in these domains are as follows:

- Analyze, synthesize, evaluate, and manage complex drug regimens for critically ill patients by monitoring and assessing the clinical, laboratory, and technological data, applying evidence-based information, collaborating with other health care professionals, and developing individualized care and monitoring plans.
- Design and implement critical care pharmacy services and take responsibility for the planning, delivery, and management of those services.
- Communicate in ways that foster the development of effective, collaborative, interprofessional teams; educate health professionals about the safe and effective use of medications in critically ill and injured patients; and educate family and caregivers concerning the medication treatments administered in the critical care setting.
- Retrieve and assess relevant medical and patient information to practice evidence-based medicine, conduct clinical research, and contribute to the body of knowledge regarding pharmaceutical care in critically ill and injured patients.

The petition compares the similarities and the important differences between the recognized domains and functional areas for critical care pharmacist specialists and pharmacotherapy specialists. Commentary also is provided contrasting critical care pharmacy with nutrition support and other BPS-recognized specialties. The critical care pharmacy specialist performs a significant breadth and depth of direct patient care functions and implementation of practices and systems. These functions are centered in improving patient care and outcomes in critically ill and injured patients, preventing medication errors and predictable adverse events, and educating others on the interprofessional health care team.

Criterion F: Education and/or Training

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

According to the Accreditation Council for Pharmacy Education (ACPE) *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*, the pharmacy curriculum provides a thorough foundation in the biomedical, pharmaceutical, social/behavioral/administrative, and clinical sciences. The curriculum provides graduates with the competencies needed to enter pharmacy practice in any setting and to contribute to the profession of pharmacy throughout their careers. The Doctor of Pharmacy degree alone, however, does not provide sufficient educational depth and breadth required for critical care pharmacy practice. Additional training, clinical work experience, and study are necessary to prepare a specialist to provide pharmaceutical care to critically ill and injured patients.

The North American Pharmacist Licensure Examination (NAPLEX) and state licensure requirements set a minimum standard for practicing pharmacy. Following licensure, pharmacists have not yet acquired the differentiated knowledge and skills required for practice in critical care pharmacy. The most direct and efficient training path to obtain the required specialized knowledge and skills includes completion of a Doctor of Pharmacy degree, postgraduate year one (PGY1) residency training, followed by PGY2 critical care residency training, clinical work experience, and self-study. Other methods, depending on the years of experience in critical care pharmacy, may include either a combination of Doctor of Pharmacy degree education, clinical work experience, and self-study or a path that includes Doctor of Pharmacy degree education, PGY1 residency training, clinical work experience, and self-study.

Specialty residency training programs provide the most effective structured experiential learning opportunities in critical care pharmacy and have been increasingly utilized as more programs have become available over time. As of 2012, there are 99 PGY2 critical care residency programs that train 122 critical care pharmacists with specialized knowledge and skills each year.

BPS will make final determinations regarding the education and training requirements for specialty certification eligibility.

Criterion G: Transmission of Knowledge

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

Issues related to medication use in critical care are of interest to a multidisciplinary team including pharmacists, thus distribution of information occurs through mainstream peer-

reviewed medical and pharmacy journals, newsletters, and other publications. A bibliography of 182 articles in critical care pharmacy practice was compiled. Professional organizations and networking groups help critical care specialists to provide optimal care in critical care sites by promoting mentorship and expansion of knowledge. Pharmacy practice organizations offer hundreds of hours of live and web-based continuing education opportunities related to new developments and issues concerning critical care practice each year that result in the dissemination of knowledge and practice excellence. Enduring resources are also available through various methods. Articles relating to critical care pharmacy are published in many peer-reviewed journals, including journals that do not specialize in critical care, which demonstrates an interest in and need for information pertaining to critical care and improved outcomes to ensure the safest and most beneficial use of medications in critically ill patients.

Conclusion

More than five million people become critically ill or are critically injured in the United States each year. The life-and-death needs of critically ill and injured patients are complex. These needs are dictated by the patient's current problem and underlying conditions, which can be dynamic and strongly influence how drugs act and interact due to alterations in pharmacokinetics and pharmacodynamics. The knowledge and skills required to perform the specialized functions of critical care pharmacy practice are highly specific and specialized. While there is some overlap among BPS-recognized specialty areas, the needs of critically ill and injured patients who are at heightened risks for medication errors, adverse events, hospital-acquired infections, and other complications are significant and growing. The demand for services provided by critical care pharmacists has grown consistently over the past 20 years and at an increasing rate over the past decade, as improving health care quality and reducing medication errors have taken on greater priority within our health care system and society. According to survey and membership data, critical care pharmacists comprise the second largest specialized group of pharmacists, with the greatest number of advanced training programs in the profession of pharmacy. The specialized knowledge and functions, supported by societal needs and strong demand, are sufficiently unique to support the recognition of critical care pharmacy practice as a distinct specialty. Given the predicted increase in unmet public health needs, it is clear that high-quality care for critically ill and injured patients will require the full application of specialized knowledge and skills of critical care clinical pharmacists in specialized practices. Availability of BPS specialty certification would provide an appropriate means to recognize critical care pharmacists and their contributions to the care of patients with life-threatening conditions. In addition to supporting the pharmacist's path to advancement in contemporary medicine, BPS specialty certification provides assurance of pharmacists' specialized knowledge and skills to other health professionals, stakeholders, and society.

CRITERION A: Need

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

BPS defines **NEED** as a condition of requiring supply.

Critical care pharmacy practice provides specialized pharmacy services to critically ill patients. Pharmacists who specialize in critical care pharmacy participate as integral members of interprofessional health care teams. These teams work collaboratively to ensure the safe and effective use of medications in critically ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically ill patient. In critical care pharmacy practice, pharmacists must understand how to operate and interpret results from medical devices and technology that are not commonly employed in other areas of pharmacy practice. Critical care pharmacists review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

The pharmacotherapeutic management of critically ill patients requires the application of knowledge and skills across a wide range of disease states, including presentation at the most extreme end of the spectrum. Critical care pharmacy specialists must couple these skills with an in-depth understanding of the differences between critically and non-critically ill patients, as well as the management of common disease states under uncommon circumstances. The most notable differences influencing pharmacotherapy and predicted responses in critically ill and injured patients include temporary alterations in pharmacokinetics secondary to organ system dysfunction (e.g., fluid retention/loss, decreased perfusion to liver and kidneys, decreased albumin, malnutrition). These issues are compounded by the complex medication regimens often required for patient care, which can lead to medication errors, drug-drug interactions, drug-disease interactions, and other critical challenges.

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

As the potential for negative outcomes increases in the high-risk, fast-paced critical care environment, preventable errors secondary to medication use and misuse continue to occur.

Despite the growing body of knowledge related to the prevention and detection of such errors, there is still a tremendous need to improve patient care by addressing the preventable causes of negative outcomes in critically ill patients. In specialized practice, critical care pharmacists meet these needs by contributing to the team-based management of critically ill patients; preventing and detecting medication errors and ADEs; ensuring appropriate and thorough medication reconciliation; preventing antimicrobial resistance by optimizing antimicrobial selection; serving as the primary source of complex drug information, knowledge, and current research on the multidisciplinary care team; and conducting clinical research.

Unmet Needs in Preventing and Detecting Adverse Drug Events and Medication Errors

Critical care is challenged by an inherent dichotomy. In critical care settings, lifesaving care is provided for the sickest of patients, yet the therapy itself and the pace with which it is sometimes delivered are associated with significant risks of adverse events and serious medical and medication errors.¹ The prevalence of ADEs and medication errors is important, as the number of events or errors directly correlates with patient injury and negative outcomes. Many of the ADEs and medication errors are preventable, however many events are not recognized before patient injury has occurred.

It is widely recognized that adverse events and medication errors occur at an increased rate among critically ill patients who are receiving intensive care compared with care delivered to non-critically ill patients under more routine circumstances. The increased risk stems from numerous factors, including complexity and seriousness of disease states, complicated therapeutic regimens, use of technology, and oftentimes rapid changes in medication therapy. Adverse events have been found to occur at a rate of approximately 81 per 1,000 patient days in the ICU, and serious medical errors occur at a rate approaching 150 per 1,000 patient days.¹ A decisive need exists in critical care practice to decrease the occurrence of both ADEs and medication errors in order to improve patient outcomes and the quality of care that patients receive.² Critical care clinical pharmacists meet this need, working in collaboration with medical intensivists and other health professionals.

Preventable and Predictable Adverse Drug Events

Several studies examining the causes of adverse events and medication errors and have found that the majority of ADEs and medication errors occurring in the ICU are preventable and attributable to incorrect drug dosing secondary to limited pharmacotherapy knowledge of the prescriber.^{3,4} In 2011, a cross-sectional, retrospective analysis showed only 25 percent of ADEs that occur in critical care practice are considered to be unpredictable (e.g., unknown allergic reactions). Researchers found that more than 70 percent of ADEs are considered to be predictable, resulting from preventable causes such as incorrect drug dosing. Other common examples of predictable and preventable ADEs include hypoglycemia (in 33 percent of observed

events), hypokalemia, and prolonged activated partial thromboplastin time; the latter two combined account for 45 percent of the observed events.⁴

Nonmodifiable risk factors that increase a patient's chance of experiencing an ADE include advanced age, sex, severity of illness, organ dysfunction, and history of substance abuse; however, a majority of the risk factors for ADEs in critically ill patients have been found to be modifiable.⁵ Risk factors for ADEs are often associated with patients admitted emergently with acute kidney injury, thrombocytopenia, or a complex medication regimen. In addition, patients receiving multiple drugs metabolized by cytochrome P450 (CYP) isoenzymes are at increased risk for ADEs when drugs that affect the CYP system are added or removed.⁵ Alterations in pharmacokinetic and pharmacodynamic parameters also are common in critically ill and injured patients. An understanding of the factors that alter these parameters is necessary to adjust drug doses and monitor for therapeutic drug levels and presence of toxicity. Of note regarding modifiable ADE risk factors, the majority of adverse events occurring in critically ill patients have been found to be associated with limited knowledge among the multidisciplinary care team of how drugs interact to increase or decrease concentrations of other drugs, which can result in toxicity.⁵ As documented by Leape et al., critical care pharmacists have demonstrated specialized knowledge and skills to address these challenges and fill this important need.⁶

Unmet Needs in the Prevention of Medication Reconciliation Errors

According to the Agency for Healthcare Research and Quality, medication discrepancies occur in approximately one third of patients admitted to the hospital, in nearly one third of patients transferred between hospital units, and in 14 percent of patients at discharge. Medication reconciliation helps to decrease discrepancies by comparing a patient's hospital medication regimen at admission, unit transfer, or discharge with the patient's home medication regimen. Although medication reconciliation is well-known to decrease the occurrence of therapeutic duplication, verify drug changes, and confirm drug dosages,⁷ critically ill patients often are admitted to ICUs emergently. As a result, medication reconciliation needs may be overshadowed by the acute situation and not be addressed prior to admission without concerted efforts.^{8,9} Emergency admissions to hospitals and ICUs can lead to unintentional discontinuation of medications used to treat underlying chronic disease, with potentially serious and negative consequences.^{8,9} In an observational study, Stewart and Lynch found 74 percent of the patients had at least one medication discrepancy, concluding that pharmacists are important in finding medication discrepancies.¹⁰

Unmet Needs in the Prevention of Antimicrobial Resistance

The prevalence of antimicrobial resistance in inpatient settings continues to increase as antibiotics are overprescribed, ineffectively selected for empiric therapy, prescribed with

incorrect dosing, or prescribed for too short of a duration.¹¹ In critically ill patients, antimicrobial resistance is higher than among patients treated in any other area of care due to increased numbers of susceptible patients, invasive procedures performed, and devices used. Critically ill patients who contract an antimicrobial-resistant organism infection are at greater risk of morbidity and mortality, and their care frequently results in higher health care costs.¹²

Numerous studies have explored emerging antimicrobial resistance patterns with device- or procedure-associated infections and the economic and health impact of hospital-acquired infections.^{13,14} With multidrug-resistant pathogens accounting for increasing numbers of hospital-acquired infections, and higher costs and morbidity associated with such infections, the critical care pharmacist's role in antimicrobial stewardship becomes increasingly important. Studies have demonstrated the value of critical care pharmacists' contributions to improving antimicrobial use and reducing negative outcomes.¹⁵⁻¹⁹

Unmet Needs in Evidence-Based Practice and Research

Immediate access to evidence-based medicine, current research, and a deep understanding of their application to the care of critically ill patients are required to provide specialized critical care pharmacy services. The critical care setting can be a fast-paced environment where the seriousness of patients' conditions sometimes demands rapid assimilation of multifaceted information and clinical data to make lifesaving decisions.² Under these circumstances, time is often not readily available for health professionals to research current therapeutic advancements and research, assimilate, and apply the information needed to make reasoned patient care decisions. In many clinical situations, practice guidelines do not exist, or there may be gaps in knowledge. The critical care clinical pharmacist routinely interprets and applies medical and scientific literature to make evidence-based therapy recommendations. As established previously, most medication errors have been associated with a lack of expertise in the pharmacotherapeutic management of critically ill patients, potential alterations in pharmacokinetics and pharmacodynamics, and how drugs interact.^{3,4} Critical care clinical pharmacists possess specialized knowledge and skills that enable them to collaborate with their interdisciplinary team members and determine the best course of action for these patients. The multidisciplinary care team relies on the critical care pharmacist to rapidly assess medication regimens, patient status, and response based on clinical and technological data, and make recommendations to optimize patient outcomes. The critical care pharmacist in specialized practice is a vital member of the multidisciplinary team by providing pharmacotherapy knowledge that helps to reduce adverse events and improve patient outcomes.¹³

There is a great need for high-quality research focused on drug therapy in critically ill patients. Although the existing research literature regarding critical care medicine and critical care

pharmacy practice is relatively strong, the scientific evidence underpinning practice is continuously evolving. Critical care pharmacists play an active role in conducting and collaborating in research that affects patient outcomes. Advances in technology and medication therapy demand aggressive ongoing research to assess the use of emerging medications and devices in critically ill patients. Patient safety relies on research and dissemination of information in the management of patients who require critical, intensive care.

Unmet Needs in the Prevention and Management of Complications in Critically Ill Patients: Sedation, Ventilation, Anticoagulation, and Hospital-Acquired Infections

Patients who are admitted into the critical care unit often have complex illness and conditions such as organ failure, myocardial infarction, stroke, infection, or major trauma. Depending on patient circumstances, drugs that are commonly used in the critical care units include sedatives, antimicrobials, and anticoagulants. Patients who are receiving drugs in these classes often require specialized monitoring and assessment because these agents are associated with negative outcomes, including death if not managed correctly.²⁰

Critically ill patients who require mechanical ventilation are commonly given sedatives and analgesics. Evidence-based guidelines were developed to improve patient outcomes and reduce sedation-related adverse events. Although the sedation and analgesic guidelines have been available for several years, adherence is not consistent. Inappropriately managed sedation may result in longer lengths of stays and unnecessarily prolonged intubation and mechanical ventilation.¹⁶ Critical care pharmacists serve an integral role in ensuring patients are appropriately sedated and achieve the best possible outcomes.

Critically ill patients are at high risk for a thromboembolic event secondary to risk factors including recent surgery, sedentary lifestyle, and hemodynamic instability. Anticoagulation therapy with unfractionated heparin, low-molecular-weight heparin, or vitamin K antagonists is frequently used in the ICU to prevent or treat thromboembolic complications. With concern for patient safety and the nature of the dangers associated with anticoagulation therapy, there is a tremendous need for the multidisciplinary care teams to have a critical care pharmacist available to manage anticoagulation therapy, assess medication regimens for interactions, and educate patients upon discharge.

Nosocomial infections such as *Clostridium difficile*-associated disease (CDAD) are increasingly more common in the ICU owing to risk factors including advanced age and concurrent medical conditions. CDAD is also becoming more difficult to treat as new strains with mechanisms of resistance have been detected. Risk factors for increased CDAD mortality include advanced

aged patients with leukocytosis, hypoalbuminemia, or a nasogastric feeding tube. Early identification of CDAD is associated with better outcomes and decreased mortality. By identifying patients with CDAD risk factors and recent antimicrobial therapy with cephalosporins, clindamycin, or fluoroquinolones, additional monitoring can be used to assess patients and ensure that antimicrobial therapy is started immediately to reduce mortality and improve outcomes.²¹

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

The critical care pharmacy specialist is the primary source of complex drug information and evidence-based medicine on the multidisciplinary care team. These pharmacists serve the critically ill patient in several ways. First, critical care pharmacists offer patient-specific, evidence-based dosing, frequency, duration, and therapeutic monitoring plans. Second, they dedicate time to researching, analyzing, and learning to apply advances in critical care pharmacotherapy. Third, they educate the multidisciplinary care team about pharmacotherapy advances in critical care. By maintaining and consistently renewing knowledge, the critical care pharmacist is able to provide the most up-to-date and appropriate pharmacotherapy recommendations to the team thereby ensuring patients receive the best possible care.

As part of a multidisciplinary care team, the critical care pharmacist in specialized clinical practice provides information on appropriate doses and durations of drugs to ensure optimal benefits while minimizing potential risks. The critical care pharmacist understands that critically ill patients often have factors (e.g. decompensated organs, fluid imbalances, acute blood loss, low albumin) affecting distribution and response to medications that may require dosage adjustments in order to prevent toxicity. Further, critically ill patients are commonly on numerous medications that have the ability to interact with the addition and removal of other drugs. The critical care clinical pharmacist understands these unique pharmacokinetic and pharmacodynamic parameters, including the effects on the CYP450 system, which enables them to predict how changes to a medication regimen will affect the concentrations of other drugs in critically ill patients.

Critical care pharmacists also serve an important role in antimicrobial stewardship. There has been a growing public health problem associated with antibiotic resistance in the ICU, and critical care pharmacy specialists understand the connection between inappropriate antibiotic selection, incorrect dosage, or improper duration.¹⁹ As members of the antimicrobial stewardship team, the critical care pharmacist offers interventions to help to ensure patients

are receiving appropriate antibiotic therapy and thus minimize factors for resistance.^{13,19} Critical care pharmacists make appropriate empiric antibiotic recommendations to practitioners based on disease severity and the most likely causes of infection. They also follow up on antibiotic monitoring and ensure therapy is appropriately narrowed or de-escalated when culture results are known. Choosing an appropriate antibiotic initially has positive effects on the health care community by preventing resistance, but it also offers benefits for patients including decreased length of stay, decreased duration of mechanical ventilation, and reduced hospital mortality.^{13,22}

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

Public Health Risks of Medication-Related Problems

Patients in the critical care unit have life-threatening illnesses or injuries that may require immediate lifesaving interventions. Under these circumstances, interventions with medications or devices may be employed, out of necessity, with incomplete patient lab reports, medical histories, and diagnostic tests, therefore increasing the likelihood of adverse events and medication errors.⁵

In 2005, Rothschild et al. examined and categorized the types and frequency of ADEs and medication errors that occurred in critical care units.¹ This prospective, observational study found that adverse events occurred at a rate of 80.5 per 1,000 patient days in two critical care units within a large tertiary care teaching hospital. This frequency translated to adverse events occurring in 20.5 percent of patients. The rate of serious medical errors was reported as 149.7 per 1,000 patient days; 11percent of these medication errors were considered to be potentially life threatening. Overall, medications were responsible for 47 percent of the adverse events and 78 percent of the medical errors. Several types of errors were identified in this study, however the most common type was failure to carry out treatment plans. Based on average daily census and extrapolation of data to all teaching hospitals in the United States, researchers estimate that 148,000 life-threatening ADEs and medication errors occur annually in teaching hospitals.¹

Marshall et al. found that treatment protocols for sedation and analgesic drug therapy for critically ill, mechanically ventilated patients were not consistently followed for patients in their institution. The researchers conducted a study to demonstrate the impact of pharmacist interventions on the outcomes of ICU patients on continuous sedative therapy. The results of this before-and-after study showed the duration of ventilation was significantly decreased in the group of patients with daily pharmacist intervention to ensure sedation per protocol.²³

Critical care multidisciplinary teams, with critical care pharmacists as integral members, work collaboratively to improve outcomes, treatment, and prevent adverse events and medication errors. Critical care pharmacists are crucial members of the interprofessional team. With expertise in critical care pharmacotherapeutics, critical care pharmacists detect and prevent medication errors and preventable adverse events and collaborate to ensure that treatment plans are individualized and implemented appropriately.

Public Health Risks of Antimicrobial Resistance

The development of antimicrobial resistance is a serious threat to both domestic and global treatment of infectious pathogens.¹⁸ Antibiotic resistance increases morbidity and mortality as well as health care costs. Each year approximately two million people are diagnosed with a hospital-acquired infection. Of these, 22 percent will die of poor antimicrobial response secondary to resistance. Resistance also increases health-care costs as patients with multidrug-resistant infections typically require more expensive antibiotics and are hospitalized for a longer duration than patients with nonresistant infections.¹⁹

Antimicrobial stewardship teams serve a meaningful role in helping to reduce resistance by ensuring appropriate use of antimicrobial agents.^{19,24} Stewardship is especially important in critical care, where percentages of resistant infections and mortality are high in comparison with other hospital units.¹⁹ In 2004, MacArthur et al. found that 9 percent of patients with severe sepsis received inappropriate empiric antibiotic therapy, resulting in an a 30- to 40-percent mortality rate in affected patients.²⁵ Utilizing the advanced specialized knowledge of the critical care clinical pharmacist to optimize antimicrobial regimens can help to mitigate the risks associated with antimicrobial resistance in critical care patients.

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

The vision of pharmacy states that by 2015, pharmacists will be "valued patient care providers whom health care systems and payers recognize as having responsibility for assuring desired outcomes of medication use."

—Joint Commission of Pharmacy Practitioners (JCPP)²⁶

Pharmacists have a responsibility to the American public to ensure that medications are used appropriately and desired medication use outcomes are attained. Achieving the JCCP vision will require expansion in the number of specialized pharmacists with the knowledge, skills, and abilities to manage the complex medication needs of critically ill and injured patients.

Pharmacists specializing in critical care have unique knowledge and skill sets that enable them to assume the role of the pharmacotherapy expert for critically ill and injured patients.²³

As drug therapy experts, clinical pharmacists have a responsibility to the public to improve health by ensuring optimal medication outcomes with limited adverse events and to prevent medication errors and toxicity. In specialized critical care practice, the critical care pharmacist is the team member who collaboratively monitors, defines, and adjusts patients' pharmacotherapy; works to identify and solve therapeutic problems; participates in multidisciplinary care rounds; interprets laboratory, clinical, and technological data; and leads antibiotic stewardship efforts.

Critical care pharmacists' specialized roles, functions, and contributions to patient care are well-documented in the literature. In a landmark trial by Leape et al., pharmacist participation in multidisciplinary rounds was found to reduce preventable ADEs associated with errors in medication orders by 66 percent to 3.5 adverse events per 1,000 patient days. The results of the trial demonstrate the benefit of having critical care pharmacists engaged in multidisciplinary teams in the ICU.⁶ This trial has since helped to promote the development of new research that looks beyond the traditional dispensing roles of the pharmacist and analyzes the outcomes pharmacists can have on enhancing patient outcomes in the critical care unit by collaborating with prescribers and other care providers and being directly involved in the ongoing formulation of patient care decisions.

In Kim et al., the benefits of incorporating a critical care pharmacist on multidisciplinary rounds were examined.²⁷ This retrospective cohort study examined 112 hospitals and 107,324 patients who were admitted to Pennsylvania hospitals. Hospitals were stratified based on intensity of staffing and use of a multidisciplinary care team. The results showed that hospitals with rounds in the ICU involving a multidisciplinary care team were associated with a 16 percent reduction in mortality of critically ill patients compared with hospitals that did not use a multidisciplinary care team.

Critical care units have the highest prevalence of multidrug-resistant infections in a hospitals.¹² Critical care pharmacy specialists take an active role in the antimicrobial stewardship team by ensuring appropriate empiric antibiotic therapy is started and de-escalation occurs when culture results are known. By ensuring antibiotics are appropriately initiated, maintained, and then stopped, critical care pharmacists can prevent increasing resistance in critical care units and improve patients' likelihood of survival.

Critical care pharmacists serve as practice leaders within their institutions, organizations and within the profession. They often serve as preceptors for advanced pharmacy practice experiences (APPEs), introductory pharmacy practice experiences (IPPEs) and, PGY1 and PGY2 residency experiences. A new specialty in critical care would further the BPS mission: “to improve patient care through recognition and promotion of specialized training, knowledge, and skills in pharmacy and specialty board certification of pharmacists.”²⁸ BPS specialty certification is not only the pharmacist’s path to advancement in contemporary medicine but also a roadmap for pharmacists who desire to gain additional training and knowledge to differentiate themselves from pharmacists in general or other specialty practices. By achieving certification, pharmacists acquire a tool that provides assurance of their specialized knowledge and skills to other health professionals, stakeholders, and society.

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

To meet the pharmacotherapeutic needs of critically ill and injured patients, critical care clinical pharmacists apply specialized knowledge, skills, and training as vital members of the multidisciplinary critical care team. They have in-depth knowledge about critically ill patients and contribute to the care and monitoring of these patients. Pharmacists specializing in the care of critically ill and injured patients perform functions that cannot be adequately performed by pharmacists in general practice; such pharmacists have not acquired the specialized knowledge and skills in areas that distinguish critically ill patients from those who are not critically ill, such as predicting and managing important alterations in pharmacokinetic parameters and pharmacodynamic responses to medications. Entry-level practitioners lack training in the interpretation and use of clinical and technological data from devices used in critical care that are not utilized in other areas of practice. The fundamental knowledge and experience required to provide specialized pharmaceutical care to critically ill patients is not obtained through entry-level education or PGY1 residency training.

The 2007 ACPE standards and guidelines for Doctor of Pharmacy programs include no specific curriculum standards for incorporating critical care medicine in pharmacy programs.²⁹ As a result, many pharmacy schools do not offer or require critical care courses. An entry-level pharmacist lacks the breadth and depth of specialized knowledge and skills to adequately provide specialized pharmaceutical care to critically ill and injured patients.

PGY1 residency programs offer advanced training across many areas of pharmacy practice to pharmacists. These programs are required to provide diversity and variety of experiences across different therapeutic areas and populations of patients, but not all PGY1 programs offer

their residents an opportunity to work with critical care patients.³⁰ While PGY1 residencies advance the pharmacist's competence beyond entry-level practice, they are not intended to produce specialty trained graduates. Without further training, neither a pharmacist in general practice nor a PGY1 residency graduate would have the specialized knowledge, skills, and experience to enable them to appropriately manage patients with critical care pharmacy needs.

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

Critical care clinical pharmacists serve as vital members of the critical care interprofessional team. They have in-depth knowledge about pharmacotherapeutics in critically ill patients. Critical care pharmacists contribute to the clinical care and monitoring of the critically ill and perform functions that cannot be adequately performed by pharmacists in other BPS-recognized specialties. All pharmacists are educated to obtain, interpret, and evaluate patient information to appropriately manage drug therapy, assess the need for treatment and/or referral, and identify patient-specific factors that affect health, pharmacotherapy, and/or disease management. However, critical care pharmacy specialists have refined and expanded these skills with emphasis in critical care, often through additional training, experience, and credentials, and they more frequently perform specialized functions in caring for patients who are critically ill.

Within the medical profession, it is recognized that the base of knowledge and skills in medicine far exceeds an individual's ability to master every facet of medicine. Currently physicians may become certified in any of 145 medical specialties or subspecialties. Among the specialties in medicine, overlap is apparent in many areas. In critical care, the specialties of anesthesiology, emergency medicine, internal medicine, and obstetrics and gynecology all have subspecialties in critical care.³¹ This seeming overlap is unavoidable given the complexities of care for critically ill and injured patients. Likewise, in pharmacy, the breadth and depth of knowledge exceed an individual's ability to master content and skills at an advanced level in all areas of practice and pharmacotherapy. Specialty pharmacy practice in critical care is distinct from other BPS specialties in its emphasis on medication use in critically ill and injured patients that requires substantial specialized knowledge, skills, and abilities working within a distinct and unique patient population.

Similar to the overlap seen among medical specialties, some overlap in domains exist between the proposed critical care specialty and other BPS-recognized specialties, particularly pharmacotherapy. The differences, however, are significant. The specialized knowledge and functions performed by the critical care pharmacy specialist differs substantially from those of

the pharmacotherapy specialist because of the depth of knowledge in the care, monitoring, and treatment of critically ill and injured patients.

While there are some similarities between the tested material on the Board Certified Pharmacotherapy Specialists (BCPS) exam and the domains of critical care pharmacy, there are major differences as well. It is important to acknowledge that the BCPS exam is designed to test knowledge and understanding across a broad spectrum of therapeutic areas and patient populations. It cannot deeply focus on specific areas to ensure a specialty level of knowledge, skills, and functions. Since the BCPS exam is designed to assess knowledge and skills in pharmacotherapy broadly, and not in any one specific area, pharmacists who are board certified in pharmacotherapy without additional training or education cannot effectively meet the needs of critically ill patients.

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

Other highly educated and competent health care professionals, including those specializing in critical care medicine, are unable to meet the needs and mitigate medication-related risks in the care of critically ill and injured patients. Their scopes of practices and responsibilities may require attention to other aspects of the patients' evaluation, diagnosis, and care thereby drawing focus away from the details of pharmacotherapeutic management, potential alterations in medication response, drug interactions, and medication compatibility. The education and training of other health professionals, although extensive for some, does not provide the depth and breadth of pharmacotherapeutic knowledge and skills required for the care of critically ill and injured patients that is possessed by pharmacists in critical care specialty practice.

Health professional programs that require focus in other areas of patient management, diagnosis, and care may de-emphasize pharmacology and therapeutics in order to maintain capacity for other content. The World Health Organization investigated why patients sometimes are prescribed ineffective or unnecessary pharmacologic treatment. Investigators determined that many medical school programs rely on transferring drug knowledge through personal experiences instead of teaching students pharmacotherapeutic principles to determine the best therapeutic drug choice.³² For example, pharmacology lectures within physician assistants programs aim to provide the "big picture," by focusing on general ADEs and monitoring parameters associated with specific classes of drugs rather than the interactions and ADEs associated with individual drugs.³³ These health professionals serve other vitally important functions as part of the interprofessional critical care team. The critical care

pharmacist brings expertise in pharmacology, pharmaceuticals, therapeutics, pharmacokinetics, and pharmacodynamics. This, coupled with training and experience in applying this knowledge to the critically ill patient, is unique among the professionals that comprise the ICU team. Critical care pharmacy specialists have the unique ability to inform medication-related decisions to meet the needs of critically ill and injured patients, therefore enabling the health care team to work collaboratively to improve therapeutic outcomes and medication safety.

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

More than five million people become critically ill or critically injured in the United States each year. The life-and-death needs of critically ill and injured patients are complex. These needs are dictated by the patient's current problem and underlying conditions, which can be dynamic and strongly influence how drugs act and interact due to alterations in pharmacokinetics and pharmacodynamics. The knowledge and skills required to perform the specialized functions of critical care pharmacy practice are highly specific and specialized. While there is some overlap among BPS-recognized specialty areas, the needs of critically ill and injured patients who are at heightened risks for medication errors, adverse events, hospital-acquired infections, and other complications are significant and growing.

Pharmacists in other specialties and with generalized knowledge and skills defined by Doctor of Pharmacy programs and licensure lack the required expertise and skills to meet these needs. Likewise, other health professionals lack the depth and breadth of pharmacotherapy in critically ill and injured patients to meet society's needs in critical care. The specialized knowledge and functions, supported by societal needs and strong demand, are sufficiently unique to support recognition of critical care pharmacy practice as a distinct specialty. Given the predicted increase in unmet public health needs, it is clear that high-quality care for critically ill and injured patients will require the full application of specialized knowledge and skills of today's critical care clinical pharmacist and those who would seek specialty recognition in critical care pharmacy.

Pharmacists who have not obtained the specialized knowledge or developed and refined the required skills in critical care practice cannot adequately provide the specialized care required by critically ill and injured patients, nor are they prepared to manage patients who may acutely decompensate. Many of the medication errors and predictable ADEs that do occur in critically ill patients occur at the hands of highly competent, well-trained intensivists, pharmacists, nurses,

and other health professionals whose training and education do not include the specialized pharmacotherapy knowledge and skills of the critical care clinical pharmacist.^{1,3}

Specialists in critical care pharmacy who have completed advanced training possess specialized knowledge, skills, and abilities to adeptly manage and make recommendations for critically ill patients. Critical care pharmacists can better meet the needs of critically ill and injured patients and improve health care quality.

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CRITERION B: Demand

The area of specialization shall be one in which there exists a significant and clear health demand to provide the necessary public reason for certification. ***This criterion emphasizes DEMAND.***

BPS defines **DEMAND** as a willingness and ability to purchase the services of a Board Certified Pharmacist.

Demand for Critical Care Pharmacist Services

Each year in the United States, five million patients of all ages become critically ill or are critically injured and require intensive care through traditional, surgical, or specialty ICUs in hospitals, trauma centers, and health systems. The care provided has life-and-death consequences. To accurately, safely, and skillfully manage and deliver care to these patients, health professionals with specialized knowledge and experience work in interprofessional teams to assimilate clinical and technological information and develop and refine treatment plans. Medication therapy is a central component to the care of critically ill and injured patients who sometimes require specialized pharmacologic or technological interventions to maintain blood pressure, respiration, nutrition, and other homeostatic functions, in addition to the patient's primary condition. The critical care pharmacy specialist brings a deep understanding of pharmacotherapeutics in critically ill patients that includes the important alterations in pharmacokinetic and pharmacodynamic properties and the ability to adeptly interpret and apply clinical, biochemical, and technological data to monitor response. Pharmacists with the expertise to perform these functions and skills are central to interprofessional critical care teams.

The demand for critical care pharmacy specialists has grown steadily over the past 20 years, with a sharp increase since the turn of the century, concurrent with the enhanced emphasis on improving health care quality.¹ Demand can be expressed in terms of requests for services from health systems, other health professionals, and society. It also can be reflected in employment trends and surveys that document increased demand for pharmacists who provide care to critically ill and injured patients, along with increases in specialized residency programs designed to train critical care pharmacy specialists.

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

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

- Derek Angus, MD, MPH, FRCP, University of Pittsburgh Medical Center and School of Medicine
- Margaret Clapp, MS, MDiv, RPh, Chief Pharmacy Officer, Massachusetts General Hospital, a Partners Healthcare affiliate
- Jon Horton, PharmD, Regional Director of Pharmacy, University of Pittsburgh Medical Center
- Judith Jacobi, PharmD, FCCM, FCCP, DPNAP, BCPS, Indiana University Health Methodist Hospital, Past President SCCM
- Institute for Safe Medication Practices: Michael Cohen, RPh, MS, ScD
- Roundtable on Critical Care Policy: Bradley Poss, MD, Chairman of the Board
- Society of Critical Care Medicine: Clifford S. Deutschman, MD, MS, FCCM, President

Key points within these letters of support speak to the demand for critical care pharmacists practicing at the specialty level. A brief summary of each letter is outlined below.

The Roundtable for Critical Care Policy is an organization that provides a forum for leaders in critical care and public health to advance a common federal policy agenda designed to improve the quality, delivery, and efficiency of critical care in the United States. The Roundtable brings together broad stakeholders including renowned critical care clinicians, patient groups, academia, public health advocacy interests, and industry. In their letter of support, Chairman of the Board, Dr. Bradley Poss speaks to the demand for critical care pharmacists on ICU care teams: *“The care delivered in the ICU is technology-intensive, treatment is unusually complex ...and outcomes have life or death consequences. Clinical pharmacists that are skilled and experienced in critical care are vital in managing both the pharmacotherapy and nutritional needs of patients of all ages with severe illness and injury.”* He concludes: *“...pharmacists that complete the proposed critical care training requirements are a valuable asset to ICU care teams and enhance the quality of care delivered to patients. We strongly support the specialty certification for critical care pharmacists.”*

On behalf of the Society of Critical Care Medicine (SCCM), President Clifford Deutschman expresses the society's support for the recognition of critical care pharmacy practice as a specialty. In his letter, Dr. Deutschman describes the important role critical care pharmacists serve in patient care, and in leadership in SCCM, practice, and research. He concludes: *"The leadership of the Society of Critical Care Medicine recognizes the important contributions of Critical Care Pharmacists to the care of critically ill and injured patients through their safe and effective use of specialized medications and also their contributions to our organizational activities, the education of their peers and critical care multiprofessional colleagues, and research."*

Dr. Derek Angus is a board certified critical care physician and Professor of Critical Care Medicine at the University of Pittsburgh Medical Center. He speaks directly to the demand for critical care pharmacists in his Level 1 trauma and academic medical center, which has more than 600 beds, including 20 percent of which are dedicated to intensive care. *"The care of critically ill patients is delivered by multidisciplinary teams, which include pharmacists with training dedicated to this uniquely complex patient population.... We are actively seeking out mechanisms to increase the availability of pharmacists with critical care knowledge and training in our ICUs. Recognition of the specialization of pharmacists with this skill set would well serve this growing and ongoing need."*

The Institute for Safe Medication Practices (ISMP) educates the health care community and consumers about safe medication practices and medication error prevention. In ISMP's letter of support, Dr. Michael Cohen emphasizes the increased risk of inadvertent misuse and patient harm, resulting directly from the "high alert" status of critical care drugs and drug categories and the way that drugs are utilized in critical care. He speaks to the demand for critical care pharmacy specialists from a patient safety perspective. *"Certification will...help to optimize outcomes of critically ill patients by assuring employment of evidence-based drug therapy, performing drug therapy monitoring and quality improvement activities to enhance the safety and effectiveness of medication use. [ISMP] sincerely believes that board certification for critical care pharmacy practice is a necessary step in assuring competent individuals to carry out these important safety functions."*

Dr. Judith Jacobi, from the University of Indiana Methodist Hospital, is the Past President of the SCCM. She strongly supports specialty recognition for critical care pharmacists, addressing demand from her dual perspectives of interprofessional organization leadership and Level 1 trauma center practice. Dr. Jacobi states, *"As a Past-President of SCCM, I can attest to the important roles held by Critical Care Pharmacists within this organization and at the bedside. With regard to recognition of specialized pharmacists as fellows of SCCM, she says "...the lack of standardized board certification credentials (for specialized critical care pharmacists) as a*

starting point for application is different from our physician and nurse peers. Availability of board certification in critical care pharmacy as a credential would lead to a requirement that candidates for fellowship demonstrate this minimum standard. She concludes: "...certification would be beneficial to differentiate the practitioner who is prepared to meet the needs of complex populations and facilitate credentialing for advanced roles in drug therapy management."

As the Regional Director of Pharmacy for the University of Pittsburgh Medical Center, Dr. Jon Horton speaks to the demand as an employer of critical care clinical pharmacists: *"There is a definable knowledge and skill set unique to the training and/or experience that is desired for pharmacists providing clinical pharmacy services to these critically ill patients. Specialization by board certification provides a means for recognizing clinical pharmacists who possess these desirable characteristics. We have made substantial efforts to provide a unit-based critical care [pharmacist] for each of our ICUs, and currently have 7 dedicated unit-based pharmacists."*

Margaret Clapp, Chief Pharmacy Officer of Massachusetts General Hospital, speaks to the demand for critical care pharmacists and specialty recognition broadly. As an employer, she writes: *"The level of care provided in the contemporary ICU setting...and the number of ICU beds as a proportion of total beds has also increased nationally, [creating] a very real and continuing demand for clinical pharmacists with specialized training and experience in critical care to meet this need. An external validation process for specialty recognition that can be offered by BPS board certification would be valuable to identify those clinical pharmacists that have the requisite knowledge and experiences to fill this important role. This specialty recognition will be a valuable credential for prospective employers, other members of the patient care team in the ICU, and to patients and their families."*

These statements are representative of the demand, support, and acceptance of critical care pharmacist specialists nationwide. They further substantiate the widespread and growing demand for the professional services of these specialized practitioners and support recognition of critical care pharmacy practice as a specialty.

In addition to these formal letters of support, 113 employers of critical care pharmacists expressed their support of specialty recognition of critical care pharmacy practice by voluntarily signing the petition. Of these, 73 are directors of pharmacy and 40 are critical care pharmacists with hiring responsibilities. Appendix B-2 contains the list of pharmacy administrators who chose to sign in support of the proposed specialty recognition of critical care pharmacy practice.

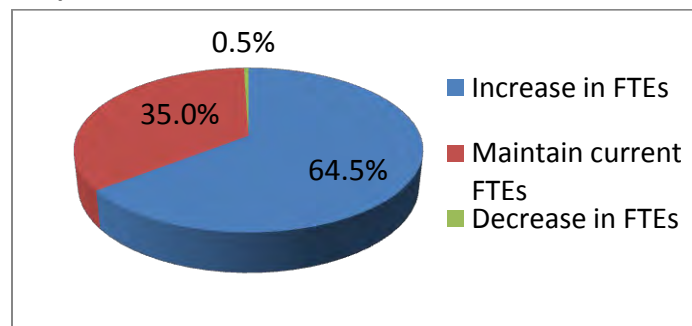
GUIDELINE 2. Include estimates of positions for pharmacists with specialized training and knowledge in the proposed specialty that are currently filled and those that are currently unfilled. Identify these positions by practice settings. Describe the sources and methods used to determine these estimates.

In an effort to estimate the number of positions for pharmacists with specialized training and knowledge in critical care practice and the demand for specialty certification in this area, the petitioning organizations conducted a Critical Care Pharmacist Employer Survey that was fielded to directors of pharmacy in hospitals and health systems. The survey instrument is attached as Appendix B-3. In addition, this same survey was embedded into a Critical Care Pharmacist Survey, to ascertain similar information among practitioner leaders who also have direct responsibility for hiring pharmacists for critical care practice. Responses were received from 204 employers, including 131 directors of pharmacy and 73 critical care pharmacists who both practice and have hiring responsibilities.

Responding critical care pharmacist employers indicated that they collectively employ 1,034 FTEs to care for critically ill patients in their institutions. Employers who responded have collectively recruited for 256 critical care pharmacists over the past 3 years and filled 95.8 percent of these positions. In making hiring decisions, 86.7 percent of responding employers indicate that PGY2 residency training in critical care is ranked first or second among desirable training. In addition, 29 percent require BPS or other certification.

Responding employers report 39 currently vacant positions for critical care pharmacists. Employers further estimate that they will hire 234 to 243 additional critical care pharmacists over the next 3 years. Looking ahead, 99.5 percent of employers who responded estimate their demand for critical care pharmacy specialists will remain stable or grow over the next 5 years, as shown in Figure B-1.

Figure B-1. Anticipated Growth in Demand for Critical Care Pharmacy Specialists over the Next 5 Years (2012-2017)

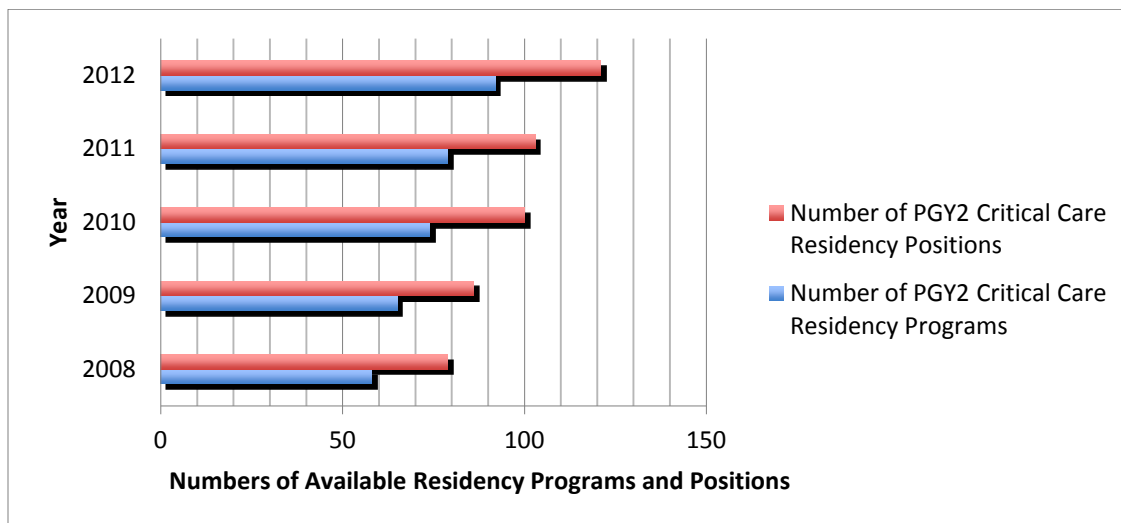


These survey results demonstrate a consistent and growing market for critical care specialists.

Trends in PGY-2 Critical Care Residency Programs and Positions

Among all of the PGY-2 residencies available in pharmacy, critical care accounts for the most programs and positions. In addition, the numbers of PGY2 residency programs and positions in critical care have increased steadily and consistently since 2008, as noted in Figure B-2. PGY2 critical care residency programs and positions available have grown from 58 programs and 79 positions in 2008 to 99 programs with 122 available positions in 2012.

Figure B-2. Growth in Number of PGY2 Specialized Residencies in Critical Care, 2008-2012



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

Employer demand as evidenced by the number of filled and unfilled positions for specialized critical care pharmacist services can be documented by evaluating the following:

- Petitioning organizations' Critical Care Pharmacist Employers Survey
- Online employment searches
- Trends in PGY2 critical care residency training programs
- Employment opportunities for pharmacists that appear in selected pharmacy journals and in online employment sites for pharmacists.

Demand for Critical Care Pharmacist Specialists

The Critical Care Pharmacist Employer Survey conducted by the petitioning organizations in August 2012 and searches via a national employment web site revealed numerous available positions for critical care pharmacist specialists and an active recruiting environment:

- Searches on a national employment web site aggregator (www.indeed.com) on September 11, 2012, yielded 92 open positions for pharmacist specialists in critical care under active recruitment. Search terms included combinations of “critical care pharmacist,” “ICU pharmacist,” “critical care,” and “pharmacist.”
- The Critical Care Pharmacist Employer Survey conducted by the sponsoring organizations reveal 39 critical care pharmacist positions are currently vacant among the practices represented by the survey respondents.

Advertisements for Critical Care Pharmacists.

Employer demand for specialized critical care pharmacy services can be documented by tabulating the number of advertisements for employment opportunities for critical care pharmacists that appear in selected pharmacy journals and in online employment sites. Figure B-3 details the numbers and sources for critical care pharmacist employment advertisements published from July 1, 2009, through December 31, 2011.

Figure B-3. Critical Care Pharmacist Employment Advertisements

Organization	Year	Number of Advertisements for Critical Care Pharmacists	Number of Advertisements for PGY-2 Critical Care Residencies
ACCP	2009	237	NA
ACCP	2010	286	NA
ACCP	2011	256	NA
<i>Total ACCP Advertisements</i>		<i>804</i>	
ASHP	2009	34	NA
ASHP	2010	28	NA
ASHP	2011	24	24
<i>Total ASHP Advertisements</i>		<i>86</i>	<i>24</i>
TOTAL ADVERTISEMENTS from January 1, 2009 – December 31, 2011		890	24

The petitioning organizations did not differentiate practice functions requested by the employer in these advertisements; however, all advertisements specifically called for a critical care pharmacist. A total of 890 positions were listed during the 3-year period, with a cumulative increase in demand of 3 percent from 2009 through 2011.

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

The demand for critical care pharmacist specialists' knowledge, skills, and abilities has increased consistently over the past 20 years. Employer data show a consistent demand over the past 3 years and increasing forward over the next 5 years. Increases in the number of critical care specialty residency programs and positions provide additional evidence of this demand as employers create residency programs to meet clinical needs and expand the number of pharmacists with the specialized knowledge and skills of a critical care pharmacist specialist.

Of 204 employers who responded to the Critical Care Pharmacist Employer Survey, 66 percent indicated that if BPS approves the proposed specialty in critical care pharmacy practice, they would be "highly likely," "likely," or "somewhat likely" to require the specialty credential for the critical care pharmacist specialists who work in their institutions; furthermore 113 employers chose to sign in support of this petition to recognize critical care pharmacy as a specialty.

¹ Dager W, Bolesta S, Brophy G, et al. PRN Opinion Paper. An opinion paper outlining recommendations for training, credentialing, and documenting and justifying critical care pharmacy services. *Pharmacotherapy*. 2011;31(8):135e-175e.

CRITERION C: Number and Time

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

The data sources for determining the number of pharmacists in critical care pharmacy practice and the time spent in this specialty area are outlined below:

- The Report of the Role Delineation Study of Critical Care Pharmacy, conducted by Professional Examination Service on behalf of BPS.
- An analysis of membership records of ACCP and ASHP, and membership statistics from SCCM.
- Results of a survey of pharmacists who practice in critical care pharmacy practice as identified by the petitioning organizations; the Critical Care Pharmacists Survey was fielded to 2,928 pharmacists in August 2012.
- Results of a membership survey, conducted by ACCP in March 2011, on the topic of Recognition of New Pharmacy Specialties.

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

Specialty practice in critical care pharmacy has grown substantially, and PGY2 residency programs have produced increasing numbers of critical care pharmacists with specialized knowledge and skills over the past 5 years (2008 to 2012). During this period, the number of critical care residency positions available increased from 79 to 122.¹

To determine the number of practitioners who identified themselves as practicing in critical care pharmacy, an analysis of membership records from ASHP and ACCP was completed. The petitioning organizations identified 2,928 individuals currently working in critical care pharmacy practice after removing duplicate entries among membership records of both organizations. In addition, SCCM reports 1,500 pharmacist members.

The of Critical Care Pharmacists Survey was developed by the petitioning organizations to obtain quantitative information about the demand for critical care specialists, the amount of time dedicated to critical care practice, and the education and training of those practicing in the specialty. The survey was fielded in August 2012 to 2,928 individuals identified through analysis of the sponsoring organizations' membership database records. The survey yielded 504 responses, a response rate of 17.2 percent. Of these, 476 responses are from pharmacists who practice in critical care. A copy of the survey instrument is attached as Appendix C-1. More than 250 pharmacists took the initiative to sign the online petition in support of recognition for the critical care pharmacy specialty.

More than 91 percent of critical care pharmacists responding to the Critical Care Pharmacists Survey report that they practice in the area of critical care specialization as defined below:

Definition of Critical Care Pharmacy Practice

Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

In 2011, ASHP conducted a national survey of pharmacy directors at general and children's medical-surgical hospitals in the United States to evaluate pharmacy practice in hospital settings. The survey assessed various specialty areas and reported the amount of time that pharmacists are assigned to provide care to defined patient populations. Unpublished data show that pharmacists within health systems are assigned to critical care most frequently.² Based on the 2011 ASHP national survey, pharmacists are assigned to critical care in 68.8 percent of hospitals,² up from 65.4 percent in 2009.³

Based upon survey results, membership records evaluated, and the estimated percentages of pharmacists who join professional organizations, we estimate that a total of 6,000 to 7,000 pharmacists are currently engaged in specialized critical care pharmacy practice.

This number is likely underestimated because not all pharmacists in critical care practice are members of ACCP, ASHP, APhA, SCCM, or other organizations; however, we believe that those pharmacists who are more professionally engaged are more likely to pursue specialty recognition.

Critical care pharmacists practice in a vast array of critical care settings including academia, hospital or health system intensive care units (ICUs), as a residency director, or in hospital administration.

In the *Report of the Role Delineation Study of Critical Care Pharmacy*, respondents were asked to indicate the type of hospital setting where they provided the majority of their patient care. Thirty-six percent of critical care pharmacists worked in a university hospital. The results from the role delineation study are shown in Figure C-1.⁴

Figure C-1. Hospital Practice Settings for Critical Care Pharmacists

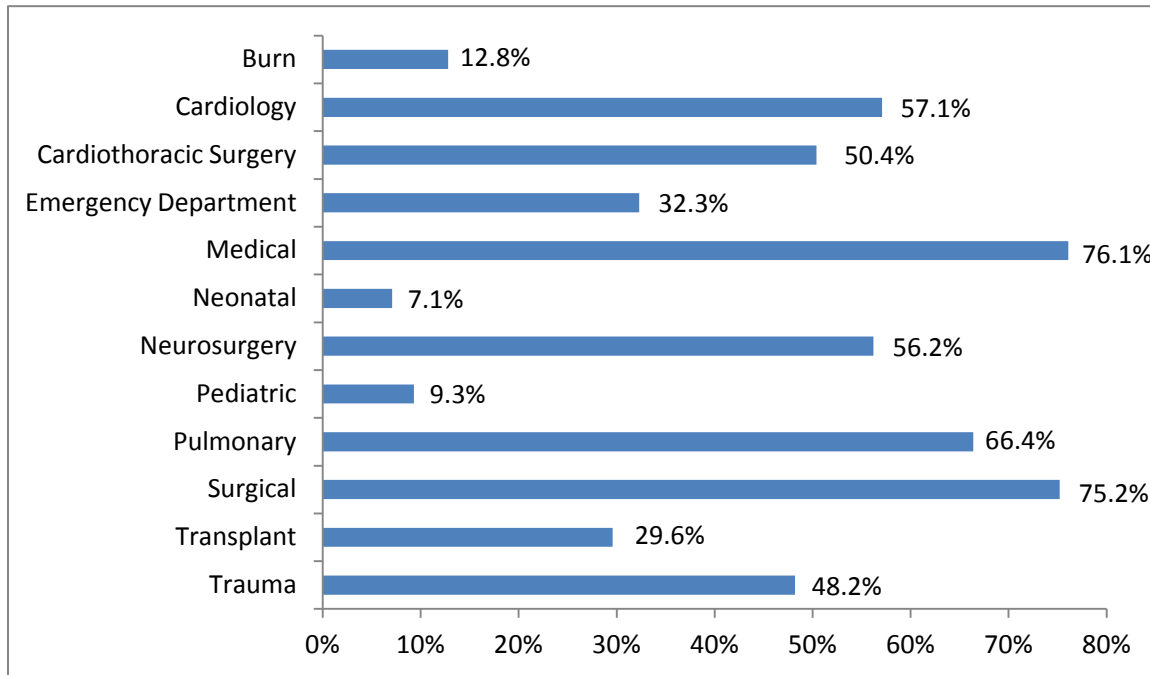
Practice Setting	Number of Responses	Percentage
University hospital	82	36.4%
Community teaching hospital	58	25.8%
Community hospital	57	25.3%
Private teaching hospital	18	8.0%
Government hospital	9	4.0%
Other	1	0.4%
TOTAL	225	100%

In addition, the role delineation study describes surveyed pharmacists' responses concerning the patient populations for which they provide critical care pharmacy services. Most respondents provide care for multiple populations. The most prevalent patient populations served by critical care pharmacists who responded to the survey include:

- Adult medical (76.1 percent)
- Adult surgical (75.2 percent)
- Pulmonary (66.4 percent)
- Cardiology (57.1 percent)
- Neurosurgery (56.2 percent)

Patients in cardiothoracic surgery and trauma also receive care from nearly half of the respondents. Critical care pharmacists who responded to the role delineation study survey reported that only 5 percent of their patients were under the age of 18 years. These results are outlined in Figure C-2.⁵

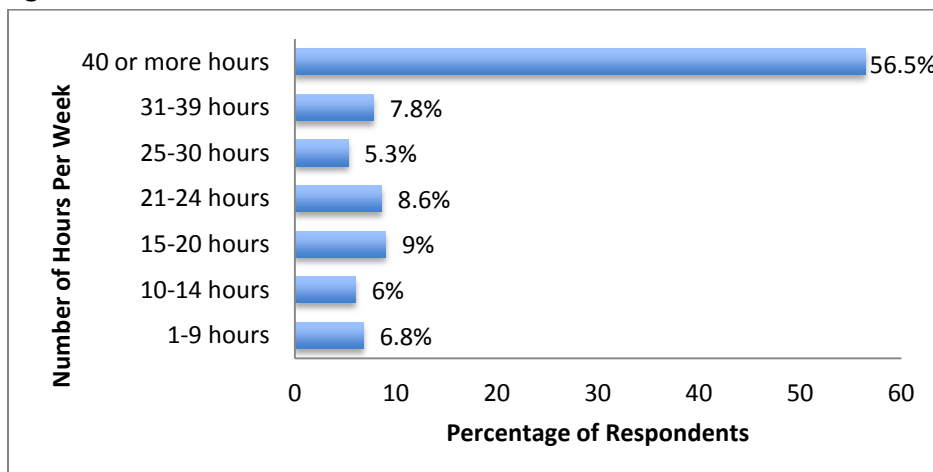
Figure C-2. Percentage of Patient Populations Receiving Critical Care Pharmacy Services



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

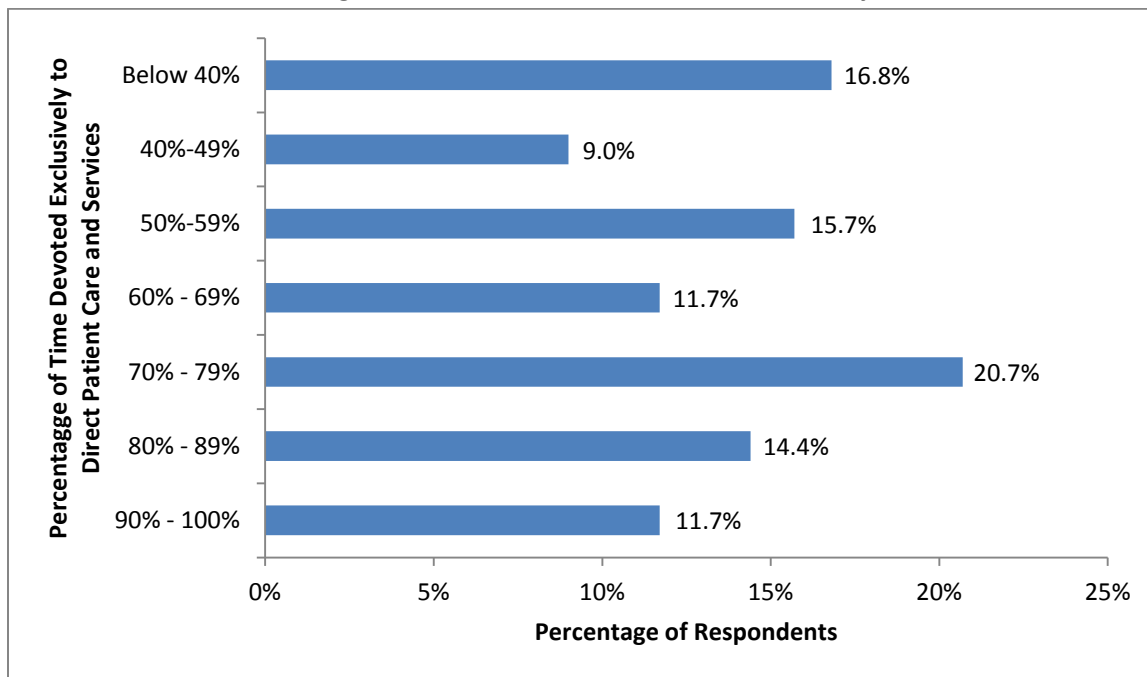
In the Critical Care Pharmacists Survey, critical care pharmacists were asked to indicate the number of hours per week that they practiced in their critical care practice site. The results outlined in Figure C-3 that show 56.5 percent of respondents practice 40 or more hours per week at their critical care practice site.

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



In addition, the Critical Care Pharmacists Survey asked pharmacists to quantify the average weekly percentage of time devoted exclusively to providing direct patient care and services according to the definition of Critical Care Pharmacy Practice. Of the respondents, 355 pharmacists (74%) report spending more than 50% of their time dedicated to direct patient care at the specialty level. The results are outlined in Figure C-4.

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



In the Report of the Role Delineation Study of Critical Care Pharmacy, results show that respondents are highly engaged in the specialty of critical care pharmacy with an average of 72 percent of work time spent providing pharmacy services to critically ill patients. An average of 64 percent of work time was spent providing direct patient care.¹

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

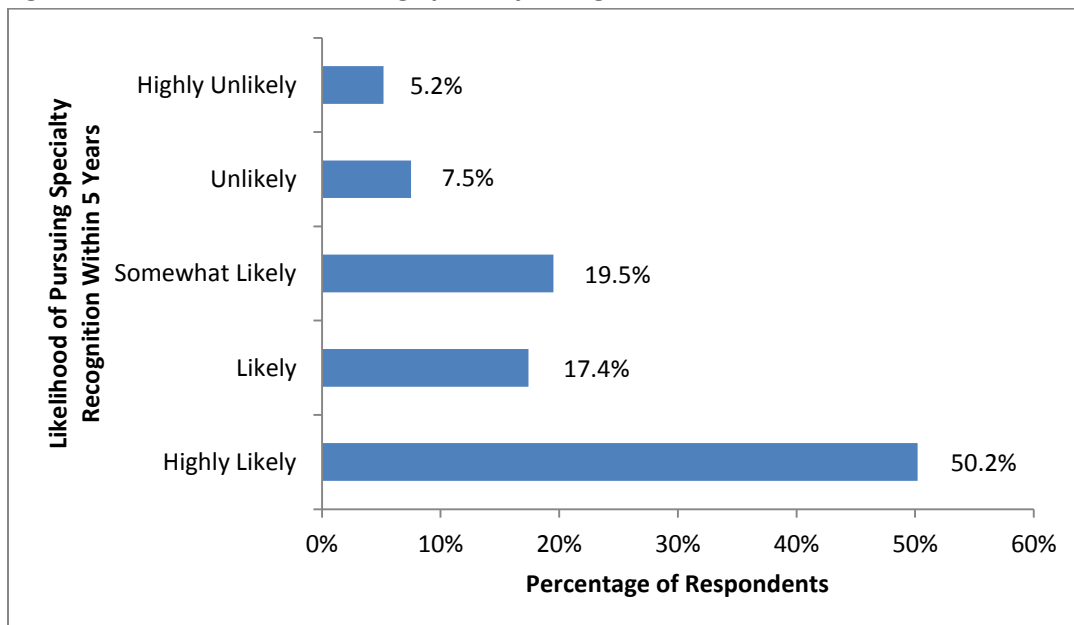
To estimate the number of pharmacists who would likely seek board certification in critical care pharmacy, we evaluated data from membership surveys conducted by the petitioning

organizations jointly and independently, along with anticipated numbers of PGY2 residency graduates.

ACCP conducted a survey of their membership in March 2011 to assess opinions regarding the recognition of new specialties (see Appendix C-2). Respondents indicated that a specialty certification in critical care pharmacy was necessary to appropriately certify clinical pharmacy practitioners. Of the 1,099 respondents who are currently board certified, 56 percent believed that new BPS specialty certification is needed to appropriately recognize and credential clinical pharmacy practitioners in critical care practice. The survey also showed that 53.6 percent of the 724 respondents that were not currently board certified also agree that BPS specialty certification in critical care pharmacy practice is needed. Finally, the survey found that 350 respondents (120 who are not yet certified in any specialty and 230 who are currently board certified in another specialty) would seek specialty recognition in critical care if offered by BPS.

The Critical Care Pharmacists Survey also asked respondents to indicate how likely they would be to pursue critical care specialty recognition within the next 5 years if the petition to recognize critical care pharmacy practice is approved by BPS. A total of 87 percent indicated that they would be “highly likely,” “likely,” or “somewhat likely” to pursue specialty recognition in critical care (Figure C-5).

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



As described in Criterion B, PGY2 critical care residency programs have the capacity for 122 graduates annually. Individuals who complete specialized residency training in critical care

would be likely to pursue specialty recognition, yielding 600 potential candidates over the next 5 years.

Since the Critical Care Pharmacists Survey was disseminated only to individuals who were members of certain organizations, the number of critical care pharmacists who would seek certification for critical care as a specialty is probably underrepresented. The growth and number of residency programs in critical care pharmacy show an increased need for certification of pharmacists who are practicing at the specialty level to care for critically ill patients. Recognition of critical care pharmacy practice as a BPS-recognized specialty has broad acceptance within the profession and will certainly increase the numbers of individuals who are likely to seek certification.

¹ American Society of Health-System Pharmacists. Residency Matching Program—Match Statistics. Available at: <http://www.natmatch.com/ashprmp/aboutstats.html>. Accessed September 11, 2012.

² American Society of Health-System Pharmacists. 2011 ASHP National Survey of Pharmacy Practice in Hospital Settings. Unpublished data.

³ Pedersen CA, Schneider PJ, Scheckelhoff D. ASHP national survey of pharmacy practice in hospital settings: monitoring and patient education—2009. *Am J Health Syst Pharm*. 2010;67:542–58.

⁴ Professional Examination Service on behalf of the Board of Pharmacy Specialties. *Report of the Role Delineation Study of Critical Care Pharmacy*. Washington, DC: Board of Pharmacy Specialties; April 2012.

⁵ Dager W, Bolesta S, Brophy G, et al. PRN Opinion Paper. An opinion paper outlining recommendations for training, credentialing, and documenting and justifying critical care pharmacy services. *Pharmacotherapy*. 2011;31(8):135e–175e.

CRITERION D: Specialized Knowledge

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

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

The specialized knowledge of pharmaceutical sciences required for specialty practice in critical care pharmacy is outlined below in Guideline 1. Guideline 2 associates this knowledge with the biological, physical, and behavioral sciences. Guidelines 3 and 4 explain how the specialized knowledge applied by the critical care pharmacy specialist differs from that of the general practice pharmacist and of pharmacists practicing in other recognized specialty areas of pharmacy practice.

BPS commissioned a role delineation study to describe and empirically validate the domains, tasks, and knowledge that comprise specialty practice in critical care pharmacy.¹ The complete *Report of the Role Delineation Study of Critical Care Pharmacy* is attached as Appendix D-1.

Domains of Critical Care Pharmacy Practice

The role delineation study identified and validated the domains of specialty practice in critical care pharmacy and the knowledge areas associated with each domain. The domains are:

- **Domain 1: Clinical Skills and Therapeutic Management**
Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the health care team.
- **Domain 2: Practice Administration and Development**
Tasks related to advancing critical care pharmacy practice establishing, implementing, and monitoring systems and policies to optimize the care of critically ill patients.

- **Domain 3: Information Management and Education**

Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of health care providers and trainees.

Criterion D documents the areas of specialized knowledge required for specialized practice in critical care pharmacy. To perform the required functions, critical care pharmacy specialists must attain specialized knowledge in each of the three domains. This knowledge is unique or required at a deeper level in comparison with the knowledge required by pharmacists in general practice or in other BPS-recognized specialties. The *Report of the Role Delineation Study of Critical Care Pharmacy* lists 43 areas of knowledge identified within the three domains that comprise critical care pharmacy. These domains and areas of knowledge are listed in Table D-1.

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

Domain of Critical Care Pharmacy Practice	Knowledge Unique or Required with Greater Emphasis/Depth by Critical Care Pharmacy Specialists
Domain 1: Clinical Skills and Therapeutic Management	<ul style="list-style-type: none"> ▪ Diagnosis, pathophysiology, epidemiology, risk factors, and treatment of conditions in critically ill patients in the following therapeutic areas: pulmonary, cardiovascular, neurology and neurological injuries, psychiatry, renal, hepatogastrointestinal, immunology, endocrine, hematology, infectious diseases, toxicology, and surgery ▪ Sedation, analgesia, delirium, and neuromuscular blockade ▪ Nutrition support in the critically ill patient ▪ Alterations of pharmacodynamics and pharmacokinetics in the critically ill (e.g., effects of hypothermia, mechanical ventilation, volume resuscitation, organ dysfunction) ▪ Drug interactions and adverse drug events common in critical care ▪ Pharmacoeconomics (e.g., cost effectiveness, cost minimization) ▪ Sepsis/SIRS ▪ Advanced Cardiac Life Support (ACLS) principles ▪ Devices commonly utilized in critical care (e.g., balloon pump, left ventricular assist device, cooling devices, extracorporeal membrane oxygenation) ▪ Procedures commonly performed in critical care (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia) ▪ Renal replacement therapy ▪ Mechanical ventilation principles and monitoring techniques ▪ Critical care monitoring techniques (e.g., hemodynamic, neurologic, cardiovascular) ▪ Impact of alterations in anatomy and physiology due to trauma, surgery or

	<p>congenital causes on medication therapy</p> <ul style="list-style-type: none"> ▪ Routes of administration for medications in critically ill patients ▪ Routes of administration for nutrition (enteral vs. parenteral) and alterations in absorption of nutrients in critically ill patients ▪ Preventative and supportive care measures used in the care of critically ill patients ▪ Fluid, electrolyte, and acid/base management in ICU patients ▪ Agents used for acute volume resuscitation and hemostasis (e.g., crystalloids, colloids, blood products, hemostatic agents) ▪ Parenteral vasoactive and inotropic agents ▪ End of life care ▪ Impact of critical illness on pre-existing conditions (e.g. endocrine disorders, cardiovascular diseases, infectious diseases, respiratory diseases) ▪ Application of evidence-based critical care literature and clinical practice guidelines in designing a patient-specific plan of care ▪ Outcome indicators for pharmacotherapy of disease states common to ICU patients ▪ Documentation processes used for critical care pharmacy services
<p>Domain 2: Practice Administration and Development</p>	<ul style="list-style-type: none"> ▪ Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey) ▪ Metrics for evaluating quality of critical care pharmacy services (e.g., lengths of ICU stay, mortality, cost-effectiveness) ▪ Quality assurance and process improvement methods ▪ Evidence-based literature supporting the value of critical care pharmacy ▪ Application of evidence-based critical care literature in designing institutional guidelines ▪ Communication strategies ▪ Resources (e.g., financial, technological, human) necessary to care for critically ill patients ▪ Medication safety principles pertinent to patients requiring care in the ICU
<p>Domain 3: Information Management and Education</p>	<ul style="list-style-type: none"> ▪ Principles and methods of educating pharmacists, fellows, residents, students, and other healthcare professionals ▪ Techniques for educating critically ill patients/caregivers ▪ Published documents from professional societies (e.g., American Society of Health-System Pharmacists [ASHP], American College of Clinical Pharmacy [ACCP], Society of Critical Care Medicine [SCCM]) regarding the education and training of critical care pharmacists ▪ Research design, methodology, and statistical analysis

	<ul style="list-style-type: none"> ▪ Clinical application and limitations of published data and reports ▪ Regulatory/IRB requirements relative to conducting critical care research ▪ Continuing professional development opportunities in critical care (e.g., professional organization membership, committee involvement, sources of continuing education, mentorship) ▪ Mentorship principles, techniques, and strategies ▪ Medical literature publication and review process ▪ Opportunities for disseminating critical care knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)
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ICU = intensive care unit; IRB = institutional review board; SIRS = systemic inflammatory response syndrome.

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

Patients with a broad range of diseases and conditions are managed in critical care. In addition to the primary presenting problems, critical illnesses and injuries affect patients’ underlying chronic diseases and conditions, adding layers of complexity in the care of affected patients. These patients often require complicated medication regimens and a variety of interventions to maintain cardiopulmonary function, appropriate nutrition as well as to prevent infections and other complications. To effectively care for patients with complex medication regimens and take responsibility for achieving intended therapeutic outcomes, critical care pharmacists rely on a specialized body of knowledge in the pharmaceutical sciences that is distinguished by its breadth and depth.

The clinical management of critically ill and injured patients requires an in-depth knowledge of the drugs used in the treatment of conditions in the following therapeutic areas: pulmonary, cardiovascular, neurology and neurological injuries, renal, hepato-gastrointestinal, immunology, endocrine, hematology, infectious diseases, toxicology, psychiatry, trauma, and surgery. In-depth understanding of the diagnosis, monitoring, and management of conditions in these therapeutic areas, along with sedation, analgesia, neuromuscular blockade, and the management of delirium is also required.

Upon this foundation, the practice of critical care pharmacy requires a substantial depth and breadth of knowledge regarding alterations in the pharmacodynamic responses to and pharmacokinetic properties of drugs in critically ill and injured patients, coupled with understanding of the impact of alterations in anatomy and physiology from trauma, surgery, or congenital causes on medication therapy decisions. Knowledge of integrated pharmacotherapeutic principles associated with medications and diseases managed in critical

care—and the interplay of each with underlying conditions and dynamic clinical parameters—is required.

Medication-specific knowledge emphasized to a greater extent in critical care pharmacy compared with generalized or other specialty practices include renal replacement therapy, routes of administration, compatibility of medications and nutrition (e.g., enteral versus parenteral), and alterations in absorption and drug distribution in critically ill patients. Critical care pharmacists in specialty practice must stay abreast of the latest information and technology, drug interactions, and ADEs common in critical care along with pharmacoeconomic data regarding alternative treatment strategies. Knowledge related to antimicrobial selection and local pathogens and resistance patterns provide an important foundation for antimicrobial stewardship functions.

Other specialized knowledge required in critical care pharmacy includes parenteral vasoactive and inotropic agents; fluid, electrolyte, and acid/base management; agents used for acute volume resuscitation, hemostasis, and advanced cardiac life support; and nutrition, preventive, and supportive care measures used in the care of critically ill patients. Knowledge regarding monitoring techniques to assess hemodynamic, neurologic, pulmonary, and cardiovascular parameters is important for understanding and assessing clinical response and status.

Furthermore, critical care pharmacists must possess specialized knowledge regarding medical devices commonly utilized in critical care, mechanical ventilation principles and monitoring, and procedures commonly performed in critically ill or injured patients (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia).

Finally, knowledge is required regarding advance directives and end-of-life care, evidence-based critical care literature and clinical practice guidelines, and outcome indicators for pharmacotherapy of disease states common to patients cared for in the ICU. Implementation and management of critical care pharmacy services requires additional knowledge regarding the processes for developing and documenting critical care pharmacy services. Together, this unique body of knowledge and skills enables critical care pharmacists to perform specialized functions that fulfill unmet patient care needs.

Specialized knowledge of the pharmaceutical sciences in critical care requires a solid initial educational foundation, which is acquired through entry-level Doctor of Pharmacy programs and defined in the *ACPE Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*.² Specialty practice in critical care builds on a foundation of knowledge in medicinal chemistry, including the chemical basis of pharmacology and therapeutics and structural activity relationships that lead to drug-target interactions, and chemical pathways of drug metabolism, in concert with a broad

understanding of pharmacology. Pharmacotherapeutic principles of medications used in critical care, including mechanism of action, pharmacodynamics, pharmacokinetics, bioavailability, bioequivalence, potential ADEs and side effects, and interactions between drug-target, drug-drug, drug-food, and drug-lab tests underpin these pharmacists' ability to analyze individual patient situations and make determinations regarding drug treatment.

Patients requiring critical care often must receive medications through nontraditional routes of administration. For example, some medications that typically are oral dosage forms need to be delivered parenterally or through enteral feeding tubes. Knowledge of pharmaceuticals and biopharmaceuticals provides important insights into compatibility and drug delivery through varying dosage forms and their associated physical-chemical properties, which may influence the stability of different compounds if administered concurrently. Knowledge of toxicology and poisoning adds to this foundation.

Bloom's taxonomy of learning states that acquiring knowledge is only the first step in the hierarchy of cognitive learning that enables critical thinking, synthesis, and problem solving.³ Specialized knowledge provides the foundation—the means to the desired end — enabling pharmacists to perform the specialized tasks and functions required to identify and solve highly complex medication drug therapy problems.^{3,4}

Critical care pharmacists in specialty practice enhance their ability to prevent, detect, or ameliorate ADEs, through acquisition of specialized knowledge of potential ADEs associated with medications and of combinations of medications frequently used in critically ill patients.

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

A broad-based, in-depth, specialized knowledge of the pharmaceutical sciences described above in Guideline 1 provides the critical underpinning of the complex knowledge in the biological, physical, and behavioral and social sciences required to manage the acute, dynamic, and life-threatening needs of critically ill and injured patients.

Critical care pharmacists must possess specialized knowledge in anatomy and physiology, pathophysiology, and pathogenesis of acute and chronic diseases, and the related alterations that occur in the presence of critical illness or injury. Use of physical, clinical, and technological assessments and devices also must be fully understood. Critical care pharmacists must keep abreast of advances in medical devices and technology commonly employed in the care of critically ill patients, and they must understand how to use and interpret data from this technology and promptly identify malfunctions. They must integrate these data with laboratory

analyses and other information to guide, monitor, and manage medication therapy and nutrition. To ensure quality of care and minimize adverse events and errors, critical care pharmacists must maintain specialized and up-to-date knowledge of evidence-based medicine, clinical practice guidelines, and clinical research; they also require an understanding of systems and processes to conduct clinical research. The ability to interpret the published literature to determine the validity of the research methods, results, and outcomes and to make judgments regarding the relative merits of evolving and sometimes conflicting information is a foundational skill used routinely by the critical care pharmacist in specialty pharmacy practice when caring for patients and collaborating with intensivists, critical care nurses, and others on the health care team.

In the behavioral sciences, critical care pharmacists routinely draw upon theory and strategies for effective interpersonal communication, listening, negotiation, ethical decision making, cultural competence, and health literacy. This knowledge is essential for developing mutual trust and collegial relationships among the health care team, and in communicating with critically ill patients and their families or caregivers. Application of this knowledge also sustains skills required to educate health professionals in training and others regarding the safe use of medications in critically ill patients. Pharmacists specializing in critical care practice need to advocate for therapeutic adjustments, advise on antimicrobial selections, and communicate assertively and respectfully about potential medication-related problems.

Critical care pharmacy specialists need to understand comparative and relative short- and long-term costs associated with various therapeutic options. In this regard, and in an era of increasingly common shortages of medications used in critical care, specialized knowledge in the bioequivalence of alternative therapeutic options is important to ensure that strategies to provide care in the face of drug shortages or to reduce costs to the institution and/or patient result in positive or equivalent effects on the patients' clinical status.

Collaboration with prescribers and other members of the health care team in managing the complex care of critically ill patients requires specialized knowledge in communication and negotiation strategies with peers, subordinates, or superiors, as well as understanding of legal and practical aspects of critical care pharmacy services. In addition, the critical care pharmacy specialist must be knowledgeable regarding the methods and systems for documenting patient care activities and plans (e.g., electronic health records, other communication systems).

The body of specialized knowledge described in Guidelines 1 and 2 provides the required foundation for the analysis, assimilation, and problem-solving skills required by critical care pharmacists in the care of critically ill and injured patients. As Bloom³ explains, learning is

hierarchical. Learning and performance at high levels, such as that required for managing the complexities of critically ill patients, begins with obtaining knowledge (i.e., learning facts) and comprehending that knowledge. Applying the knowledge is an interim step, leading ultimately to the ability to fully use and integrate the knowledge with other data in collaboratively developing and refining individualized care plans for critically ill patients and engaging in clinical research. Criterion E describes the skills and functions performed by critical care pharmacists based on these high levels of specialized knowledge acquisition to make determinations regarding choice of medications, management of complex conditions, and synthesis of care plans.

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

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

The licensure examination, by definition, sets a *minimum* competency standard. Specialty certification, by contrast, serves “to demonstrate advanced knowledge and skills independent of, and in addition to, a degree program or license.”⁵ Board certification requires the acquisition of specialized knowledge that prepares a pharmacist for advanced practice levels. Functions performed by critical care pharmacy specialists, and the specialized knowledge that support these functions, are qualitatively different from those provided by pharmacists in the general practice of pharmacy. Compared with general pharmacy practice, pharmacists in critical care pharmacy routinely perform many unique functions and additional functions at greater depth or with greater emphasis than in generalized practice.

As established under Criterion A, the needs of critically ill and injured patients are complex and dynamic. General physiologic functions are strongly influenced by critical illness and injury. Common chronic conditions may present in patients, however, often they are associated with complications, may further complicate acute conditions, or are likewise influenced by critical injury and illness. Collectively, these changes alter usual and predicted drug metabolism, and pharmacodynamic responses to medications. Entry-level Doctor of Pharmacy programs provide neither the depth nor breadth of knowledge necessary to make clinical decisions and

recommendations regarding medication use in critically ill and injured patients. Notably, when dosing and medication use decisions are based on usual pharmacokinetic principles and predicted pharmacodynamic responses—rather than specialized knowledge of the actions of medications in critically ill and injured patients—medication errors and preventable harm have been shown to occur. Most Doctor of Pharmacy programs do not provide in-depth education about the differences between critically ill and non–critically ill patients, nor are critical care pharmacy practice experiences (e.g., rotations) required as APPEs. Without additional knowledge, skills, and experience, the graduates of entry-level Doctor of Pharmacy degree programs are not sufficiently prepared to provide specialized care to critically ill and injured patients.

The NAPLEX Blueprint⁶ (see Appendix D-2) is a list of competency statements describing the knowledge, judgment, and skills expected of an entry-level pharmacist. The licensure examination establishes the acquisition, comprehension, and application of basic, general pharmacy practice knowledge, but not the analysis, synthesis, and evaluation of specialized knowledge of pharmacotherapeutics in relation to critical illness and injury. The minimum competency standards set by licensure fall short of the validated knowledge and expertise required of a critical care pharmacy specialist.

Required specialized knowledge of critical care pharmacists includes familiarity with medical devices and technology commonly employed in the care of critically ill patients. The specialized practitioners must be capable of interpreting, integrating, and applying these data to therapeutic decision making. Critical care pharmacy practice also requires expertise associated with the conduct and evaluation of clinical research; evidence-based medicine and clinical guidelines; and communication and negotiation strategies. Some of these areas of knowledge may be introduced in the Doctor of Pharmacy curriculum, however they are neither mastered at a specialty level during entry-level education nor measured by the licensure examination.

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

BPS has not yet recognized a specialty in pharmacy that encompasses the domains and specialized areas of knowledge required for critical care pharmacy practice. BPS-recognized specialties in nutrition support, psychiatry, and oncology focus on narrow segments of patients who may become critically ill, and therefore lack the required breadth of specialized clinical and pharmacotherapeutic knowledge required to provide specialized care of critically ill patients. Ambulatory care is focused on the management of chronic diseases, preventive care, and

health promotion for ambulatory patients, collectively constituting a completely different emphasis. Nuclear pharmacy lacks the direct patient care aspect of critical care practice and does not include the key areas of specialty knowledge outlined in Guidelines 1 and 2. Although critical care pharmacy practice requires knowledge and skills required for the nutritional support of critically ill and injured patients, the proposed specialty is distinct from the BPS-recognized specialty in nutrition support pharmacy. The examination content for nutrition support pharmacy is vastly different from the findings of the *Report of the Role Delineation Study of Critical Care Pharmacy*; 68 percent of the nutrition support pharmacy specialty exam is focused on individualizing nutrition support care plans, and the pharmacotherapeutic management of critically ill and injured patients is not evaluated. The sole BPS specialty that shares some common areas of specialized knowledge with the proposed critical care specialty is pharmacotherapy. There are, however, distinct differences between specialized pharmacotherapy practice and the proposed critical care pharmacy specialty.

Table D-2 lists the domains of critical care pharmacy practice in comparison with the domains of specialized pharmacotherapy practice. While critical care and pharmacotherapy both include the clinical management of patients, the Clinical Skills and Therapeutic Management domain of critical care is highly specific to critically ill and injured patients; this domain also stipulates 10 percent greater focus than pharmacotherapy. The pharmacotherapy specialty is broader, providing care to a more clinically diverse patient population. The pharmacotherapy specialty includes a greater emphasis (25 percent) on information management (i.e., retrieval, generation, interpretation) and education (i.e., dissemination), when compared with critical care (19 percent); qualitatively there are additional differences in the knowledge required.

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

Critical Care Pharmacy Specialist Domains (Proposed Examination Percentage)	Pharmacotherapy Specialist Domains (Examination Percentage)
Clinical Skills and Therapeutic Management (66 %)	Patient-Specific Pharmacotherapy (60 %)
Practice Administration and Development (15 %)	Retrieval, Generation, Interpretation and Dissemination of Knowledge in Pharmacotherapy (25 %)
Information Management and Education (19 %)	Systems and Population-Based Pharmacotherapy (15 %)

Table D-3 lists the specialized knowledge within each of the domains of critical care pharmacy practice and pharmacotherapy specialty practice. This side-by-side comparison shows that despite some limited overlap, the knowledge required for critical care pharmacy practice is more in-depth and centered specifically on the care of critically ill and injured patients. Pharmacotherapy in contrast encompasses a specialized level of care across the spectrum of

disease states, conditions, patient populations, and venues of care. Pharmacotherapy also has a greater emphasis on knowledge in support of administrative functions over clinical knowledge, compared with critical care.

Table D-3. Contrast in Knowledge Areas between Critical Care Pharmacy and Pharmacotherapy

Critical Care Pharmacy Specialist	Pharmacotherapy Specialist
<p>Domain 1: Clinical Skills and Therapeutic Management</p> <ul style="list-style-type: none"> ▪ Diagnosis, pathophysiology, epidemiology, risk factors, and treatment of conditions in critically ill patients in the following therapeutic areas: pulmonary, cardiovascular, neurology and neurological injuries, psychiatry, renal, hepato-gastrointestinal, immunology, endocrine, hematology, infectious diseases, toxicology, and surgery ▪ Sedation, analgesia, delirium, and neuromuscular blockade ▪ Nutrition support in the critically ill patient ▪ Alterations of pharmacodynamics and pharmacokinetics in the critically ill (e.g., effects of hypothermia, mechanical ventilation, volume resuscitation, organ dysfunction) ▪ Drug interactions and adverse drug events common in critical care ▪ Pharmacoeconomics (e.g., cost effectiveness, cost minimization) ▪ Sepsis/SIRS ▪ Advanced Cardiac Life Support (ACLS) principles ▪ Devices commonly utilized in critical care (e.g., balloon pump, left ventricular assist device [LVAD], cooling devices, extracorporeal membrane oxygenation) ▪ Procedures commonly performed in critical care (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia) ▪ Renal replacement therapy ▪ Mechanical ventilation principles and monitoring techniques ▪ Critical care monitoring techniques (e.g., hemodynamic, neurologic, cardiovascular) ▪ Impact of alterations in anatomy and physiology due to trauma, surgery or congenital causes on medication 	<p>Domain 1: Patient-Specific Pharmacotherapy</p> <ul style="list-style-type: none"> ▪ Anatomy and physiology ▪ Disease state knowledge (prognosis; pathophysiology; epidemiology; etiology; risk factors; pathogenesis; signs and symptoms; diagnostic criteria; pharmacotherapy; pharmacokinetics; pharmacodynamics; pharmacoeconomics; pharmacogenomic; pharmaceuticals; drug-drug, drug-laboratory, drug-nutrient, drug-device, and drug-disease interactions; adverse drug effects; non-drug treatment; drug administration) ▪ Disease/drug monitoring parameters (physical examination, laboratory and point of care tests, diagnostic tests, therapeutic goals) ▪ Evidence-based practice guidelines ▪ Patient education principles and methods ▪ Health literacy ▪ Regulatory requirements related to prescribing and monitoring specific drugs (e.g., methadone, isotretinoin, REMS programs) ▪ Federal regulations related to patients rights and protections (e.g., privacy, child/adult protective services, advance directives, living will, power of attorney, do not resuscitate) ▪ Ethical issues ▪ Formats used to document pharmacotherapy recommendations and follow-up ▪ Humanistic factors or outcomes (e.g., patient satisfaction, quality of life) ▪ Cultural competence and sensitivity

<p>therapy</p> <ul style="list-style-type: none"> ▪ Routes of administration for medications in critically ill patients ▪ Routes of administration for nutrition (enteral vs. parenteral) and alterations in absorption of nutrients in critically ill patients ▪ Preventative and supportive care measures used in the care of critically ill patients ▪ Fluid, electrolyte, and acid/base management in ICU patients ▪ Agents used for acute volume resuscitation and hemostasis (e.g., crystalloids, colloids, blood products, hemostatic agents) ▪ Parenteral vasoactive and inotropic agents ▪ End of life care ▪ Impact of critical illness on pre-existing conditions (e.g. endocrine disorders, cardiovascular diseases, infectious diseases, respiratory diseases) ▪ Application of evidence-based critical care literature and clinical practice guidelines in designing a patient-specific plan of care ▪ Outcome indicators for pharmacotherapy of disease states common to ICU patients ▪ Documentation processes used for critical care pharmacy services 	<ul style="list-style-type: none"> ▪ Health promotion and disease prevention ▪ Complementary and alternative medicine
<p>Domain 2: Practice Administration and Development</p> <ul style="list-style-type: none"> ▪ Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey) ▪ Metrics for evaluating quality of critical care pharmacy services (e.g., lengths of ICU stay, mortality, cost-effectiveness) ▪ Quality assurance and process improvement methods ▪ Evidence-based literature supporting the value of critical care pharmacy ▪ Application of evidence-based critical care literature in designing institutional guidelines ▪ Communication strategies ▪ Resources (e.g., financial, technological, human) necessary to care for critically ill patients 	<p>Domain 3: Systems and Population-Based Pharmacotherapy</p> <ul style="list-style-type: none"> ▪ National regulatory and accrediting agency requirements for preventing, tracking, and reporting new, unusual, or severe pharmacotherapeutic events ▪ Process/procedures for reporting to the FDA and other organizations new, unusual or severe adverse events related to drugs and/or devices ▪ Evidence-based clinical practice and patient-care standards ▪ Comparative effectiveness research/reviews ▪ Health system-based standards and Federal regulations (e.g., TJC, NCQA, OSHA, CMS, HEDIS, LEAPFROG, HIPAA, FDA)

<ul style="list-style-type: none"> ▪ Medication safety principles pertinent to patients requiring care in the ICU 	<ul style="list-style-type: none"> ▪ Principles of medication-use evaluation and prevention of drug-related injury ▪ Performance improvement process ▪ Principles of formulary and drug use system management ▪ Ethical issues (industry interactions, conflict of interest, disclosure) ▪ Continuity of patient care (e.g., medication reconciliation, in-home medication use)
<p>Domain 3: Information Management and Education</p> <ul style="list-style-type: none"> ▪ Principles and methods of educating pharmacists, fellows, residents, students, and other healthcare professionals ▪ Techniques for educating critically ill patients/caregivers ▪ Published documents from professional societies (e.g., American Society of Health-System Pharmacists [ASHP], American College of Clinical Pharmacy [ACCP], Society of Critical Care Medicine [SCCM]) regarding the education and training of critical care pharmacists ▪ Research design, methodology, and statistical analysis ▪ Clinical application and limitations of published data and reports ▪ Regulatory/IRB requirements relative to conducting critical care research ▪ Continuing professional development opportunities in critical care (e.g., professional organization membership, committee involvement, sources of continuing education, mentorship) ▪ Mentorship principles, techniques, and strategies ▪ Medical literature publication and review process ▪ Opportunities for disseminating critical care knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters) 	<p>Domain 2: Retrieval, Generation, Interpretation and Dissemination of Knowledge in Pharmacotherapy</p> <ul style="list-style-type: none"> ▪ Primary, secondary, and tertiary references ▪ Search strategies ▪ Information resources ▪ Biostatistical methods ▪ Internal and external validity ▪ Clinical and statistical significance ▪ Principles and methods of educating health care students and professionals ▪ Role modeling, mentoring, and coaching techniques ▪ Knowledge/skills assessment techniques ▪ Research hypothesis generation ▪ Research design and methodology ▪ Protocol and proposal development ▪ Regulatory requirements for the conduct of research (e.g., HIPAA, IRB, OSHA, NIH) ▪ Data management ▪ Design of publications for dissemination of new knowledge

CMS = Centers for Medicare and Medicaid Services; FDA = Food and Drug Administration; HEDIS = Healthcare Effectiveness Data and Information Set; HIPAA = Health Insurance Portability and Accountability Act; ICU = intensive care unit; IRB = institutional review board; LEAPFROG = The Leapfrog Group; NCQA = National Committee for Quality Assurance; NIH = National Institutes of Health; OSHA = Occupational Safety and Health Administration; REMS = risk evaluation and mitigation strategies; SIRS = systemic inflammatory response syndrome; TJC = The Joint Commission.

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

² Accreditation Council for Pharmacy Education. *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*. 2011. Available at: <http://www.acpe-accredit.org/standards/default.asp>. Accessed August 17, 2012.

³ Bloom BS, ed. *Taxonomy of Educational Objectives: The Classification of Educational Goals*. Chicago, IL: Susan Fauer Company, Inc; 1956.

⁴ Anderson LW, Krathwohl DR, Airasian PW, et al., eds. *A Taxonomy for Learning, Teaching, and Assessing — A Revision of Bloom's Taxonomy of Educational Objectives*. New York, NY: Addison Wesley Longman, Inc.; 2001.

⁵ Board of Pharmacy Specialties. *2012 Candidate's Guide*. Available at: <http://www.bpsweb.org/pdfs/CandidatesGuide.pdf>. Accessed September 17, 2012.

⁶ National Association of Boards of Pharmacy. NAPLEX blueprint. Available at: <http://www.nabp.net/programs/examination/naplex/naplex-blueprint>. Accessed November 1, 2012.

CRITERION E: Specialized Functions

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

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

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

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

- **Domain 1: Clinical Skills and Therapeutic Management**
Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the health care team.
- **Domain 2: Practice Administration and Development**
Tasks related to advancing critical care pharmacy practice establishing, implementing, and monitoring systems and policies to optimize the care of critically ill patients.
- **Domain 3: Information Management and Education**
Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of health care providers and trainees.

Within these domains, the role delineation study presents 30 tasks that have been validated on the basis of the importance of the task statement and the frequency that the tasks are performed. The full list of validated tasks in critical care pharmacy practice can be found in

Appendix D-1. The functions that are unique or emphasized in specialized critical care pharmacy practice are reported in Table E-1.

Table E-1. Functions That Are Unique or Emphasized in Specialized Critical Care Pharmacy Practice

Domain of Critical Care Pharmacy Practice	Specialized Functions That Are Unique to or Emphasized in Specialized Critical Care Pharmacy Practice
<p>Domain 1: Clinical Skills and Therapeutic Management</p>	<ul style="list-style-type: none"> ▪ Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies. ▪ Perform comprehensive review and assessment of a critically ill patient’s current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines. ▪ Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient’s physiological condition and severity of illness. ▪ Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient. ▪ Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critical care monitoring (e.g., ICP measurements, hemodynamic monitoring parameters, mechanical ventilator settings, ECGs). ▪ Interpret, analyze, and integrate collected information for a critically ill patient. ▪ Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient. ▪ Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence. ▪ Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient. ▪ Design and recommend a monitoring plan to assess a critically ill patient’s response to therapeutic regimens and progress toward therapeutic goals. ▪ Monitor a critically ill patient and evaluate therapeutic and adverse outcomes. ▪ Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals. ▪ Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled analgesia, nebulizers). ▪ Participate in the management of the medical emergencies and resuscitation events. ▪ Facilitate continuity of care by communicating pertinent patient information to

	<p>health care professionals within the ICU and when transitioning into or out of the ICU.</p> <ul style="list-style-type: none"> ▪ Document direct patient care activities as appropriate.
<p>Domain 2: Practice Administration and Development</p>	<ul style="list-style-type: none"> ▪ Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients. ▪ Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients. ▪ Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based). ▪ Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team. ▪ Justify and document clinical and financial value of critical care pharmacy services. ▪ Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area. ▪ Promote the role and optimal use of critical care pharmacists to key stakeholders.
<p>Domain 3: Information Management and Education</p>	<ul style="list-style-type: none"> ▪ Educate health care professionals and other stakeholders concerning issues related to the care of critically ill patients. ▪ Educate critically ill patient and caregivers on issues related to medications and nutrition support. ▪ Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions. ▪ Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice. ▪ Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks). ▪ Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population. ▪ Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).

ECG = electrocardiography; ICP = intracranial pressure; ICU = intensive care unit.

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

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

- 1. Analyze, synthesize, evaluate, and manage complex drug regimens for critically ill patients by monitoring and assessing the clinical, laboratory, and technological data, applying evidence-based information, collaborating with other health care professionals, and developing individualized care and monitoring plans.*

Critical care pharmacists in specialized practice apply specialized knowledge in the collection, interpretation, and integration of clinical information from a variety of sources. Data sources include physical assessment, medical record and history, laboratory data, technological data available via medical devices. Critical care pharmacists obtain, analyze, and assimilate the medical history and clinical status information of a critically ill or injured patient and perform a comprehensive medication review and assessment. These pharmacists utilize physical examination results, vital signs, physical exam findings, and other pertinent assessments to comprehensively assess a critically ill patient's physiological condition and severity of illness. They actively participate in collaborative clinical decision making on rounds with the interprofessional team. Critical care pharmacy specialists assess relevant data from laboratory studies, imaging studies, procedures, and advanced critical care monitoring devices. They hold responsibility for interpreting, analyzing, and integrating clinical information for a critically ill patient and assessing and prioritizing medical, medication, and nutrition-related therapy and problems.

Using patient-specific data and best available evidence, critical care pharmacists collaborate as a member of a multidisciplinary team to establish and prioritize therapeutic goals for critically ill or injured patients. They monitor critically ill patients and evaluate therapeutic response and adverse outcomes and modify care plans as required. Critical care pharmacists monitor for clinical changes and alterations that can influence action and metabolism of medications and adjust dosages and medication therapy as needed. The critical care pharmacy specialist facilitates the administration of medications, including the

assessment of available administration routes, intravenous compatibilities and stability, and utilization of appropriate medication delivery technologies. They also participate in the management of medical emergencies and patient resuscitation events as required.

Specialists in critical care pharmacy practice facilitate continuity of care by performing medication reconciliation and communicating pertinent patient information to health care professionals within the ICU and during transition into or out of the ICU. They also document clinical status, medication response, therapeutic plans, adverse events, and patient care interventions.

- 2. Design and implement critical care pharmacy services and take responsibility for the planning, delivery, and management of those services.*

Critical care pharmacists ensure that critical care pharmacy services optimize medication-related outcomes for critically ill patients and develop and implement institutional policies and guidelines that facilitate the care of critically ill patients. They utilize and obtain buy-in for evidence-based clinical guidelines, with other members of the interdisciplinary critical care team, and perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area. Promoting the role and optimal use of critical care pharmacists and justifying and documenting clinical and financial value of critical care pharmacy services are important functions of critical care clinical specialists.

- 3. Communicate in ways that foster the development of effective, collaborative, interprofessional teams; educate health professionals about the safe and effective use of medications in critically ill and injured patients; and educate family and caregivers concerning the medication treatments administered in the critical care setting.*

Critical care specialists establish and sustain collaborative professional relationships with other health care practitioners who are part of interprofessional teams. They educate healthcare professionals, critically ill patients, caregivers, and other stakeholders on issues related to medications use and safety, nutrition support, and other concerns related to the care of critically ill patients. Critical care pharmacists also provide education, training, and mentoring for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.

4. *Retrieve and assess relevant medical and patient information to practice evidence-based medicine, conduct clinical research, and contribute to the body of knowledge regarding pharmaceutical care in critically ill and injured patients.*

Critical care pharmacy specialists participate in continuous professional development related to critical care pharmacy practice to stay current with advances in pharmacotherapeutics, safety, and quality. They engage in clinical research and actively contribute to the published literature in critical care. Critical care pharmacists in specialized practice must retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population. They also disseminate the information through staff development and education, and serve as a resource to other members of their interprofessional health care team.

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

A recent graduate with a Doctor of Pharmacy degree is educated to provide care in generalized practice in a variety of settings. The scope of practice defined by the licensure examination assures that a licensed pharmacist has met the baseline, minimum standards to practice pharmacy. The licensure examination, by definition, sets a minimum competency standard. BPS certification is a voluntary process by which a pharmacist's education, experience, knowledge, and skills in a particular practice area are confirmed well beyond what is required for licensure.² Patients who are critically ill require the specialized knowledge and skills provided by critical care specialists in order to optimize health and medication-use outcomes and prevent medication errors and adverse events.

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

Critical care pharmacy specialists engaged in specialized functions have obtained competencies in the domains of clinical skills and therapeutic management, practice administration and development, and information management and education. They are responsible for analyzing,

synthesizing, evaluating, and managing complex drug regimens for critically ill patients by monitoring and assessing the clinical, laboratory, and technological data, applying evidence-based information, collaborating with other health care professionals, and developing individualized care and monitoring plans. They design and implement critical care pharmacy services and take responsibility for the planning, delivery, and management of those services.

Additional skills include the ability to communicate in ways that foster the development of effective, collaborative, interprofessional teams; educate health professionals about the safe and effective use of medications in critically ill and injured patients; and educate family and caregivers concerning the medication treatments administered in the critical care setting. Critical care pharmacists must be skilled in retrieving and assessing relevant medical and patient information in the context of evidence-based medicine. These specialists also conduct clinical research and contribute to the body of knowledge regarding pharmaceutical care in critically ill and injured patients.

While pharmacy students acquire and practice some of these knowledge, skills, and functions during their Doctor of Pharmacy educational program, they are neither mastered at a specialty level during entry-level education nor measured by the licensure examination.

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

No currently recognized BPS specialty encompasses the specialized functions required of the critical care pharmacy specialist. For example, specialists in nuclear pharmacy lack the fundamental pharmacotherapeutic, medication management, and direct patient care skills of critical care specialists. Specialties in nutritional support, psychiatry, and oncology do not primarily focus on the care of critically ill patients and consequently may lack the required breadth and depth. Nutrition support pharmacists do provide nutritional support for critically ill patients; however, the domains of the specialty do not encompass the other tasks and functions performed by pharmacists practicing at a specialty level in critical care.

The sole currently recognized specialty area with any degree of overlap in functions and knowledge with those of the proposed critical care specialty is pharmacotherapy. A closer look at the domains and specialized areas of knowledge for both specialty areas, however, reveals important differences. The BPS recognized specialty in pharmacotherapy is divided into three domains: (1) patient-specific pharmacotherapy; (2) retrieval, generation, interpretation, and dissemination of knowledge in pharmacotherapy; and (3) health system–related

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

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

Critical Care Pharmacist Specialist Domains (Proposed Examination Percentage)	Pharmacotherapy Specialist Domains (Examination Percentage)
Clinical Skills and Therapeutic Management (66 %)	Patient-specific Pharmacotherapy (60 %)
Practice Administration and Development (15 %)	Retrieval, Generation, Interpretation and Dissemination of Knowledge in Pharmacotherapy (25 %)
Information Management and Education (19 %)	Systems and Population-based Pharmacotherapy (15 %)

Similar to the overlap seen among medical specialties, some overlap in functional domains exist between the proposed critical care specialty and other BPS-recognized specialties, particularly pharmacotherapy. However, the differences are significant. The specialized knowledge and functions performed by the critical care pharmacy specialist differ substantially from pharmacotherapy specialty functions and clinical operations because of the depth of knowledge in the care, monitoring, and treatment of critically ill and injured patients. The role delineation study reveals a 10 percent additional focus on patient care in critical care, compared with pharmacotherapy. While board certified pharmacotherapists provide care to a wide range of patients in a variety of clinical circumstances, specialized practice in critical care requires significant depth and emphasis on medication therapy management of patients who are critically ill or injured. It is important to acknowledge that the pharmacotherapy exam is designed to test knowledge and understanding across a broad spectrum of therapeutic areas and patient populations. The pharmacotherapy specialty cannot deeply focus on specific areas to ensure a specialty level of knowledge, skills, and functions required for critical care pharmacy practice. The pharmacotherapy exam is designed to assess knowledge and skills in pharmacotherapy broadly; however, it does not validate acquisition of knowledge in any one specific area. As a result, pharmacists who are board certified in pharmacotherapy without additional training or education cannot effectively meet the complex needs of critically ill patients.

Differences in the depth and focus of the functions related to the care of critically ill patients within each domain differentiate critical care pharmacy practice and pharmacotherapy specialty practice. Table E-3 lists the tasks defined by the pharmacotherapy examination content outline and the specialized functions listed in Table E-1 that are unique to, or that require greater depth and emphasis, by critical care pharmacy specialists.

Table E-3. Contrast in Functional Areas between Critical Care and Pharmacotherapy

Specialized Functions Performed by the Critical Care Pharmacy Specialist	Specialized Functions Performed by the Pharmacotherapy Specialist
<p>Domain 1: Clinical Skills and Therapeutic Management</p> <ul style="list-style-type: none"> ▪ Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies ▪ Perform comprehensive review and assessment of a critically ill patient’s current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines ▪ Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient’s physiological condition and severity of illness ▪ Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient ▪ Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critical care monitoring (e.g., ICP measurements, hemodynamic monitoring parameters, mechanical ventilator settings, ECGs) ▪ Interpret, analyze, and integrate collected information for a critically ill patient 	<p>Domain 1: Patient-Specific Pharmacotherapy</p> <ul style="list-style-type: none"> ▪ Collect patient-specific data to identify problems and individualize care <ul style="list-style-type: none"> – Review patient data regarding history, physical assessment, working diagnosis, laboratory and other diagnostic tests, and orders regarding drug therapy – Perform patient assessments (for example, physical examination, point of care testing) – Obtain information from patient, family, and health care team members – Obtain additional pertinent data ▪ Interpret data to identify problems <ul style="list-style-type: none"> – Interpret subjective and objective data – Identify drug-related problems – Develop/update a problem list ▪ Design an individualized therapeutic plan <ul style="list-style-type: none"> – Determine and prioritize prevention and treatment goals – Consider ethical, cultural, legal, economic, quality of life and safety issues – Select drug and/or non-drug interventions – Identify potential for drug-drug, drug-disease, drug-nutrient, drug-device, and/or drug-laboratory interactions ▪ Implement a therapeutic plan in collaboration with other health care professionals <ul style="list-style-type: none"> – Evaluate and resolve patient or health-care-system problems in the implementation of a patient’s therapeutic plan – Administer drugs – Order diagnostic and/or laboratory tests

<ul style="list-style-type: none"> ▪ Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient ▪ Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence ▪ Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient ▪ Design and recommend a monitoring plan to assess a critically ill patient’s response to therapeutic regimens and progress toward therapeutic goals ▪ Monitor a critically ill patient and evaluate therapeutic and adverse outcomes ▪ Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals ▪ Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled analgesia, nebulizers) ▪ Participate in the management of the medical emergencies and resuscitation events ▪ Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU ▪ Document direct patient care activities as appropriate 	<ul style="list-style-type: none"> – Perform diagnostic and/or laboratory tests – Communicate a therapeutic plan to health care professionals – Document a therapeutic plan ▪ Educate patient and/or caregiver regarding a therapeutic plan <ul style="list-style-type: none"> – Identify and prioritize patient education needs – Recognize patient education barriers – Select and use appropriate educational method(s) – Assess patient’s knowledge/skill acquisition ▪ Monitor and modify a therapeutic plan <ul style="list-style-type: none"> – Monitor a therapeutic plan by collecting and interpreting data – Modify a therapeutic plan as needed
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<p>Domain 2: Practice Administration and Development</p> <ul style="list-style-type: none"> ▪ Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients ▪ Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients ▪ Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based) ▪ Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team ▪ Justify and document clinical and financial value of critical care pharmacy services ▪ Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area ▪ Promote the role and optimal use of critical care pharmacists to key stakeholders 	<p>Domain 3: Systems and Population-Based Pharmacotherapy</p> <ul style="list-style-type: none"> ▪ Document and report new, unusual, or severe pharmacotherapeutic events (e.g., adverse reactions, drug interactions, medication errors, drug/device/assay defects) ▪ Collect and interpret data to characterize/identify health system and/or public health related problems ▪ Design, justify, and garner support for health system and/or public health-related initiatives ▪ Implement health system and/or public health-related initiatives ▪ Measure and monitor outcomes of health system and/or public health-related initiatives
<p>Domain 3: Information Management and Education</p> <ul style="list-style-type: none"> ▪ Educate health care professionals and other stakeholders concerning issues related to the care of critically ill patients ▪ Educate critically ill patient and caregivers on issues related to medications and nutrition support ▪ Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions ▪ Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice ▪ Participate in continuous professional 	<p>Domain 2: Retrieval, Generation, Interpretation and Dissemination of Knowledge in Pharmacotherapy</p> <ul style="list-style-type: none"> ▪ Identify and retrieve relevant biomedical literature ▪ Interpret biomedical literature with regard to study design and methodology, statistical analysis, and significance of reported data and conclusions ▪ Educate health care professionals, students, patients, and the public ▪ Conduct research to generate clinical, economic, humanistic or translational knowledge applicable to patient care ▪ Prepare and disseminate new knowledge (e.g., original research, review articles, case reports,

<p>development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks)</p> <ul style="list-style-type: none"> ▪ Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population ▪ Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process) 	<p>abstracts, reviews and monographs)</p>
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ECG = electrocardiography; ICP = intracranial pressure; ICU = intensive care unit.

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

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

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

CRITERION F: Education and/or Training

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

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

The critical care setting involves a multidisciplinary approach to treating patients with complex health care needs. Critical care pharmacy specialists are able to advise and oversee all parts of the medication use process to ensure the safest and most beneficial use of medications in critically ill patients. They participate in all aspects of the medication use process, from collaborating with physicians on selecting and adjusting medications, to providing information to other health care professionals on safe administration and adequate monitoring for adverse events and response. These functions require specialized knowledge and skills beyond those acquired as part of entry-level education into the profession of pharmacy.

According to the *ACPE Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*, the pharmacy curriculum provides a thorough foundation in the biomedical, pharmaceutical, social/behavioral/administrative, and clinical sciences and prepares graduates with the competencies needed to enter pharmacy practice in any setting and to contribute to the profession of pharmacy throughout their careers.¹ The pharmacy curriculum provides the student the necessary tools to ensure optimal medication therapy outcomes and patient safety, fulfills the educational requirements for licensure as a pharmacist, and satisfies the requirements of schools and colleges of pharmacy for the degree. The curriculum also develops the knowledge in graduates that meets the criteria of good sciences, professional skills, attitudes, and values, as well as the ability to integrate and apply learning both to the present practice of pharmacy and to the advancement of the profession. Furthermore, the curriculum is designed to encourage the development of students as leaders and agents of change.

The Doctor of Pharmacy curriculum provides the basic education and training that graduates need to practice at a generalist level. Although the didactic portion of the curriculum regarding critical care pharmacy may be rudimentary, it also may provide some insight into the fundamental education and training for the critical care pharmacy specialist. The Doctor of Pharmacy curriculum is designed to develop competent and well-rounded pharmacists by fostering the development and maturation of critical thinking and problem-solving skills and enabling individuals to transition from dependent students to active, self-directed, lifelong learners.

Experientially, ACPE standards require students to complete IPPEs and APPEs. Furthermore, current ACPE standards require that APPEs include primary, acute, chronic, and preventive care among patients of all ages and that these experiences develop pharmacist-delivered patient care competencies. However, APPEs are not required to specifically address the area of critical care practice. Critical care can be chosen as an elective if available, or may be experienced during an inpatient/acute care general medicine rotation.

Following completion of the academic degree program, pharmacists must pass the NAPLEX, developed by the National Association of Boards of Pharmacy. Successful performance on the NAPLEX is an indication that the candidate demonstrates the knowledge, judgment, and skills required to be a competent entry-level pharmacist.

The three areas of expected core competencies assessed via the NAPLEX for prospective pharmacists are as follows²:

- Area 1: Assess pharmacotherapy to assure safe and effective therapeutic outcomes.
- Area 2: Assess safe and accurate preparation and dispensing of medications.
- Area 3: Assess, recommend, and provide health care information that promotes public health.

Pharmacists can acquire the differentiated knowledge and skills required for specialized critical care pharmacy practice by a variety of methods. These methods may include:

- PharmD degree education, clinical work experience, and self-study.
- PharmD degree education, PGY1 residency training, clinical work experience, and self-study.
- PharmD degree education, PGY1 residency training, PGY2 residency in critical care, clinical work experience, and self-study.
- PharmD degree education, critical care fellowship (with or without a residency), clinical work experience, and self-study.

An efficient means of training for practice as a critical care pharmacy specialist is to complete a PGY1 residency in pharmacy practice followed by completion of a PGY2 residency or fellowship in critical care. Residency programs provide effective and structured experiential learning opportunities in critical care because they place the pharmacist directly into the area of specialty for at least 1 year.

Although the core competencies to obtain a Doctor of Pharmacy degree are rigorous enough to provide the pharmacist with the tools to practice in a generalized setting, the degree alone does not provide the knowledge and skills of sufficient concentration for a career as a critical care pharmacist specialist. Additional training, clinical work experience, and study are necessary. Because critical care is an evolving specialty based in collaborative work through an interdisciplinary health care team, many critical care pharmacy specialists also have obtained the needed knowledge, skills, and abilities through mechanisms other than structured training programs.

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

Critical care pharmacists can attain the required knowledge and skills necessary for specialized practice through advanced training programs. Formal training programs available to prepare pharmacists to become specialized in critical care pharmacy practice include residencies and fellowships. In addition, a variety of traineeships, as described in Criterion G, are available to augment the critical care pharmacist's education and skills for practicing in the critical care environment.

Residency Training

Advanced education and training is available through ASHP-accredited generalized PGY1 and specialty PGY2 residencies. Appendix F-1 provides a copy of the ASHP Accreditation Standard for Postgraduate Year Two (PGY2) Pharmacy Residency Programs.) Currently there are 99 PGY2 critical care pharmacy residency programs in the United States, with capacity for training 122 individuals each year. PGY2 residencies offer a direct, concentrated, and efficient path for specialty training.

Accredited PGY2 specialty residencies in critical care prepare pharmacists to provide exceptional pharmaceutical care for patients who are critically ill. PGY2 residency training builds upon a PGY1 residency by enhancing the resident's depth of knowledge, skills, attitudes, and abilities. Through concentrated experiences in managing critically ill and injured patients with

the support of a seasoned critical care pharmacist, these programs cultivate pharmacists' ability to provide care in the most difficult patient cases. These residencies also provide training in leadership and management of a critical care practice. Accordingly, PGY2 residencies afford residents the opportunities to succeed as independent practitioners by conceptualizing and integrating experience and knowledge and develop both into improved pharmacotherapy management and patient outcomes.

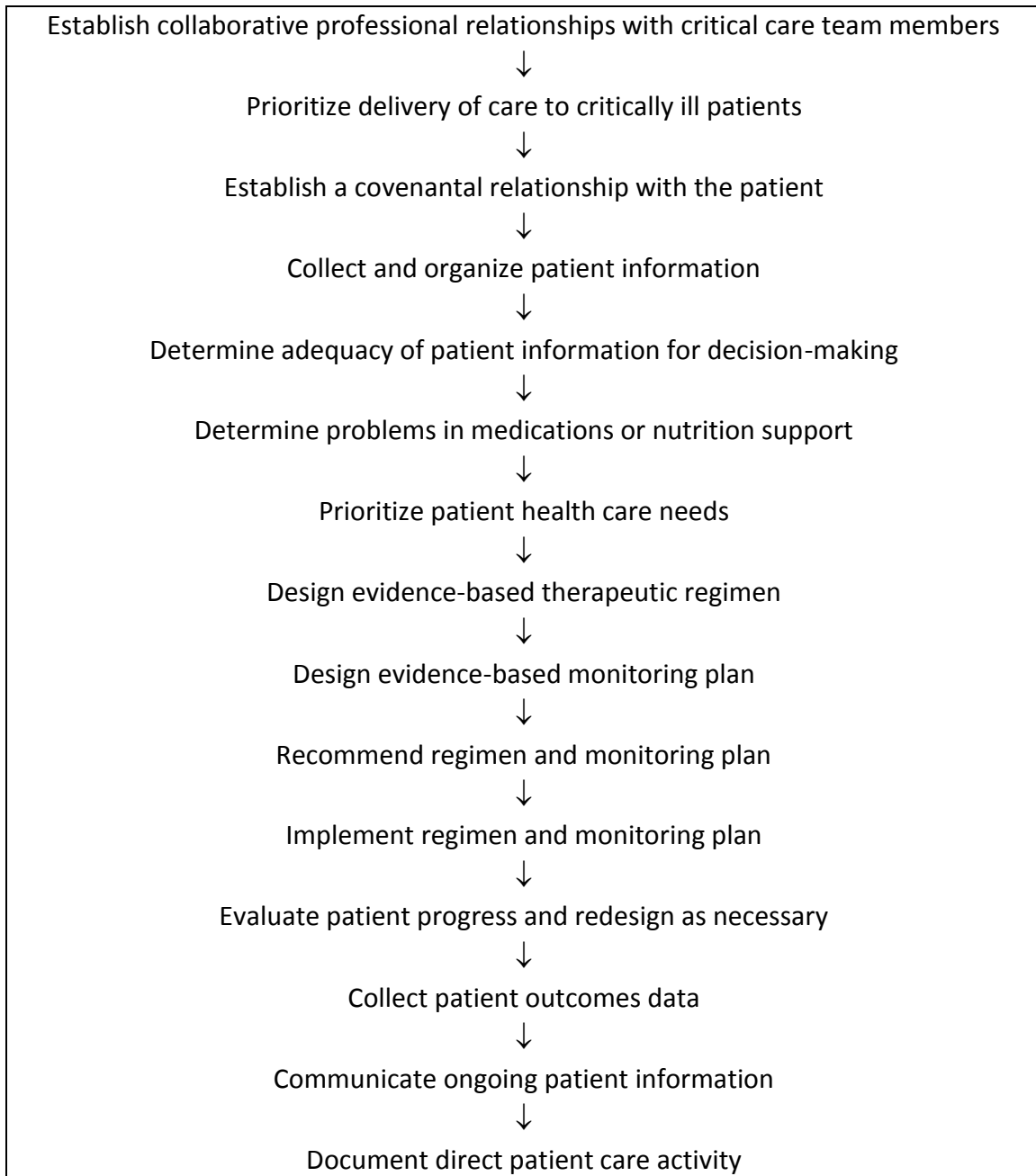
Training in the PGY2 critical care residency focuses on developing the resident's management of a variety of diseases and disorders that occur in critically ill and injured patients. The critical care PGY2 residency program emphasizes skills that include:

- Acute care and triage for patients in adult/pediatric medical and surgical intensive care, cardiothoracic, neurological trauma, burn intensive care, toxicology, cardiac intensive care, nutritional support, and emergency medicine.
- Patient assessment.
- Interpretation and application of patients' laboratory data.
- Making drug therapy recommendation and modifications.
- Familiarity and utility of medical and life-sustaining equipment.
- Adverse drug events.
- Interdisciplinary communication.
- Leadership and policy implementation.
- Cost containment of medication therapy.

PGY2 critical care residencies produce highly qualified pharmacists who are capable of providing optimal pharmaceutical care to address the unpredictable needs of critically ill patients. They are equipped to participate in the interdisciplinary critical care team and make complex medication and nutritional support recommendations quickly and efficiently, as required in this fast-paced, highly stressful setting. Critical care residencies also expose pharmacists to other challenging aspects of care, including ethical dilemmas, end-of-life care, and the difficulties regarding use of life-sustaining equipment. These practitioners are experienced in clinical research and are often relied upon to educate other health professionals. Residency graduates are prepared to lead and manage practice within hospitals and health systems. Integrating a formally trained pharmacist into the critical care team enhances patient outcomes and safety.³

Expected outcomes for PGY2 residencies in critical care include the following⁴:

- *Outcome R1*: Demonstrate leadership and practice management skills.
- *Outcome R2*: Optimize the outcomes of critically ill patients by providing evidence-based medication therapy as an integral part of an interdisciplinary team. (When provided as part of the practice of direct patient care, this outcome always involves a series of integrated, interrelated steps.)



- *Outcome R3:* Demonstrate excellence in the provision of training, including preceptorship, or educational activities for health care professionals and health care professionals in training.
- *Outcome R4:* Demonstrate the skills necessary to conduct a critical care pharmacy research project.
- *Outcome R5:* Participate in the management of medical emergencies.

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

Fellowship Training

According to *ACCP Guidelines for Clinical Research Fellowship Training Programs*, a fellowship program is a directed, individualized postgraduate training program designed to prepare the fellow to function as an independent investigator. Fellowships typically require prior completion of a master's degree or doctoral degree in a health science discipline, completion of a residency or equivalent clinical experience, and demonstrated interest in research. Fellowship programs prepare the pharmacist to be competent in the scientific research process. The training is typically divided as approximately 80 percent research and 20 percent advanced practice experiences.

Critical care fellowship programs model other fellowships and emphasize research and practice in the critical care setting. Critical care is an evolving environment that demands the most up-to-date, evidence-based medical and pharmacotherapy knowledge to provide optimal care. Experience is typically gained in protocol design; study design; data acquisition, analysis, and interpretation; grant writing; manuscript preparation; implementation of institutional review board (IRB) submission; and conducting clinical and laboratory research projects. Didactic and clinical training of pharmacy students and other health care professionals is also a common component of these programs. The ultimate goal of a critical care fellowship program is to provide the pharmacist with specialized practice experience and essential knowledge, skills, and abilities to conduct research and function as a primary investigator in critical care.⁵

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

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

Table F-1 lists PGY2 critical care residency programs as of September 12, 2012, including 99 programs with 122 residency positions.

Table F-1. PGY2 Critical Care Residency Programs (as of September 12, 2012)

Sponsoring Organization	Status	City	State	Program Director	Number of Residency Positions
Allegheny General Hospital	Accredited	Pittsburgh	PA	Edward T. Horn	1
Aurora Health Care	Candidate	Milwaukee	WI	Jeffrey D. Zimmerman	1
Avera McKennan Hospital and University Health Center	Candidate	Sioux Falls	SD	Thomas J. Johnson	2
Baptist Hospital	Accredited	Miami	FL	Heidi M. Clarke	1
Barnes-Jewish Hospital	Accredited	St. Louis	MO	James M. Hollands	1-2
Baylor University Medical Center	Accredited	Dallas	TX	Lyndsay A. Sheperd	1
Baystate Medical Center	Pre-candidate	Springfield	MA	Adam Pesaturo	1
Beaumont Hospital	Candidate	Royal Oak	MI	Jim Winegardner	1
Boston Medical Center	Accredited	Boston	MA	Kevin J. Horbowicz	1-2
Charleston Area Medical Center	Accredited	Charleston	WV	Brian Hodges	2
Christiana Care Health System	Accredited	Newark	DE	Jamie M. Rosini	1
Cleveland Clinic	Accredited	Cleveland	OH	Seth R. Bauer	1
Columbus Regional Healthcare System	Accredited	Columbus	GA	Ann Kathryn Craig	1

Detroit Medical Center/Detroit Receiving Hospital	Accredited	Detroit	MI	Lisa G. Hall Zimmerman	1
Duke University Hospital	Accredited	Durham	NC	Jennifer Mando-Vandrick	1
Emory Healthcare	Preliminary	Atlanta	GA	Stacey L. Folse	1
Fletcher Allen Health Care	Accredited	Burlington	VT	Wesley D. McMillian	1
Forsyth Medical Center	Candidate	Winston-Salem	NC	Jeremy Hodges	1
Froedert Hospital	Accredited	Milwaukee	WI	William J. Peppard	1
Georgia Health Sciences Health System/University of Georgia College of Pharmacy	Candidate	Augusta	GA	Trisha Branan	1
Grady Health System	Accredited	Atlanta	GA	Prasad E. Abraham	1
Greenville Hospital System	Accredited	Greenville	SC	Douglas L. Furmanek	1
Hennepin County Medical Center	Candidate	Minneapolis	MN	Jon T. Jancik	2
Henry Ford Hospital	Accredited	Detroit	MI	Michael Peters	1
Huntsville Hospital	Candidate	Huntsville	AL	Edward H. Eiland	1
Indiana University Health	Accredited	Indianapolis	IN	Judith Jacobi	2
Intermountain Healthcare	Candidate	Murray	UT	Paul Wohlt	1
Jackson Memorial Hospital	Accredited	Miami	FL	Christopher Morrison	1
The Johns Hopkins Hospital	Accredited	Baltimore	MD	Annette M. Rowden	1
Kaleida Health/Buffalo General Hospital	Candidate	Buffalo	NY	Kimberly T. Zammit	1
Kingsbrook Jewish Medical Center	Accredited	Brooklyn	NY	Henry Cohen	2
Kosair Children's Hospital	Candidate	Louisville	KY	Shannon R. Mayes	1

Maine Medical Center	Pre-candidate	Portland	ME	Gilles L. Fraser	1
Massachusetts General Hospital	Candidate	Boston	MA	Christopher D. Lyman	1
Mayo Clinic– Rochester	Accredited	Rochester	NY	Philip J. Kuper	1
Mayo Clinic Florida	Accredited	Jacksonville	FL	Robert M. Darracott	1
Memorial Hermann– Texas Medical Center	Accredited	Houston	TX	Teresa A. Allison	2
Methodist Dallas Medical Center	Candidate	Dallas	TX	Ilka R. Ratsaphangthong	1
Methodist Healthcare - University Hospital	Accredited	Memphis	TN	April C. Hurdle	1
The Methodist Hospital	Accredited	Houston	TX	Michael G. Liebl	2
Midwestern University, Chicago College of Pharmacy	Accredited	Downers Grove	IL	Tudy M. Hodgman	4
Medical University of South Carolina Medical Center/College of Pharmacy	Accredited	Charleston	SC	Joseph E. Mazur	2
The Nebraska Medical Center	Accredited	Omaha	NE	Stephen W. Nissen	1
New York Methodist Hospital	Accredited	Brooklyn	NY	Teena Abraham	2
New York Presbyterian Hospital	Accredited	New York	NY	Amy L. Dzierba	1
North Florida/South Georgia Veterans Health System	Accredited	Gainesville	FL	David J. Frohnapple	1
The Ohio State University Medical Center	Accredited	Columbus	OH	Kari L. Mount	1
Orlando Health	Accredited	Orlando	FL	Kara L Birrer	2
Palmetto Health Richland Memorial	Accredited	Columbia	SC	Joseph E. Kohn	1

Providence Sacred Heart Medical Center and Children's Hospital	Accredited	Spokane	WA	Clayton E. Littell	1
Renown Regional Medical Center	Candidate	Reno	NV	William Z. Marcus	1
Riverside Methodist Hospital	Accredited	Columbus	OH	Angela M. Harding	1
Rush University Medical Center	Candidate	Chicago	IL	Gourang Patel	1
St. Louis University Hospital	Accredited	St. Louis	MO	Eric W. Alexander	1
Shands at the University of Florida	Accredited	Gainesville	FL	Aimee LeClaire	1
Shands Jacksonville Medical Center	Accredited	Jacksonville	FL	Paul Tan	1
Spectrum Health	Candidate	Grand Rapids	MI	Karen J. McAllen	1
St. Joseph's/Candler Health System	Candidate	Savannah	GA	Hal E. Richards	1
St. Luke's Episcopal Hospital	Accredited	Houston	TX	Gregory A. Laine	1
St. Vincent Indianapolis Hospital	Pre-candidate	Indianapolis	IN	Jennifer McCann	1
Stanford Hospital and Clinics	Accredited	Stanford	CA	Cherwyn F. Nguyen	1
Tampa General Hospital	Candidate	Tampa	FL	Earnest Alexander	1
Texas Tech University Health Science Center School of Pharmacy/ North Texas Veterans Affairs Health Care System	Accredited	Dallas	TX	Steven E. Pass	1
Thomas Jefferson University Hospital	Accredited	Philadelphia	PA	Cara M. McDaniel	1

Truman Medical Center Hospital Hill	Candidate	Kansas City	MO	Erin M. Pender	1
UC Health– University Hospital	Accredited	Cincinnati	OH	Eric W. Mueller	1
UMass Memorial Medical Center	Accredited	Worcester	MA	Dinesh Yogaratnam	1
University Health System	Candidate	San Antonio	TX	Colleen Barthol	1
University Medical Center of Southern Nevada	Candidate	Las Vegas	NV	Jamie King	2
University of Alabama Hospital	Accredited	Birmingham	AL	Danielle F. Kunz	1
University of Arizona University Medical Center/ College of Pharmacy	Accredited	Tucson	AZ	Brian L. Erstad	1
University of California, Davis Medical Center	Accredited	Sacramento	CA	Jeremiah J. Duby	1
University of California, San Diego Medical Center	Accredited	San Diego	CA	Jennifer M. Namba	1
University of Chicago Medical Center	Accredited	Chicago	IL	Ishaq Lat	3
University of Colorado School of Pharmacy	Accredited	Aurora	CO	Douglas N. Fish	1
University of Hawaii–Hilo College of Pharmacy	Application submitted	Honolulu	HI	Sheri Tokumar	1
University of Illinois College of Pharmacy	Accredited	Chicago	IL	Eljim P. Tesoro	1
University of Kentucky HealthCare	Accredited	Lexington	KY	Jeremy D. Flynn	3
University of Maryland Medical Center	Accredited	Baltimore	MD	Sharon L. Wilson-Oliver	1

University of Michigan Hospitals and Health Centers	Accredited	Ann Arbor	MI	Melissa R. Pleva	1
University of North Carolina Hospitals and Clinics/UNC Eshelman School of Pharmacy	Accredited	Chapel Hill	NC	Stacy L. Campbell-Bright	1
University of Pittsburgh Medical Center	Accredited	Pittsburgh	PA	Amy L. Seybert	1
University of Tennessee Health Science Center/ Regional Medical Center at Memphis	Accredited	Memphis	TN	G. Christopher Wood	3
University of Tennessee Medical Center	Accredited	Knoxville	TN	Barbara E. Faircloth	1-2
The University of Texas M. D. Anderson Cancer Center	Accredited	Houston	TX	Jeffrey J. Bruno	2
University of Toledo College of Pharmacy/ University of Toledo Medical Center	Accredited	Toledo	OH	Martin J. Ohlinger	1
University of Utah Hospitals and Clinics	Accredited	Salt Lake City	UT	Sarah B. Dehoney	1
University of Virginia Health System	Accredited	Charlottesville	VA	Michelle W. McCarthy	1
University of Wisconsin Hospital and Clinics	Accredited	Madison	WI	Jeffrey T. Fish	1
University of Washington Medicine	Accredited	Seattle	WA	Andrew D. Barnes	1
VA San Diego Healthcare System	Accredited	San Diego	CA	Maria K. Stubbs	1
Vanderbilt University Medical Center	Accredited	Nashville	TN	Daniel C. Johnson	1

Virginia Commonwealth University Health System	Accredited	Richmond	VA	Gregory A. Chenault	1
Wake Forest University Baptist Medical Center	Accredited	Winston-Salem	NC	Catherine A. Pierce	1
Wesley Medical Center	Candidate	Wichita	KS	Christopher R. Durham	1
West Virginia University Healthcare	Accredited	Morgantown	WV	Richard L. McKnight	1
Wishard Health Services	Accredited	Indianapolis	IN	Natalie R. Buening	1
York Hospital	Accredited	York	PA	Karen Frock	1

Table F-2 lists critical care fellowship programs as of September 12, 2012. Five programs with five fellowship positions were available on that date.

Table F-2. Critical Care Fellowship Programs

Sponsoring Organization	City	State	Program Contact	Number of Fellowship Positions	Primary Specialty	Secondary Specialty
Nebraska Medical Center	Omaha	NE	Daniel Hilleman	1	Cardiology	Critical Care
Nebraska Medical Center	Omaha	NE	Keith Olsen	1	Critical Care	Infectious Disease/GI
University of Michigan	Ann Arbor	MI	Bruce Mueller	1	Nephrology	Critical Care
Howard University	Washington	DC	Frederic A. Lombardo	1	Oncology	Critical Care
Northeastern University and Tufts University School of Medicine	Boston	MA	John W. Devlin	1	Critical Care	

¹ Accreditation Council for Pharmacy Education. *Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*. Adopted January 23, 2011.

² National Association of Boards of Pharmacy. NAPLEX blueprint. Available at: <http://www.nabp.net/programs/examination/naplex/naplex-blueprint/>. Accessed September 1, 2012.

³ Knibbe CA, Tjoeng MM. Clinical pharmacist on intensive care unit saves lives and reduces costs. *Crit Care Med*. 2008;36(12):3269–70.

⁴ American Society of Health- System Pharmacists. Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Critical Care. 2007. Available at: <http://www.ashp.org/DocLibrary/Accreditation/Residency-Learning-System/RTP-RLSPGY2CritCareProgressiveDetailList071207.aspx>. Accessed September 15, 2012.

⁵ American College of Clinical Pharmacy. *Guidelines for Clinical Research Fellowship Training Programs*. 2004.

CRITERION G: Transmission of Knowledge

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

The specialized knowledge required for critical care pharmacy practice is transmitted through a variety of methods at diverse events, including symposia, live and web-based seminars, interactive workshops, traineeships, networking groups, and formal mentorship programs, as well as through print and electronic media including journals, periodicals, and newsletters. Each year, national and state pharmacy associations, schools and colleges of pharmacy, and for-profit educational companies offer live and enduring programming to disseminate the latest evidence for managing the unique needs of critically ill and injured patients. These events provide a mechanism for sharing innovations among pharmacists in critical care practice.

Professional Organizations and Networking Groups for Critical Care Pharmacists

Professional organizations and networking groups encourage sharing, mentorship, and the expansion of knowledge among critical care practitioners. The Society of Critical Care Medicine (SCCM) is an interprofessional organization dedicated to ensuring excellence and consistency in critical care practice. SCCM and the American College of Clinical Pharmacy (ACCP) provide pharmacy-specific critical care networking groups. These networking groups exist to advance critical care pharmacy and foster the knowledge of critical care– related topics. In addition, the American Society of Health-System Pharmacists (ASHP) and the American Pharmacists Association (APhA) have members who practice in critical care pharmacy and offer journal articles and meeting programming that support their ongoing professional growth and development. Examples of networking groups in the critical care field are provided in Table G-1.

Table G-1. Critical Care Networking Groups within the Practice of Pharmacy

Association	Networking Group	Description
American College of Clinical Pharmacy	Critical Care Practice and Research Network (PRN)	The Critical Care PRN optimizes drug therapy outcomes by promoting excellence and innovation in clinical pharmacy practice, research, and education. The main objectives of the PRN are to provide

		<p>timely educational updates to members and other pharmacists, participate in multicenter research in partnership with critical care pharmacists who are members of other organizations, use the Internet to facilitate information exchange among critical care pharmacists, and provide a means for informal networking among critical care pharmacists.</p> <p>The PRN currently has approximately 1,000 members.</p>
Society of Critical Care Medicine (SCCM)	Clinical Pharmacy and Pharmacology Section (CPP)	<p>The Clinical Pharmacy and Pharmacology Section informs and advises SCCM on matters pertaining to clinical pharmacy and pharmacology and the practice of multiprofessional critical care. The Section also works to foster the interest of pharmacists and clinical pharmacologists in critical care. In addition, the Section encourages and supports research practices and teachings in clinical pharmacy and pharmacology as it relates to critical care.</p> <p>The Section has approximately 1,500 members.</p>

APhA and ASHP do not have formal critical care interest groups within their organizations; however, they offer professional networking opportunities to their critical care pharmacist members. The APhA Academy of Pharmacy Practice and Management (APhA-APPM) provides a Clinical/ Pharmacotherapeutic practice section. APhA-APPM serves a diverse section of clinical practitioners including clinical specialists, practitioner educators, clinical researchers, and disease state managers. The ASHP Section of Clinical Specialists and Scientists contains content for pharmacists with specialty practice interests who may conduct clinical research in a number of recognized and emerging specialty areas of pharmacy practice.

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

Journals

Many critical care specialty and general medical journals publish new research, emerging evidence, technologies, and information regarding critical care practice. *Critical Care Medicine*, published by SCCM, is perhaps the most recognized critical care journal, with over 15,000 subscribers worldwide. The journal is peer-reviewed and directed at clinicians in a variety of fields including pharmacists, nurses, and physicians. In 2009, *Critical Care Medicine* was recognized among the 100 most influential journals in biology and medicine over the last 100 years by the Special Library Association.¹ Additional journals that advance and disseminate specialized knowledge among critical care pharmacists and other members of the interprofessional team include:

- *American Journal of Critical Care*
- *Journal of Trauma, Injury, Infection, and Critical Care*
- *AACN Clinical Issues: Advanced Practice in Acute and Critical Care*
- *Journal of Critical Care*
- *Intensive Care Medicine*
- *Pediatric Critical Care Medicine*
- *American Journal of Respiratory and Critical Care and Medicine*

Health professional journals not specific to critical care also disseminate research and advances in critical care knowledge, therapeutics, technology, education, safety, and patient care practices. Examples of journals that frequently publish articles pertaining to critical care pharmacy include:

- *American Journal of Health-System Pharmacy*
- *American Journal of Pharmaceutical Education*
- *The Annals of Pharmacotherapy*
- *Chest*
- *The New England Journal of Medicine*
- *Pharmacotherapy*

Newsletters and Periodicals

Associations and other organizations update members and subscribers about critical care practice and therapeutics through newsletters and other periodicals. The Clinical Pharmacy and Pharmacology Section of SCCM produces a quarterly newsletter, which contains both informative articles for pharmacists on topics related to critical care as well as updates on member activity. SCCM also sends out a newsletter twice a month called the *Critical Care eNewsletter*, which contains information pertinent not only to pharmacists, but to a broad range of health care providers in the critical care field. The ACCP Critical Care PRN uses emails

and other electronic resources to keep their members informed. In addition, APhA has a specialized health-systems edition of their *Pharmacy Today* publication that contains information directed toward pharmacists who are a part of a hospital or a health system. Beyond printed information, SCCM also hosts podcasts on its website.

ASHP publishes therapeutic practice guidelines written for the management of critically ill patients. These guidelines offer therapeutic recommendations founded on evidence based research.² The guidelines provided by ASHP include:

- Antimicrobial Prophylaxis in Surgery
- Clinical Practice Guidelines for Sustained Neuromuscular Blockade in the Adult Critically Ill Patient
- Clinical Practice Guidelines for Sustained Use of Sedatives and Analgesics in the Adult Critically Ill Adult
- Gastrointestinal Stress Ulcer Prophylaxis s (guidelines will become available later in 2012)

ASHP also provides a series of position statements for pharmacists who are in need of concise responses to specific therapeutic issues. Position statements that provide guidance for therapy in the critical care setting include³:

- Institutional Use of 0.9% Sodium Chloride Injection to Maintain Patency of Peripheral Indwelling Intermittent Infusion Devices
- Preferential Use of Metronidazole for the Treatment of *Clostridium difficile*–Associated Disease
- Role of Pharmacotherapy in Preventing Venous Thromboembolism in Hospitalized Patients

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

As of September 2012, 182 articles relating to critical care pharmacy have been published in professional literature over the past 3 years. The articles have been published in journals from various backgrounds including those relating specifically to pharmacy, pharmacotherapy, medicine, and critical care. Appendix G-1 contains a bibliography of literature relating to critical care pharmacy that has been published over the last 3 years.

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

Peer-reviewed articles dealing with the proposed critical care specialty have been published in numerous reputable journals. One example is a PRN Opinion Paper published in *Pharmacotherapy* in August 2011 that discusses recommendations and justifications for a critical care pharmacy specialty; in addition, the article details the specific qualities and applications that a critical care pharmacist must have and perform to be an effective member of a critical care team. The PRN Opinion Paper, along with other examples of peer-reviewed articles dealing with specialized critical care pharmacy practice, can be found in Appendix G-2. A bounty of articles relating to critical care specialty have been published. A few examples highlighting the value of critical care pharmacy include:

- MacLaren R, Bond CA Effects of pharmacist participation in intensive care units on clinical and economic outcomes of critically ill patients with thromboembolic or infarction-related events. *Pharmacotherapy*. 2009;29(7):761–68.
- Kim MM, Barnato AE, Angus DC, et al. The effect of multidisciplinary care teams on intensive care unit mortality. *Arch Intern Med*. 2010;170(4):369–76.
- Netzer G, Liu X, Shanholtz C, et al. Decreased mortality resulting from a multicomponent intervention in a tertiary care medical intensive care unit. *Crit Care Med*. 2011;39(2):284-93.
- Dager W, Bolesta S, Brophy G, et al. PRN Opinion Paper. An opinion paper outlining recommendations for training, credentialing, and documenting and justifying critical care pharmacy services. *Pharmacotherapy*. 2011;31(8):135e-175e.
- Erstad BL, Haas CE, O’Keeffe T, et al. Interdisciplinary patient care in the intensive care unit: focus on the pharmacist. *Pharmacotherapy*. 2011;31(2):128-37.
- Horn E, Jacobi J. The critical care clinical pharmacist: evolution of an essential team member. *Crit Care Med*. 2006;34(3 suppl):S46–S51.
- Leape LL, Cullen DJ, Clapp MD, et al. Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *JAMA*. 1999;282(3):267–70.

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

Seminars, symposia, and workshops on critical care therapeutics, issues, and new developments are held at numerous professional society meetings every year, including those of SCCM, ASHP, ACCP, and APhA. Knowledge transmission is carried out in a variety of formats including live and web-based seminars, symposia, application-based workshops, mentorships, and a national journal club. Hundreds of hours of programming are presented at these events, most of which are accredited by ACPE as continuing pharmacy education (CPE) programs.

CPE Programs, Seminars, Symposia, and Workshops

The ACPE Pharmacists Learning Assistance Network (P.L.A.N.) is a database of accredited CPE programs that can be searched according to predefined search terms. Prior to January 2012, P.L.A.N. did not segment programming in a way that was directly searchable by “critical care.” However, database searches from January 1, 2009, to present, using the key words listed in Table G-2, identified more than 5,000 programs of potential interest to pharmacists practicing in critical care.

Table G-2 – Keywords for P.L.A.N. Database Review

A-fib	DVT	pain
A-flutter	electrolyte abnormalities	pain management
acute pancreatitis	electrolyte management	platelet disorders
adverse drug reactions	embolism	pneumonia
anemia	emergency medicine	pulmonary disease
angina	end of life care	pulmonary embolism
anticoagulation	epilepsy	pulmonary hypertension
arrhythmias	gastroenterology	sedation
brain injury	geriatrics	seizure
burns and scalds	hepatitis	Stevens-Johnson Syndrome
cardiology	herpes	stroke
CHF	HIV	TIA
CKD	infectious disease	viral infections
COPD	meningitis	wound healing
critical care	MI	
drug interactions	nephrology	
drug overdose	nutrition	

A-fib=atrial fibrillation; A-flutter=atrial flutter; CHF=congestive heart failure; CKD=chronic kidney disease; COPD=chronic obstructive pulmonary disease; DVT=deep vein thrombosis; HIV=human immunodeficiency virus; MI=myocardial infarction; TIA-transient ischemic attack.

In January 2012, critical care became a searchable term within the P.L.A.N. database, allowing a more focused approach to program identification. Through this process, 40 critical care related programs were identified. The data listed in Table G-3 breaks down the types of CPE programs available. A detailed list of critical care CPE programs available through ACPE’s P.L.A.N can be found in Appendix G-3.

Table G-3. Critical Care– Related CPE Programs Listed in the ACPE P.L.A.N. Database (from January 1, 2012, to September 1, 2012)

Number of CPE Programs	Type of Activity	CPE Activity Format
17 programs	Knowledge	Live
12 programs	Knowledge	Home study
7 programs	Application	Live
4 programs	Application	Home study

Traineeships

An informal traineeship is another method for augmenting skills for practicing in the critical care environment. Traineeships can include, but are not limited to, participating in formal mentorship programs, mini-sabbaticals, and advanced cardiac life support, advanced trauma life support, pediatric advanced life support, and neonatal resuscitation program training. Each of these trainings offer an opportunity for gaining further knowledge in a patient population that is evolving and requires specialized care.

The SCCM Clinical Pharmacy and Pharmacology Section offers a Mentor Mentee Program that provides critical care pharmacists with guidance in their professional growth through interactions with other professionals. These relationships promote excellence in clinical practice, research, teaching, and involvement in the Society and serve as a means to attain counsel and support through a two-way active process of mentorship. The Section also offers a Visiting Clinical Professor Program that serves to advance critical care pharmacy and teaching; this program typically extends over 1 to 2 days with the visiting professor interacting with pharmacy practitioners, attending rounds, and providing a guest lecture.

ASHP offers a Research and Education Foundation Critical Care Traineeship for selected pharmacists. The traineeship consists of a month-long didactic program and a 10-day experiential program for three to five trainees per year. Through this program, trainees are provided experiences in designing patient-specific pharmacotherapy, solving drug therapy problems, and developing clinical protocols and guidelines related to the care of critically ill patients within the intensive care or critical care units. Current plans for the program are to accept six trainees per year.

Journal Clubs

iRoom, offered through SCCM, is a national journal club that meets monthly via a web link or telephone and enables SCCM Clinical Pharmacy and Pharmacology Section members to participate in sessions regarding critical care literature.

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

The annual conferences by the three sponsoring associations—ACCP, APhA, and ASHP provide programming pertaining to critical care pharmacy. In addition, the Critical Care Congress, organized by SCCM, has 202 hours of programming and has been accredited by the ACPE to provide CPE credit. A pharmacist is slated to co-chair this Critical Care Congress in 2012. Tables G-4 to G-7 outlines these programs.

Table G-4. Hours of Critical Care Pharmacy Programming Provided During National Events over 3 Years (2009 to 2011)

Pharmacy/Critical Care Association	Hours of Critical Care Programming
Society of Critical Care Medicine	Critical Care Congress: 202 hours
American Society of Health-System Pharmacists	Summer Meeting and Midyear Clinical Meeting: 29.5 hours
American College of Clinical Pharmacy	2011 Annual Meeting: 23 hours
American Pharmacists Association	2011 Joint Forces Pharmacy Seminar: 1 hour

Table G-5. ACCP Critical Care Programming over 3 Years (2009 to 2011)

Program	Date	Number of Certificates of Credit Issued
2011 Annual Meeting: Critical Care PRN and Society of Critical Care Medicine Focus Session—Sedation and Delirium in the ICU: Update on the Status of the 2011 SCCM Guidelines	October 17, 2011	157

<p>2011 Annual Meeting: Critical Care PRN Focus Session—Adverse Drug Events in the ICU: Learn Using High Fidelity Patient Simulation Cases</p>	<p>October 18, 2011</p>	<p>110</p>
<p>2010 Annual Meeting: Critical Care PRN Focus Session — Critical Care Challenges: External Validity and Extrapolation of Clinical Trial Data to the Bedside</p>	<p>October 18, 2010</p>	<p>126</p>
<p>2009 Annual Meeting: Critical Care PRN Focus Session —Controversies in the Management of Sepsis: A Practical Approach</p>	<p>October 20, 2009</p>	<p>94</p>
<p>2009 Annual Meeting: Pharmacokinetics/Pharmacodynamics PRN Focus Session -- Therapeutic Hypothermia: Clinical Applications and PK/PD Implications</p>	<p>October 19, 2009</p>	<p>35</p>

Table G-6. ASHP Critical Care Programming over 3 Years (2009 to 2011)

Program	Date	Number of Certificates of Credit Issued
2011 Annual Meeting What's New in the ICU	June 15, 2011	104
2011 Midyear Clinical Meeting: Traumatic Dilemmas: From ED to ICU	December 4, 2011	230
2011 Midyear Clinical Meeting: HIT, ICP, and ETOH Withdrawal: Critical Care Updates 2011	December 4, 2011	327
2011 Midyear Clinical Meeting: Patient Safety in High-Risk Settings: From the ED to the ICU	December 7, 2011	169
2011 Midyear Clinical Meeting: Inhaled Drug Therapy in the ICU: Just Blowing Smoke or the Real Deal?	December 7, 2011	155
2011 Midyear Clinical Meeting: Updates in the Management of Pain, Sedation, and Delirium in the ICU	December 8, 2011	273
2011 Midyear Clinical Meeting: Updates in Sepsis Management: A Case-Based Approach	December 8, 2011	107
2010 Midyear Clinical Meeting: Fear Factor: Preparing for Adult and Pediatric Codes	December 5, 2010	350
2010 Midyear Clinical Meeting: Dexmedetomidine as the Workhorse Sedative in the ICU	December 6, 2010	617
2010 Midyear Clinical Meeting:	December 7, 2010	139

Interpretation and Application of Guidelines in the Nutrition Continuum from ICU to Home		
2010 Midyear Clinical Meeting: Therapeutic Strategies for the Management of Pain, Agitation, and Delirium in the Intensive Care Unit	December 7, 2010	429
2010 Midyear Clinical Meeting: Glycemic Control in the ICU	December 7, 2010	259
2009 Annual Meeting: Surely, You CHEST: Implementing American College of Chest Physicians' 2008 Guidelines for Antithrombotic and Thrombolytic Therapy	June 16, 2009	144
2009 Annual Meeting: Landmark Papers: Focusing on Acute Cardiovascular Care	June 15, 2009	81
2009 Midyear Clinical Meeting: A Case-Based Approach to Inpatient Glucose Management from ICU to Discharge	December 8, 2009	160
2009 Midyear Clinical Meeting: Optimizing Patient Comfort with Safe and Effective Sedation	December 8, 2009	237
2009 Midyear Clinical Meeting: Prevention and Treatment of Delirium in the ICU	December 9, 2009	147

Table G-7. APhA Critical Care Programming over 3 Years (2009 to 2011)

Program	Date	Number of Certificates of Credit Issued
2011 Joint Forces Pharmacy Seminar: The Management of Traumatic Brain Injury: The Pharmacist's Role and Integration Into an Interdisciplinary Team at the National Intrepid Center of Excellence	November 1, 2011	54

Many other CPE conferences and programs have been conducted in specific areas of critical care pharmacy practice. Table G-8 provides examples of conferences that have been offered by ACPE-accredited CPE providers.

Table G-8. Examples of Critical Care Conferences Accredited by ACPE

Conference/Meeting	ACPE Hours Accredited
Pharmacotherapy in Critical Illness	11.5 hours
Acute Cardiac Care	18 hours
Critical Care Board Review Course	40.5 hours

Examples of program materials that reflect contemporary education programs in critical care are attached as Appendix G-4.

Non-periodical Publications

Recent literature and textbooks have been published that enhance both the skills and knowledge of pharmacists who practice in critical care. Examples of such literature include:

- *Integrating Critical Care Skills Into Your Practice* (Hess M; 2009)
- *Pocket Guide to Critical Care Pharmacotherapy* (Papadopoulos J; 2007)
- *Pulmonary and Critical Care* (ACCP, 2008)
- *Current Diagnosis and Treatment: Critical Care* (Bongard FS, Sue DY, Vintch JR; 2008)
- *Anesthesiology and Critical Care Drug Handbook* (Baughman VL, Golembiewski JA, Gonzales JP, Alvarez W; 2010)
- *Critical and Urgent Care I, II, and III –PSAP VII, Book 2* (ACCP; 2010)
- *Critical Care I and II/Transplantation* (ACCP, 2006)

Professional Awards

SCCM presents awards to its membership composed of interdisciplinary health care providers. These awards are outlined in Table G-9.

Table G-9. Society of Critical Care Medicine Awards

Award	Description/Comments
Barry A. Shapiro Memorial Award for Excellence in Critical Care Management	The award recognizes an individual who has made significant contributions to the design and/or implementation of evidence-based practice which has significantly impacted clinical, operational, or fiscal outcomes within their area of responsibility.
Master Critical Care Medicine	This award recognizes SCCM members who have been an FCCM for at least 5 years and have distinguished themselves by achieving national and international professional prominence due to personal character, leadership, eminence in clinical practice, outstanding contributions to research and education in critical care medicine, or years of exemplary service to SCCM, the American College of Critical Care Medicine, and the field of critical care medicine.
Fellow of the American College of Critical Care Medicine (FCCM)	This designation honors practitioners, researchers, administrators, and educators who have made outstanding contributions to the collaborative field of critical care.

¹ SLA Biomedical and Life Sciences Division. Top 100 journals in biology and medicine. April 2009. Available at: <http://www.dbiosla.org/publications/resources/dbio100.html> Accessed October 26, 2011.

² American Society of Health-System Pharmacists. Therapeutic Guidelines. Available at: <http://www.ashp.org/Import/PRACTICEANDPOLICY/PolicyPositionsGuidelinesBestPractices/BrowsebyDocumentType/TherapeuticGuidelines.asp>. Accessed June 2, 2012.

³ American Society of Health-System Pharmacists. Therapeutic position statements. Available at: <http://www.ashp.org/Import/PRACTICEANDPOLICY/PolicyPositionsGuidelinesBestPractices/BrowsebyDocumentType/TherapeuticPositionStatements.asp>. Accessed June 2, 2012.

Appendix B-1

Letters of Support

the
roundtable
on critical care policy

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

Dear Mr. Ellis,

On behalf of the Roundtable on Critical Care Policy, I write to you in support of the recognition of a critical care pharmacy practice by the Board of Pharmacy Specialties.

The Roundtable on Critical Care Policy is a nonprofit organization that provides a forum for leaders in critical care and public health to advance a common federal policy agenda designed to improve the quality, delivery and efficiency of critical care in the United States. The Roundtable brings together a broad cross-section of stakeholders, including renowned critical care clinicians, patient groups, academia, public health advocacy interests and industry.

Each year, five million Americans are admitted into traditional, surgical, pediatric or neo-natal intensive care units (ICUs). The care delivered in the ICU is technology-intensive, treatment is unusually complex due to what may be a patient's system—or multiple systems—challenges or failures, and outcomes have life or death consequences. Clinical pharmacists that are skilled and experienced in critical care are vital in managing both the pharmacotherapy and nutritional needs of patients of all ages with severe illness and injury. The recent drug shortages—at least 30 generic drugs commonly used in ICUs across the country are in shortage, according to analysis conducted by the Roundtable — demonstrate the increasing challenges facing pharmacists caring for the critically ill and injured on a daily basis.

The Roundtable believes that pharmacists that complete the proposed critical care training requirements are a valuable asset to ICU care teams and enhance the quality of care delivered to patients. We strongly support the specialty certification for critical care pharmacists.

Sincerely,



Brad Poss, MD
Chairman of the Board

September 14, 2012

William M. Ellis, BScPharm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, DC 20037
Via email to: pmanolakis@pmmcsolutions.com

Dear Mr. Ellis,

Thank you for the opportunity to recognize and recommend a workforce group that has an important role in the Society of Critical Care Medicine (SCCM) and an even more significant role in the care of critically ill and injured patients.

The SCCM is a multiprofessional organization that includes Critical Care Pharmacists as essential members of the patient care team for a highly challenging population of adults and children. ¹ Availability of highly trained and competent pharmacists is essential for the safe and effective use of medications, decreasing adverse events and costs of care. ² Their availability ensures timely patient assessment and analysis of therapeutic choices – with customized application and monitoring. From its inception, our organization has included multiprofessional practitioners as full members. Critical Care Pharmacists serve in important roles in our leadership and all committees, and in 2010 Judith Jacobi, PharmD, FCCM, BCPS served as our President.

SCCM has over 1500 Critical Care Pharmacists as members. As a group they are among the fastest growing membership categories within our overall membership of over 16,000. The Clinical Pharmacy and Pharmacology Section is extremely active and sponsors a monthly on-line journal club, research initiatives, and recently initiated a Drug Shortage Task Force to support practitioners during critical drug shortages - many of which have affected the care of the critically ill. A recent educational initiative has led to production of a new publication on Drug Induced Complications in the Critically Ill Patient. ³ Indeed, pharmacists serving on every one of our committees have made important contributions to the organization and multiprofessional care of the critically ill patient.

The Critical Care Pharmacist members of SCCM are almost all specialists in practice due to the complex needs of our critically ill and injured patients. In recognition of their important role 53 pharmacists have attained the prestigious title of Fellow in the American College of Critical Care Medicine. While their demonstrated role in practice, education, research and service has made selection of these individuals relatively straightforward, the lack of standardized board certification credentials as a starting point for application differentiates them from our other large membership groups (physicians and nurses). Availability of board certification in critical care pharmacy would lead to a requirement that candidates for fellowship demonstrate this minimum standard. There is a consistent and growing demand for highly trained Critical Care Pharmacists that has led to growth in the number of training programs. However, like other members of the critical

¹ Rudis MI, et al: Position paper on critical care pharmacy services. *Crit Care Med* 2000; 28:3746–3750

² Brilli RJ, et al: Critical care delivery in the intensive care unit: Defining clinical roles and the best practice model. *Crit Care Med* 2001; 29:2007-2019

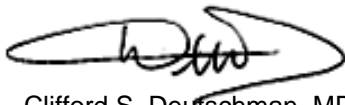
³ Papadopoulos J, et al. editors: Drug-Induced Complications in the Critically Ill Patient. 2012 SCCM, Mt Prospect, IL

care team, the aging of the US population, and increasing complexity of care has outpaced the availability of this essential group of practitioners.⁴

The contributions of Critical Care Pharmacists include enhanced medication safety, improved patient outcomes, and economic benefits.⁵ Unfortunately, many of these benefits are difficult to quantify because they may not produce measurable results- measuring prevention is always problematic. However, the energy and effort that our Critical Care Pharmacist members demonstrate within SCCM likely exemplifies their work behavior and practice. As a result, Critical Care Pharmacists and pharmacy services have become essential to the care of the critically ill, both adults and children.⁶ Specialist level Pediatric Critical Care Pharmacists are invaluable in Level I pediatric intensive care units (PICUs)- those caring for the most critically ill patients, and is desirable for Level II PICUs.

In conclusion, the leadership of the Society of Critical Care Medicine recognizes the important contributions of Critical Care Pharmacists to the care of critically ill and injured patients through their safe and effective use of specialized medications and also their contributions to our organizational activities, the education of their peers and critical care multiprofessional colleagues and research. We support the recognition of Critical Care Pharmacy Practice as a Specialty.

Sincerely,



Clifford S. Deutschman, MD, FCCM
SCCM President

CC: Judith Jacobi, PharmD, FCCM; SCCM Past President
Steven Martin, PharmD, FCCM; SCCM Council Member
Gail Gesin, PharmD; SCCM Clinical Pharmacy and Pharmacology Section Chair

⁴ Horn E, Jacobi J: The critical care clinical pharmacist Evolution of an essential team member. *Crit Care Med* 2005; 34: s46-s51

⁵ Erstad BL, et al: Interdisciplinary patient care in the intensive care unit: Focus on the pharmacist. *Pharmacotherapy* 2011; 31:128-137

⁶ Haupt MT, et al: Guidelines on critical care services and personnel: Recommendations based on a system of categorization of three levels of care. *Crit Care Med* 2003; 31:2677-2683



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Derek C. Angus, MD, MPH, FRCP
Professor and Chair
The Mitchell P. Fink Endowed Chair
in Critical Care Medicine

September 13, 2012

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

Dear Mr. Ellis:

As a board certified critical care physician and professor of critical care medicine, I am writing to express my support for the recognition of a Critical Care Pharmacy Practice by the Board of Pharmacy Specialties.

The University of Pittsburgh Medical Center (UPMC) Presbyterian is a Level I Trauma and Academic Medical Center with over 600 licensed beds, of which over twenty percent are ICU beds. The care of critically ill patients is delivered by multidisciplinary teams, which include pharmacists with training dedicated to this uniquely complex patient population. This is not a new concept, but instead reflects the philosophy of the founding fathers of critical care medicine at the University of Pittsburgh, home of the first Department of Critical Care Medicine and the first training program for critical care physicians in the United States.

Our renowned Institution was recently acknowledged as the 10th best hospital in the country by the *US News and World Report*. Our ICU team, however, does not have a critical care pharmacist consistently available to them, despite evidence in literature demonstrating the safety and mortality benefits. Because of this we are actively seeking out mechanisms to increase the availability of pharmacists with critical care knowledge and training in our ICUs. Recognition of the specialization of pharmacists with this skill set would well serve this growing and ongoing need.

I urge you to approve Critical Care Pharmacy Practice as a specialty. In this way, critically ill patients across the country will benefit from the knowledge and expertise they bring to their patient care teams.

Sincerely,

Derek C. Angus, MD, MPH, FRCP
Chair, Department of Critical Care Medicine
The Mitchell P. Fink Endowed Chair in Critical Care Medicine
Professor of Critical Care Medicine, Medicine,
Health Policy and Management, and Clinical
and Translational Science

October 25, 2012

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

Dear Bill:

As you know from our previous conversations, we are aware of a petition to the Board of Pharmacy Specialties (BPS) for recognition of critical care pharmacy practice as a specialty. I wanted to let the Board know that the Institute for Safe Medication Practices fully supports this effort and hopes that the Board will act favorably.

The nature of the critical care environment and clinical requirements of critically ill patients demands that highly competent, well trained pharmacists are available to work closely with intensivists, critical care nurses and others to assure safe employment of drug therapy.

Studies show that pharmacist participation in critical care is associated with lower rates of adverse drug events (Bates DW, Cullen DJ, Laird N. et al. Incidence of adverse drug events and potential adverse drug events implications for prevention. *JAMA*.1995;274:29-34). More and more hospitals are taking advantage of pharmacists in critical care as the number of residencies and fellowships has grown and more specialists become available.

Given the “high alert” status of critical care drugs and drug categories, and the way that drugs are utilized, there is an increased risk of inadvertent misuse and patient harm. Prevention of medication errors and adverse drug reactions is a high priority and critical care team members seek out the pharmacist’s expertise in maintaining awareness of the types of adverse drug events seen in this population. Availability of board-certified pharmacists in critical care will help to assure that a level of knowledge exists to guide the team in assuring safe medication practices.

Certification will also help to optimize outcomes of critically ill patients by assuring employment of evidence-based drug therapy, performing drug therapy monitoring and quality improvement activities to enhance the safety and effectiveness of medication-use.

We sincerely believe that board certification for critical care pharmacy practice is a necessary step in assuring competent individuals to carry out these important safety functions.

Sincerely yours,



Michael R. Cohen, RPh, MS, ScD
President



Methodist Hospital

September 28, 2012

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

Dear Mr. Ellis,

Thank you for the opportunity to recognize and recommend a workforce group that has an important role in the Society of Critical Care Medicine (SCCM) and an even more significant role in the care of critically ill and injured patients. As a Past-President of that organization, I can attest to the important roles held by Critical Care Pharmacists within this organization and at the bedside. As the senior member of my critical care pharmacy team- all of whom are BCPS, I believe that having critical care board certification credentials would be an essential component of our development and advancement as practitioners.

The SCCM is a multiprofessional organization that includes Critical Care Pharmacists as essential members of the patient care team for a highly challenging population of adults and children.¹ Availability of highly trained and competent pharmacists is essential for the safe and effective use of medications, decreasing adverse events and costs of care.² Our availability ensures timely patient assessment and analysis of therapeutic choices – with customized application and monitoring. From its inception, our organization has included multiprofessional practitioners as full members.

The SCCM has over 1500 Critical Care Pharmacists as members and as a group we are among the fastest growing membership categories within our overall membership of 16,000. The Clinical Pharmacy and Pharmacology Section is one of the most active of the specialty Sections and sponsors a monthly on-line journal club, research initiatives, and recently initiated a Drug Shortage Task Force to support practitioners during critical drug shortages- many of which have affected the care of the critically ill. A recent educational initiative has led to production of a new publication on Drug Induced Complications

¹ Rudis MI, et al: Position paper on critical care pharmacy services. *Crit Care Med* 2000; 28:3746–3750

² Brilll RJ, et al: Critical care delivery in the intensive care unit: Defining clinical roles and the best practice model. *Crit Care Med* 2001; 29:2007-2019

in the Critically Ill Patient.³ However, pharmacists serving on every one of our committees have made important contributions to the organization and multiprofessional care of the critically ill patient.

The Critical Care Pharmacist members of SCCM are generally Board Certified, and all are specialists in practice due to the complex needs of our critically ill and injured patients. In recognition of their important role 53 pharmacists have attained the title of Fellow in the American College of Critical Care Medicine. While our roles in practice, education, research and service have made selection of Fellows relatively straightforward, the lack of standardized board certification credentials as a starting point for application is different from our physician and nurse peers. Availability of board certification in critical care pharmacy as a credential would lead to a requirement that candidates for fellowship demonstrate this minimum standard.

There is a consistent and growing demand for highly trained Critical Care Pharmacists that has led to growth in the number of training programs. However, like other members of the critical care team, the aging of the US population, and increasing complexity of care has outpaced the availability of this essential group of practitioners.⁴

The contributions of Critical Care pharmacists have been documented to include enhanced medication safety, improved patient outcomes, and economic benefits.⁵ My colleagues and I are increasingly called upon to function in collaborative practice roles with other members of the multiprofessional team. As a result, Critical Care Pharmacists and pharmacy services are judged to be essential to the ICU.⁶ Subspecialty certification would be beneficial to differentiate the practitioner who is prepared to meet the needs of complex populations and facilitate credentialing for advanced roles in drug therapy management.

In conclusion, as a Critical Care practitioner and former leader of the Society of Critical Care Medicine I support the recognition of Critical Care Pharmacy Practice as a Specialty.

Sincerely,



Judith Jacobi, PharmD, FCCM, FCCP, BCPS
Past President SCCM
Critical Care Pharmacy Specialist
Indiana University Health Methodist Hospital

³Papadopoulos J, et al. editors: Drug-Induced Complications in the Critically Ill Patient. 2012 SCCM, Mt Prospect, IL

⁴ Horn E, Jacobi J: The critical care clinical pharmacist Evolution of an essential team member. *Crit Care Med* 2005; 34: s46-s51

⁵ Erstad BL, et al: Interdisciplinary patient care in the intensive care unit: Focus on the pharmacist. *Pharmacotherapy* 2011; 31:128-137

⁶ Haupt MT, et al: Guidelines on critical care services and personnel: Recommendations based on a system of categorization of three levels of care. *Crit Care Med* 2003; 31:2677-2683

UPMC Presbyterian
Shadyside

Pharmacy William M. Ellis, BSP Pharm, MS
Executive Director
200 Lothrop Street Board of Pharmacy Specialties
PFG 01-01-01 2215 Constitution Ave., NW
Pittsburgh, PA 15213 Washington, DC 20037
T 412-647-4361
F 412-647-5847

Dear Bill,

I'd like to write this letter in support of efforts to develop and acknowledge Critical Care as a specialty practice. Having practiced in Critical Care for 16 years I can attest to the value specialty trained pharmacists can bring to the care provided in the critical care setting.

As you well know, the care delivered to our patients in the ICU involves multiple technologies and treatment strategies that are dynamic and complex. There is a definable knowledge and skill set unique to the training and/or experience that is desired for pharmacists providing clinical pharmacy services to these critically ill patients. Specialization by board certification provides a means for recognizing clinical pharmacists who possess these desirable characteristics.

We have just recently had conversations with physicians regarding the value provided by our staff members and our ability to provide these services routinely and throughout all critical care areas. During this past summer we had centralized much of our unit based pharmacy staff secondary to onboarding of new staff members and providing coverage to accommodate our training needs and provide coverage for vacations. As a result of our limited staffing, we received numerous requests from physicians regarding their desire for our pharmacists services.

We are currently undertaking an evaluation of our services in attempts to determine how we might best meet the needs of our 142 critical care patients. We have made substantial efforts to provide a unit based critical care person for each of our ICU's and currently have 7 dedicated unit based pharmacists, all of whom are BCPS certified and 5 of whom that have completed a PGY-2 in critical care. In addition, we have four faculty members from the University of Pittsburgh who also provide patient care in these areas.

I would envision that as we move forward we will continue to evaluate our ability to cover our patients and provide adequate resources to meet our patients needs as we attempt to find the right balance with regards to severity of illness and our pharmacists ability to provide direct patient care.

Sincerely,



Jon Horton, Pharm.D.
Regional Director of Pharmacy



55 Fruit Street, GRB 065
Boston, Massachusetts 02114-2696
Tel: 617 726-2902
Fax: 617 726-9232

Margaret Clapp
Director of Pharmacy

October 30, 2012

William M. Ellis, BSPHarm, MS
Executive Director
Board of Pharmacy Specialties
2215 Constitution Ave., NW
Washington, DC 20037
Via email to: pmanolakis@pmmcsolutions.com

Dear Mr. Ellis,

I am writing in support of the petition being sponsored by ACCP, ASHP and APhA to recognize critical care pharmacy practice as a specialty by BPS. As the director of pharmacy for a large academic health care system, I employ multiple clinical pharmacists with training and experience in critical care therapeutics who contribute a very specialized level of knowledge as members of the interprofessional team that care for our most severely ill and injured patients. Recognition of critical care pharmacy as a specialty within our profession is consistent with the high level of practice and the unique technologic environment of the critical care unit. Our critical care pharmacists must combine a very specialized knowledge of therapeutics, understanding of challenging medication delivery needs, and application of complex monitoring including the patient interface with sophisticated medical devices to optimize care for ICU patients receiving high risk, complex medication regimens. An external validation process for specialty recognition that can be offered by BPS board certification would be valuable to identify those clinical pharmacists that have the requisite knowledge and experiences to fill this important role. This specialty recognition will be a valuable credential for prospective employers, other members of the patient care team in the ICU, and to patients and their families.

As you know, acute care in the academic (and non-academic) health care system has become increasingly complex as we care for patients with greater levels of acuity and concomitant comorbidities. The level of care provided in the contemporary ICU setting has also continued to evolve, and the number of ICU beds as a proportion of total beds has also increased nationally. This creates a very real and continuing demand for clinical pharmacists with specialized training and experience in critical care to meet this need. Formal recognition of critical care pharmacy practice as a specialty will assist with differentiation of pharmacists who are qualified to meet this specialized need.

As evidence has developed that inclusion of a clinical pharmacist as a member of the ICU patient care team can improve quality, reduce medication errors, improve outcomes and reduce costs, the expectations of pharmacist involvement by both members of the ICU team and hospital administration has increased. There is also an increased expectation that properly credentialed pharmacists will be available to support the complex needs in the ICU, and BPS recognition of this practice as a specialty will provide a valuable external credential that will provide additional assurances to all stakeholders.

At our organization, we value board certification in a relevant specialty as an important component of credentialing our clinical pharmacy specialists. If critical care pharmacy is recognized as a specialty by BPS, I anticipate that we will strongly recommend that our ICU pharmacists complete board certification in this newly recognized specialty.

Sincerely yours,

Margaret Clapp

Appendix B-2

Employer Signatures

Signatures of Support – Critical Care Employers

Jeanne Ezell, M.S., FASHP
Director of Pharmacy
Blount Memorial Hospital
907 E. Lamar Alexander Pkwy.
Maryville, Tennessee 37804

John Fanikos, RPh, MBA
Director of Pharmacy Business
Brigham and Womne's Hospital
75 Francis Street
Boston, Massachusetts 02115

Jodee Mashek, PharmD
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Nevada Regional Medical Center
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Pharmacy Director
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Detroit, Michigan 48236

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Director of Pharmacy Services
UAMS Medical Center
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Little Rock, Arkansas 72205

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Regional Director of Pharmacy
CHRISTUS Spohn
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Corpus Christi, Texas 78404

Joe Glew, MS, RPh
Director of Pharmacy Services
Elliot Hospital
One Elliot Way
Manchester, New Hampshire 03103

Mary Ibarra Diaz, PharmD
Director of Pharmacy
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2001 West 68th Street
Hialeah, Florida 33016

Janelle Christian, PharmD, BCPS
Director of Pharmacy
Mercy Hospital, A Campus of
Plantation General Hospital
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Miami, Florida 33133

Pamela Leal, PharmD
Director of Pharmacy
Lakeway Regional Medical Center
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Lakeway, Texas 78734

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Pharmacy Manager
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Director of Pharmacy
UPMC McKeesport
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Director of Pharmacy
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Jack Lemanowicz, RPh., M.S.,
Director of Pharmacy
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Senior Director of Pharmacy/Chief
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JSUMC
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Appendix B-3

Critical Care Pharmacist Employer Survey Instrument

Survey of Critical Care Pharmacist Employers

Dear Employer of Critical Care Pharmacists:

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

The American College of Clinical Pharmacy (ACCP), the American Pharmacists Association (APhA), and the American Society of Health-System Pharmacists (ASHP) have partnered to develop and submit a petition to the Board of Pharmacy Specialties (BPS) to recognize Critical Care Pharmacy Practice as a specialty. **For purposes of the petition, the definition of critical care pharmacy practice is:**

Definition of Critical Care Pharmacy Practice

Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically-ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically-ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

Please complete this 5-minute survey by Tuesday, August 28, 2012. **Your individual responses will be kept confidential.** Collectively, all employer responses will be compiled to further document the demand for this specialty and provide support for this specialty in a petition to the Board of Pharmacy Specialties.

At the end of the survey, you will have the option of entering your signature to the petition. This is strictly optional, and responses to other questions will not be linked in any way with the personal information entered to sign the petition.

If questions arise, contact Patti Manolakis, PharmD, at pmanolakis@pmmcsolutions.com.

Thank you for your time and assistance in this effort.

Bonnie A. Falcione, PharmD, BCPS, University of Pittsburgh, UPMC Presbyterian Hospital, Representing APhA

Curtis E. Haas, PharmD, FCCP, BCPS, University of Rochester Medical Center, Representing ACCP

Mary Hess, PharmD, FASHP, FCCP, FCCM, Jefferson School of Pharmacy, Representing ASHP

* Indicates response required

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

Yes

No

Critical Care Pharmacist Employers

* **What is the size of your institution?**

<50 beds

50-99 beds

100-199 beds

200-299 beds

300-399 beds

>400 beds

Other (please comment):

How many beds in your institution are critical care beds of any type?

* **What is the total number of FTEs allocated to serving critically-ill patients within your organization?**

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

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

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

* How many critical care pharmacist positions within your institution are currently vacant/unfilled?

Comments:

* Please rank, in preferred order, the current desired level of training for critical care pharmacists in your institution. 1 = most desired; 5 = least desired

- No additional training required or desired
- Employer-provided training program
- PGY-1 Residency - Pharmacy Practice
- PGY-2 Residency - Critical Care Pharmacy
- PGY-2 Residency - Other (please specify below)

PGY-2 Residency - Other (Please specify):

* If BPS recognizes critical care pharmacy practice as a specialty, what is the likelihood that you would require this new specialty credential for critical care pharmacists within your institution?

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

* Which of the following ranges best describes your organization's anticipated growth in the number of critical care pharmacists (as described above) over the next 5 years?

- 0 FTE (no growth)
- 0.5 to 1 FTE
- 1 FTE
- 2 FTEs
- 3 FTEs
- 4 or more FTEs
- Projected decrease. Please quantify:

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

What percentage of these positions were filled?

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

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

OPTIONAL: If you would like to support this specialty recognition effort by signing on to the petition to BPS, please add your signature in support of this proposed specialty by completing the requested information below. NOTE: Your personal information will not be linked in any way with your responses to any previous questions.

First Name

Last Name

Credentials

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

Submit

Definition of Critical Care Pharmacy Practice

Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically-ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically-ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

Appendix C-1

Critical Care Pharmacists Survey Instrument

Survey of Critical Care Pharmacists Interested in Board Certification

Dear Critical Care Pharmacist:

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

The American College of Clinical Pharmacy (ACCP), the American Pharmacists Association (APhA), and the American Society of Health-System Pharmacists (ASHP) have partnered to develop and submit a petition to the Board of Pharmacy Specialties (BPS) to recognize Critical Care Pharmacy Practice as a specialty. **For purposes of the petition, the definition of critical care pharmacy practice is:**

Definition of Critical Care Pharmacy Practice

Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically-ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically-ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

Please complete this 5–10 minute survey by Monday, August 27, 2012. **Your individual responses will be kept confidential.** Collectively, all pharmacist responses will be compiled to further document the unique elements of this specialty and provide support for this specialty in a petition to the Board of Pharmacy Specialties.

At the end of the survey, you will have the option of entering your signature to the petition. This is strictly optional, and responses to other questions will not be linked in any way with the personal information entered to sign the petition.

If questions arise, contact Patti Manolakis, PharmD, at pmanolakis@pmmcsolutions.com.

Thank you for your time and assistance in this effort.

Bonnie A. Falcione, PharmD, BCPS, University of Pittsburgh, UPMC Presbyterian Hospital, Representing APhA

Curtis E. Haas, PharmD, FCCP, BCPS, University of Rochester Medical Center, Representing ACCP

Mary Hess, PharmD, FASHP, FCCP, FCCM, Jefferson School of Pharmacy, Representing ASHP

Practicing Critical Care Pharmacists

* Indicates response required

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

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

* **How many years have you been in critical care pharmacy practice?**

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

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

- Full-time: 40 or more hours per week
- 31 – 39 hours per week
- 25 – 30 hours per week
- 21 – 24 hours per week
- 15 – 20 hours per week
- 10 – 14 hours per week
- 1 – 9 hours per week
- I do not practice in critical care pharmacy

* **Do you believe that you currently practice in the area of critical care specialization as defined by**

- Yes
- No

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

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

*** Please check all types of residencies/fellowships completed.**

- PGY1 Pharmacy Practice Residency
- PGY2 Critical Care Pharmacy Residency
- PGY2 Critical Care/Nutrition Support Pharmacy Residency
- Other PGY2 Residency
- Fellowship
- No residency or fellowship
- Other (please specify)

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

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

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

- Yes
- No

Critical Care Pharmacist Employers

*** What is the size of your institution?**

- <50 beds
- 50-99 beds
- 100-199 beds
- 200-299 beds
- 300-399 beds
- >400 beds
- Other (please comment):

How many beds in your institution are critical care beds of any type?

What is the total number of FTEs allocated to serving critically-ill patients within your organization?

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

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

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

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

Comments:

Please rank, in preferred order, the current desired level of training for critical care pharmacists in your institution. 1 = most desired; 5 = least desired

- No additional training required or desired
- Employer-provided training program
- PGY-1 Residency - Pharmacy Practice
- PGY-2 Residency - Critical Care Pharmacy
- PGY-2 Residency - Other (please specify below)

PGY-2 Residency - Other (Please specify):

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

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

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

- 0 FTE (no growth)
- 0.5 to 1 FTE
- 1 FTE
- 2 FTEs
- 3 FTEs
- 4 or more FTEs
- Projected decrease. Please quantify:

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

What percentage of these positions were filled?

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

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

OPTIONAL: If you would like to support this specialty recognition effort by signing on to the petition to BPS, please add your signature in support of this proposed specialty by completing the requested information below. NOTE: Your personal information will not be linked in any way with your responses to any previous questions.

First Name

Last Name

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

Submit

Definition of Critical Care Pharmacy Practice

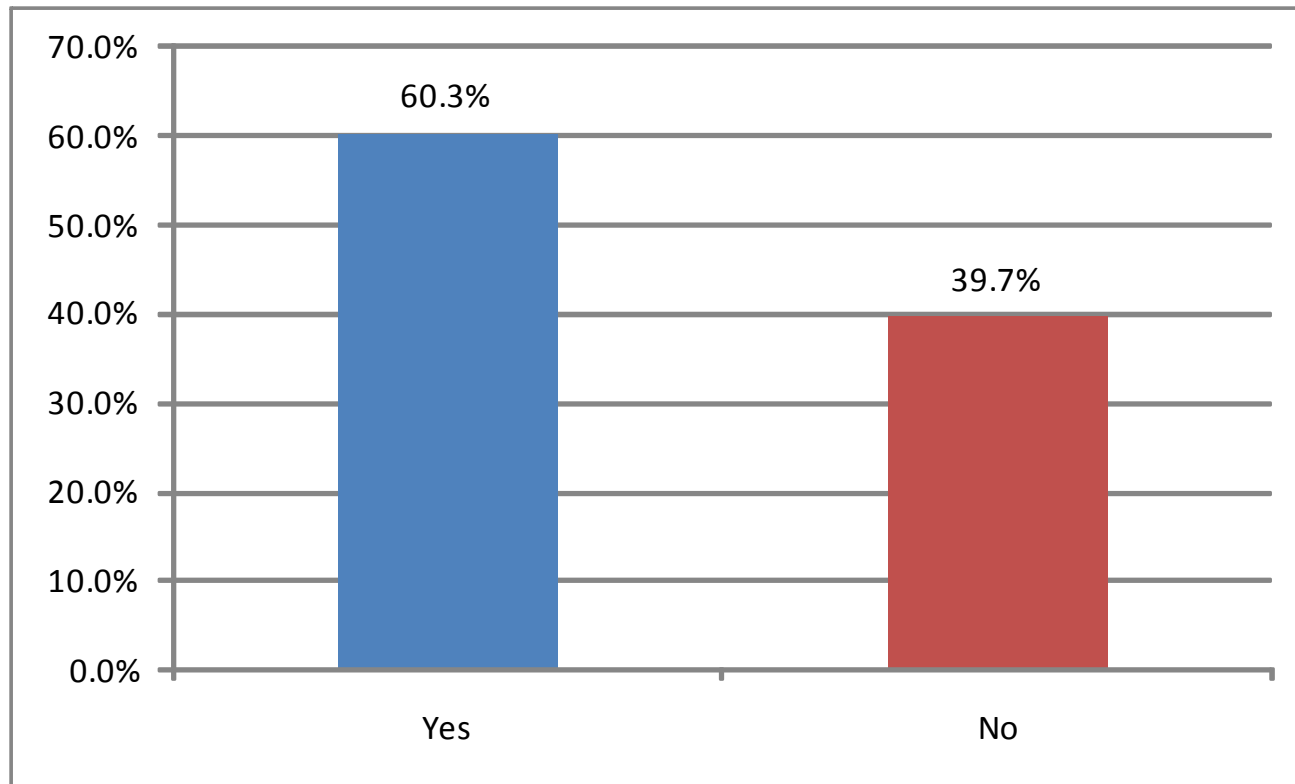
Critical care pharmacy practice specializes in the delivery of patient care services by pharmacists, as integral members of interprofessional teams, working to ensure the safe and effective use of medications in critically-ill patients. The practice requires informed, rapid assessment of clinical data for patients whose pharmacokinetic and pharmacodynamic parameters differ substantially from the non-critically-ill patient. Pharmacists in this practice are required to review, analyze, and frequently reassess multifaceted clinical and technological information to make reasoned decisions for highly dynamic patients with life-threatening conditions and complex medication regimens.

Appendix C-2

ACCP Membership Survey Results

**ACCP Opinion Survey:
Recognition of New Specialties
March 22 – 29, 2011**

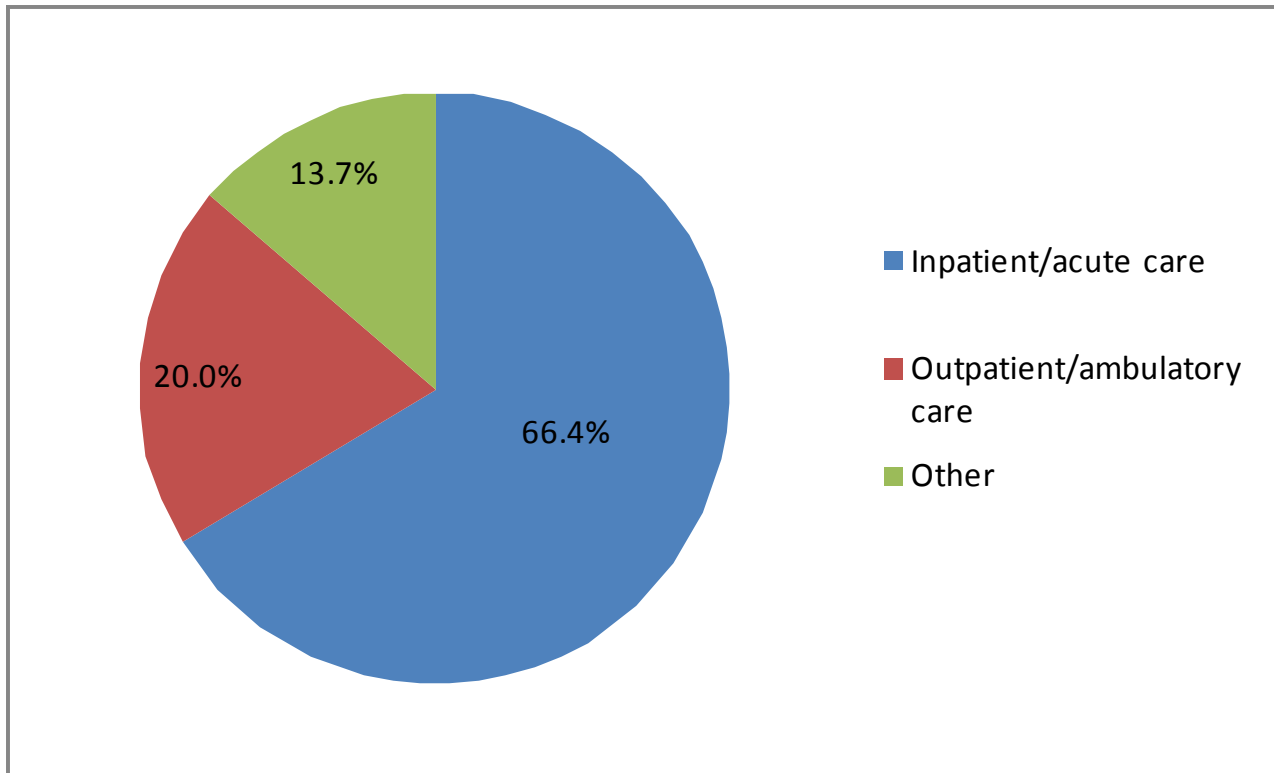
I am board certified by the Board of Pharmacy Specialties (BPS) in at least one of the BPS specialties (nuclear pharmacy, nutrition support pharmacy, oncology pharmacy, pharmacotherapy, or psychiatric pharmacy). Total respondents = 1823



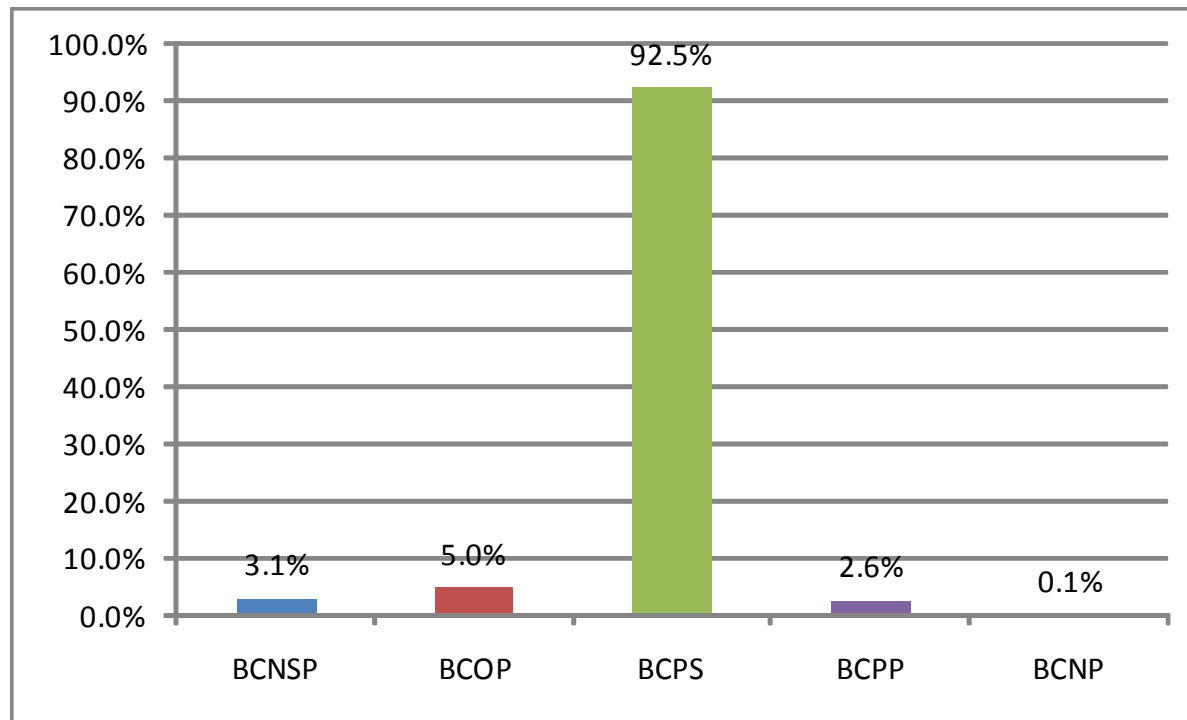
Branch 1: Board Certified (n=1099)

My primary professional/practice setting is:

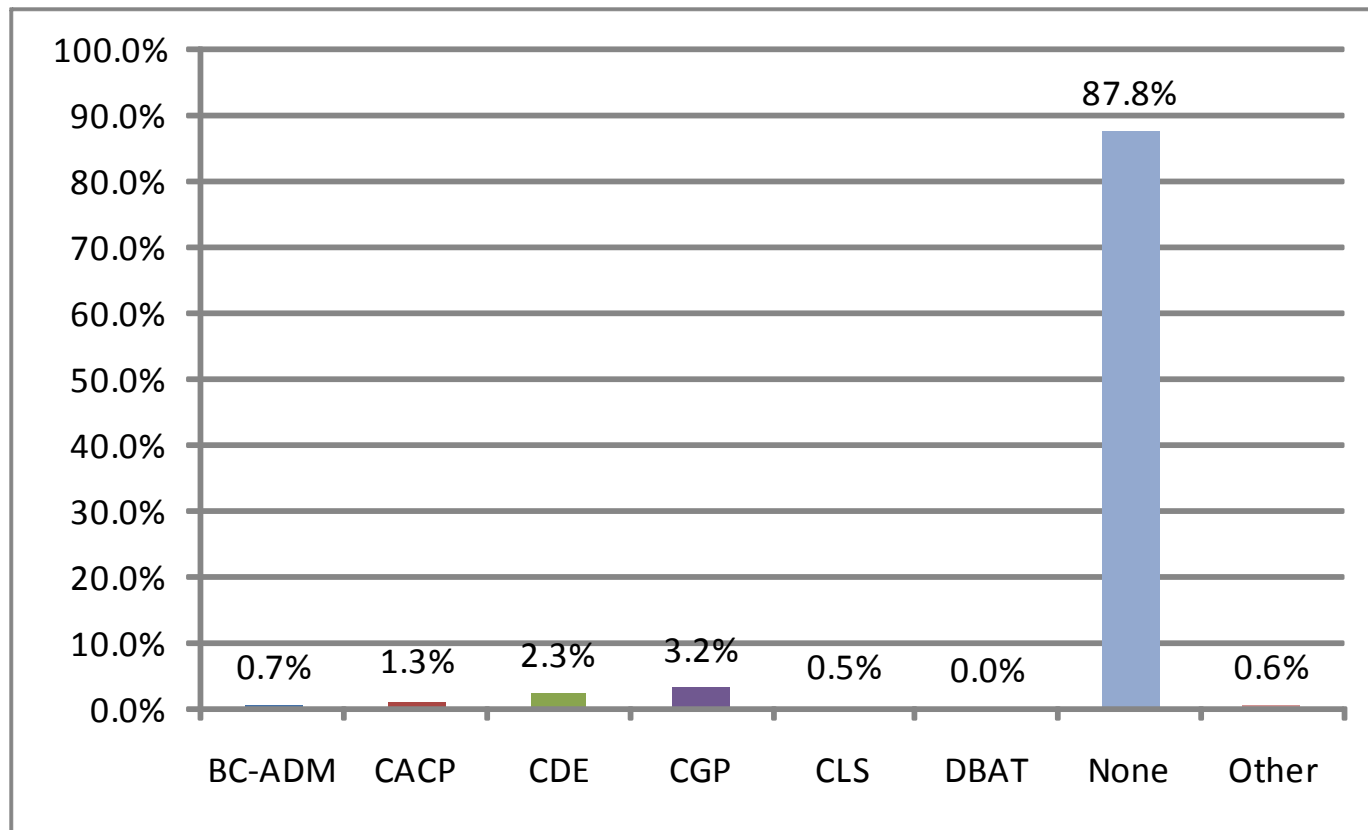
Total Respondents = 1097



I am board certified in:
Total Respondents = 1099



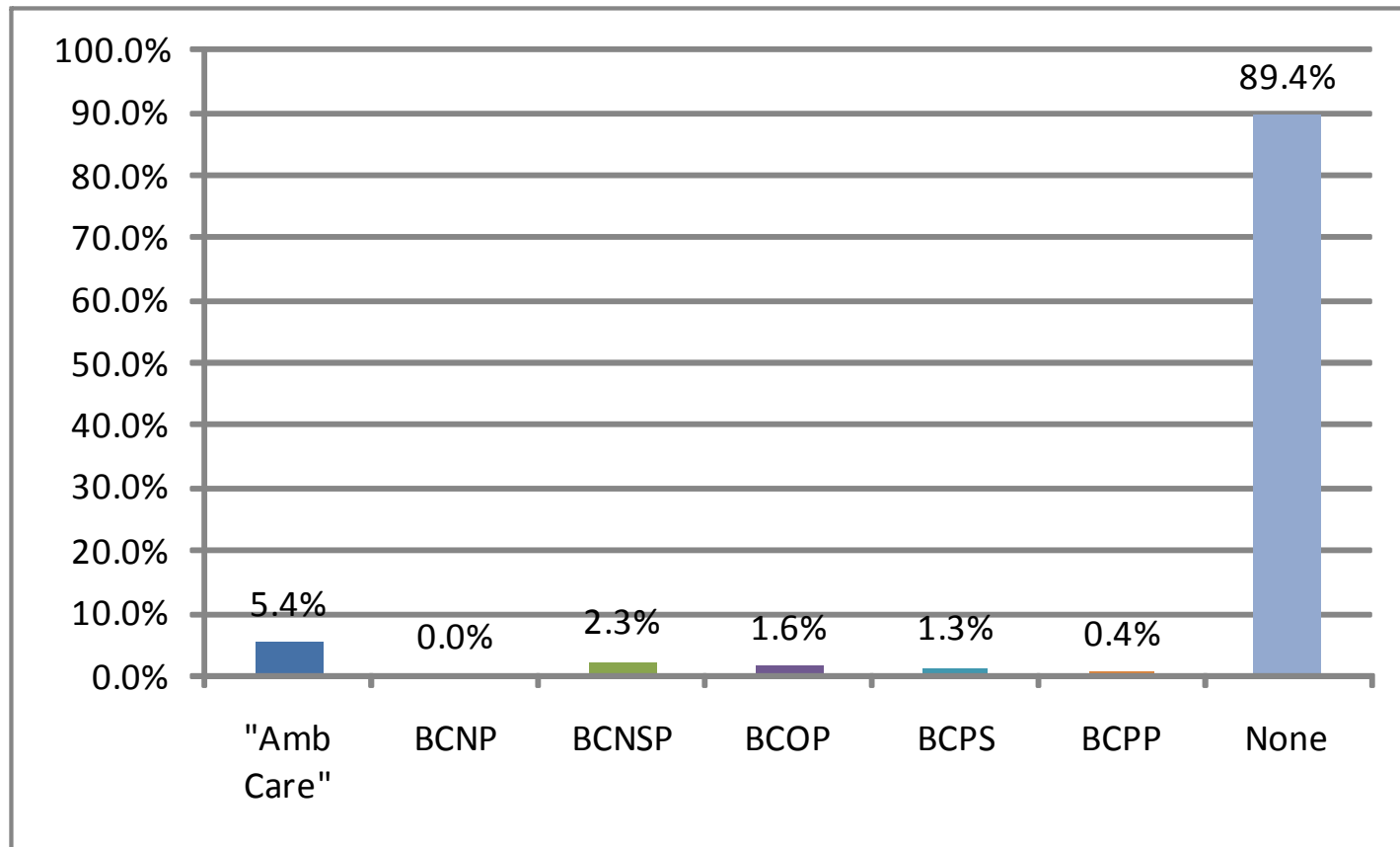
I hold other non-BPS certifications in:
Total Respondents = 1099



Do you plan to seek certification for a different BPS specialty within the next 2 years?



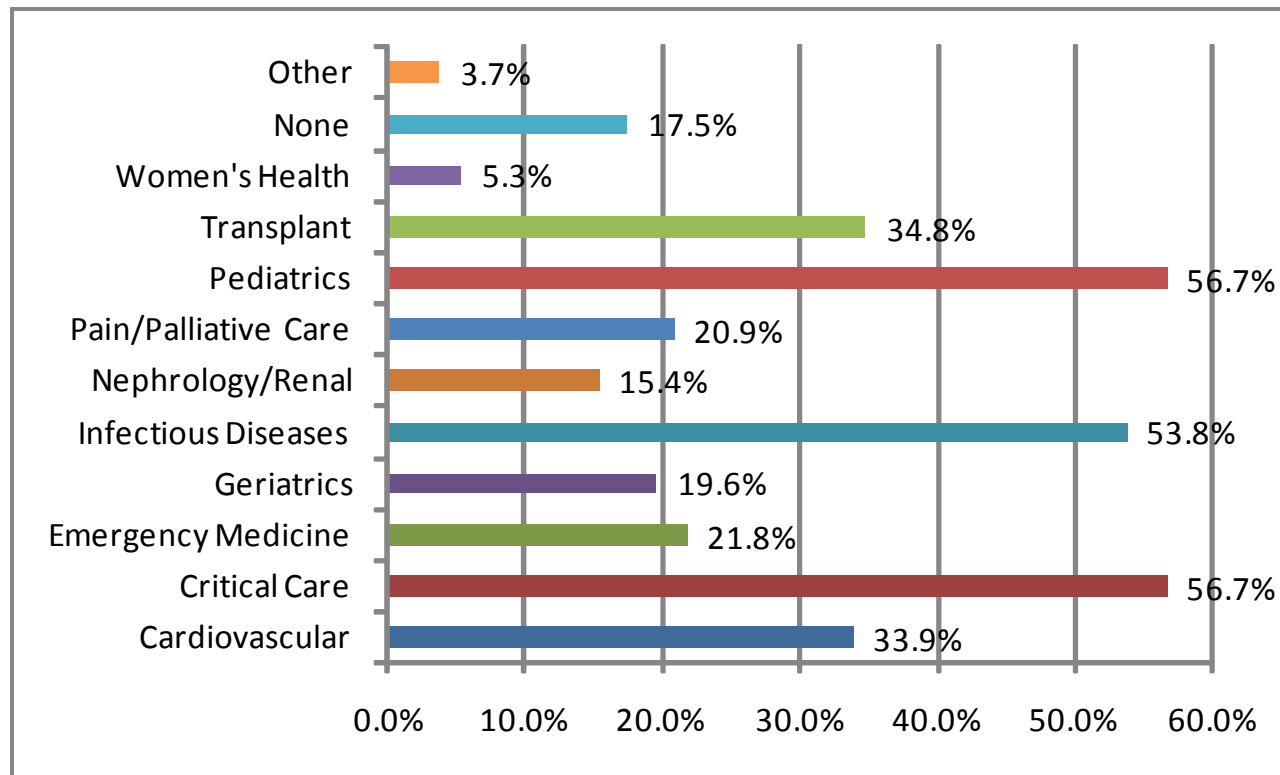
Total Respondents = 555* *Note: only 555 of this question's 1099 respondents had access to all 7 possible responses.



I believe that new BPS specialty certifications (not Added Qualifications within a specialty) are needed to appropriately certify clinical pharmacy practitioners in the area(s) below.

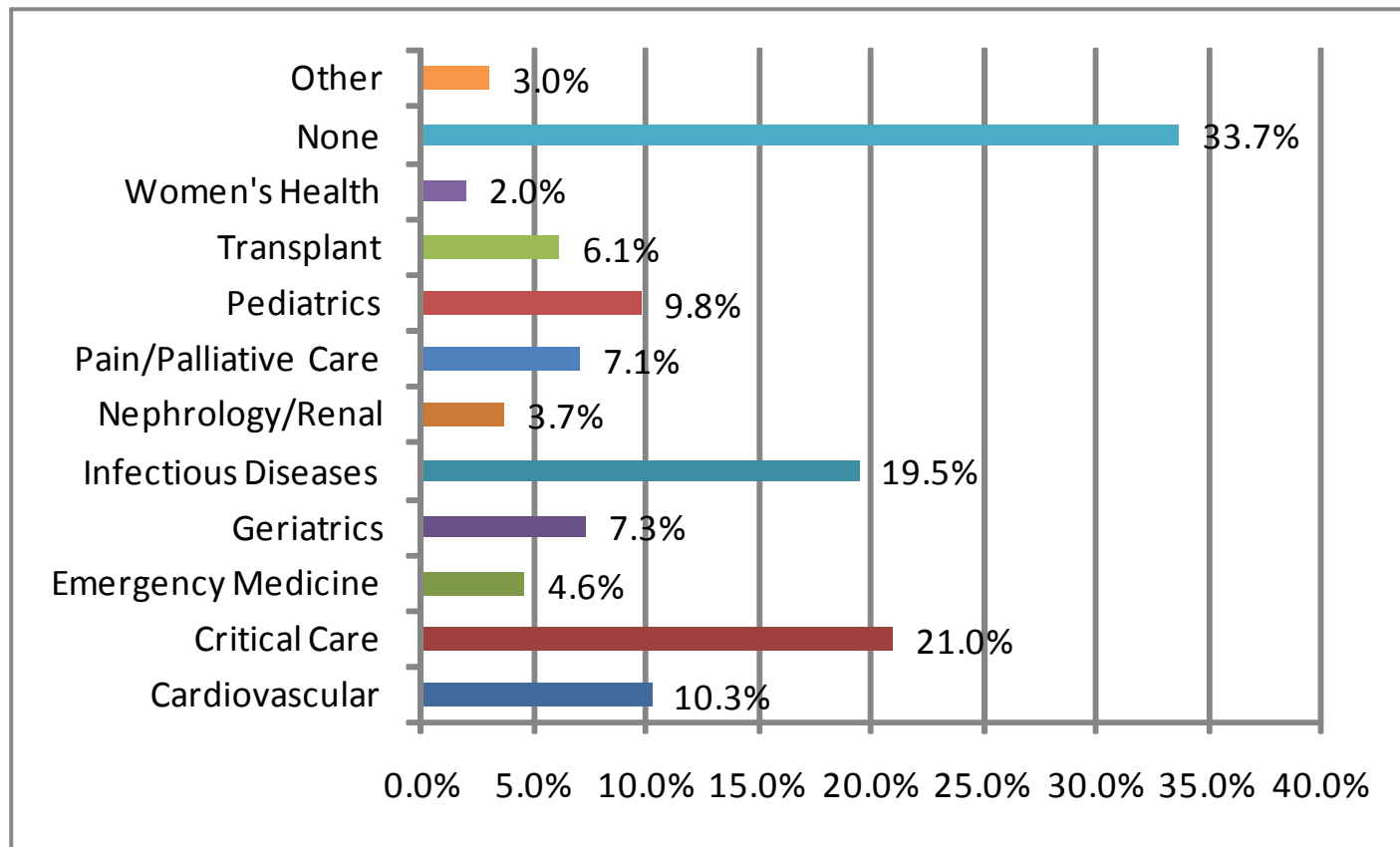


Total Respondents = 1099



If new BPS specialty certifications are offered, I will likely choose to become certified in:

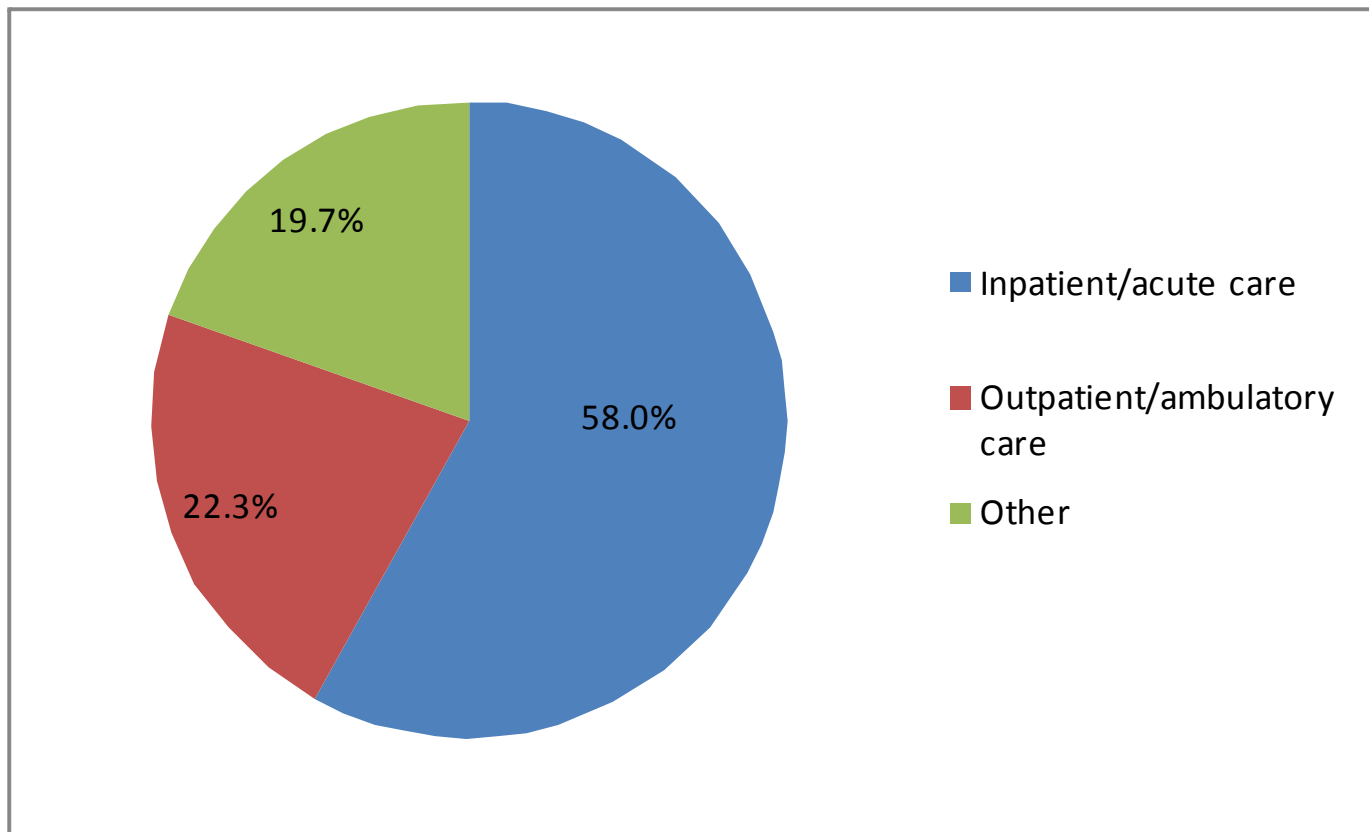
Total Respondents = 1099



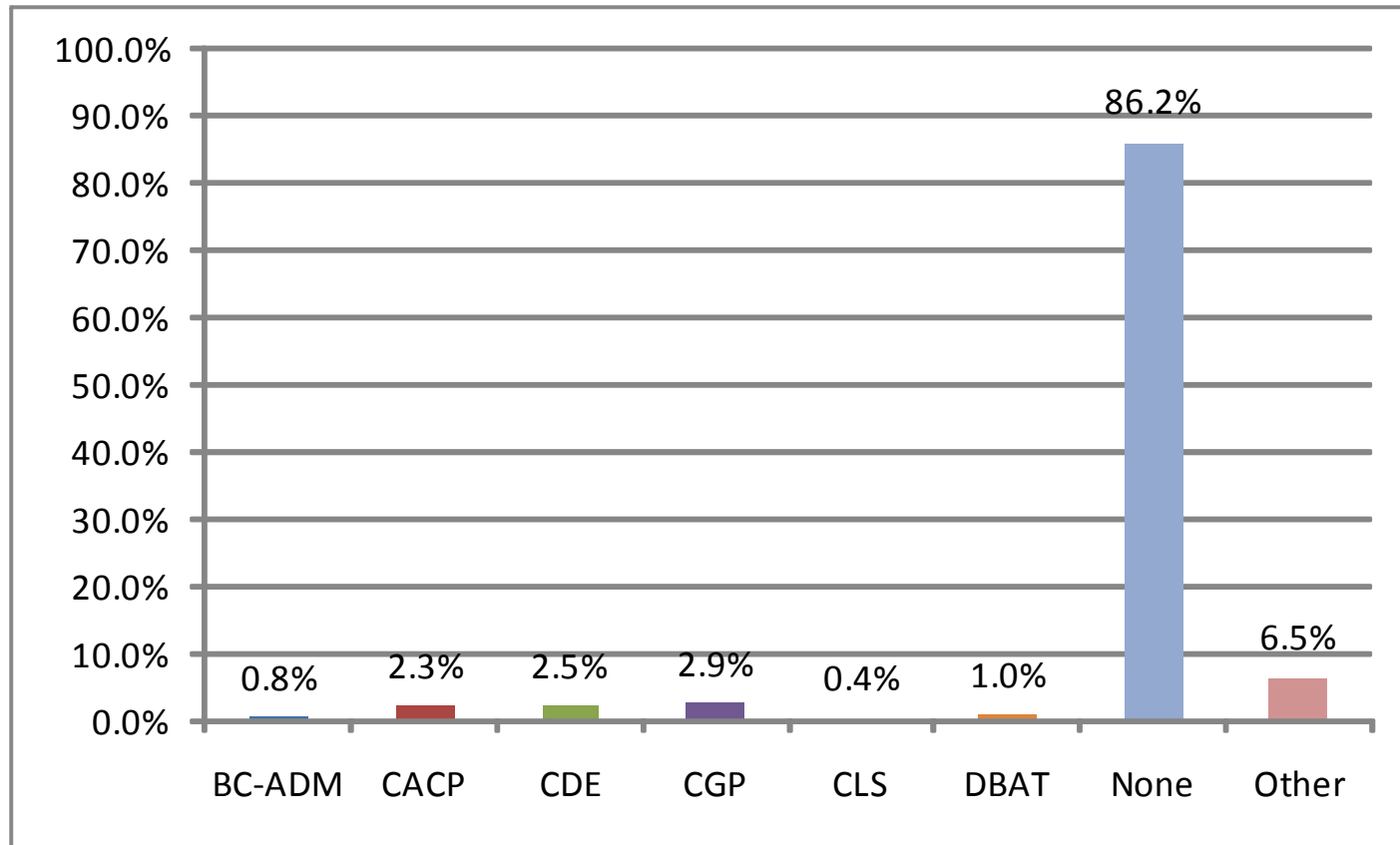
Branch 2: Not Board Certified (n=724)

My primary professional/practice setting is:

Total Respondents = 722

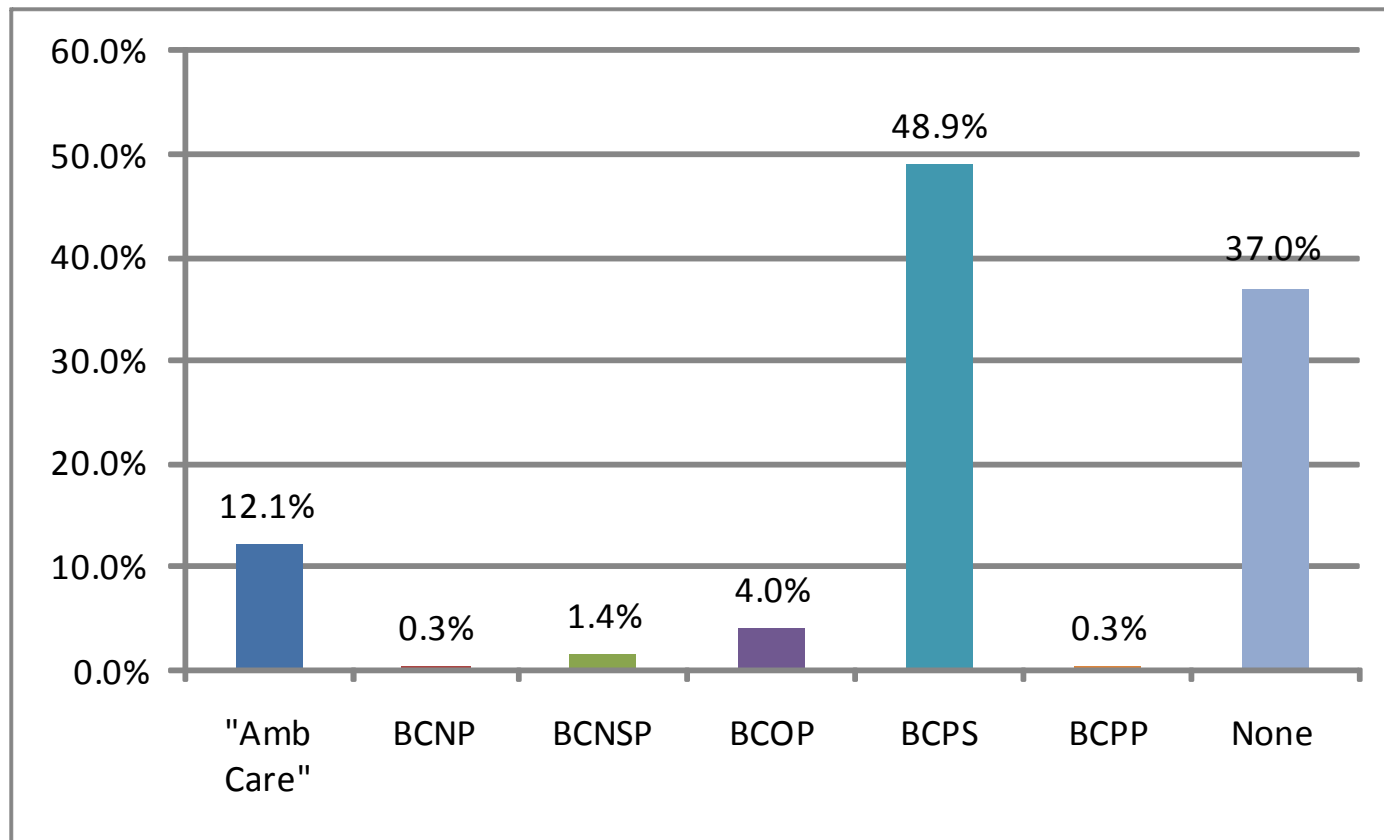


I hold other non-BPS certifications in:
Total Respondents = 724



Do you plan to seek certification for a BPS specialty within the next 2 years?

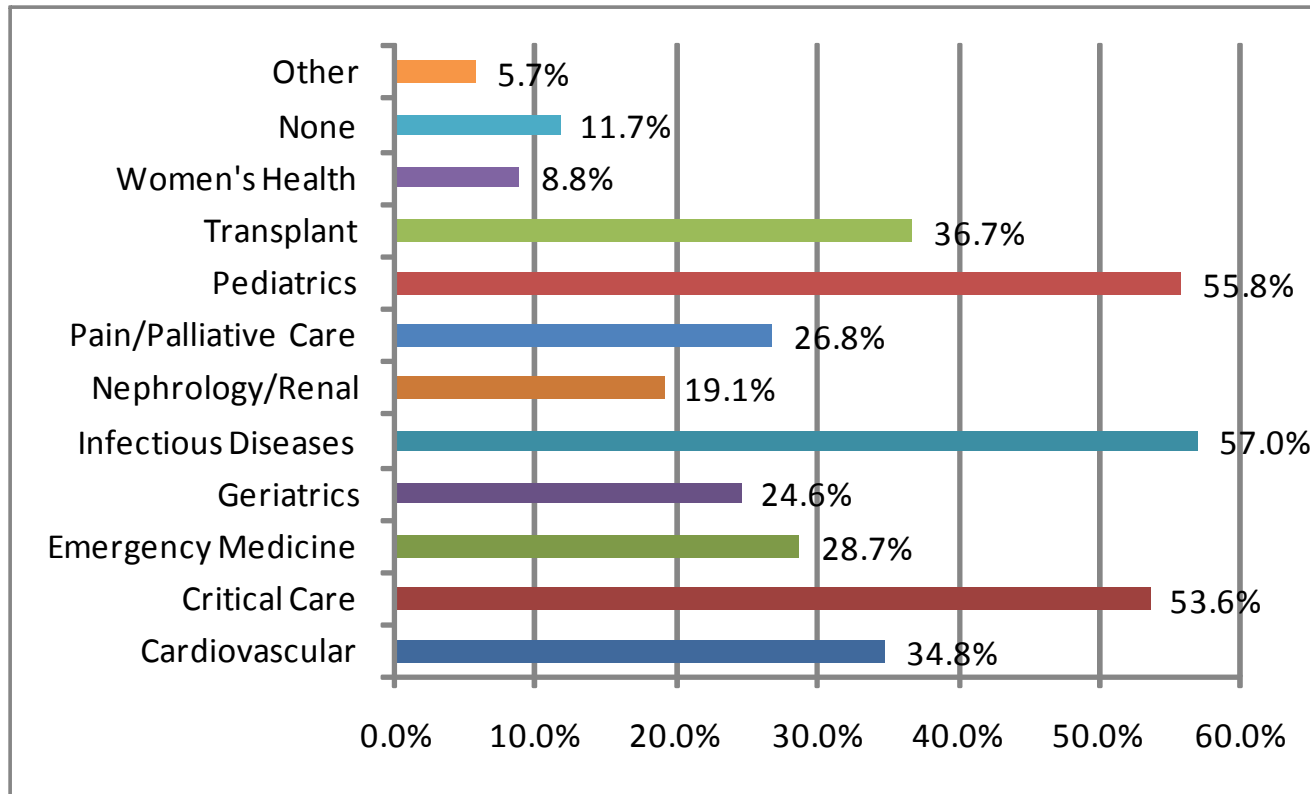
Total Respondents = 354* *Note: only 354 of this question's 724 respondents had access to all 7 possible responses.



I believe that new BPS specialty certifications (not Added Qualifications within a specialty) are needed to appropriately certify clinical pharmacy practitioners in the area(s) below.

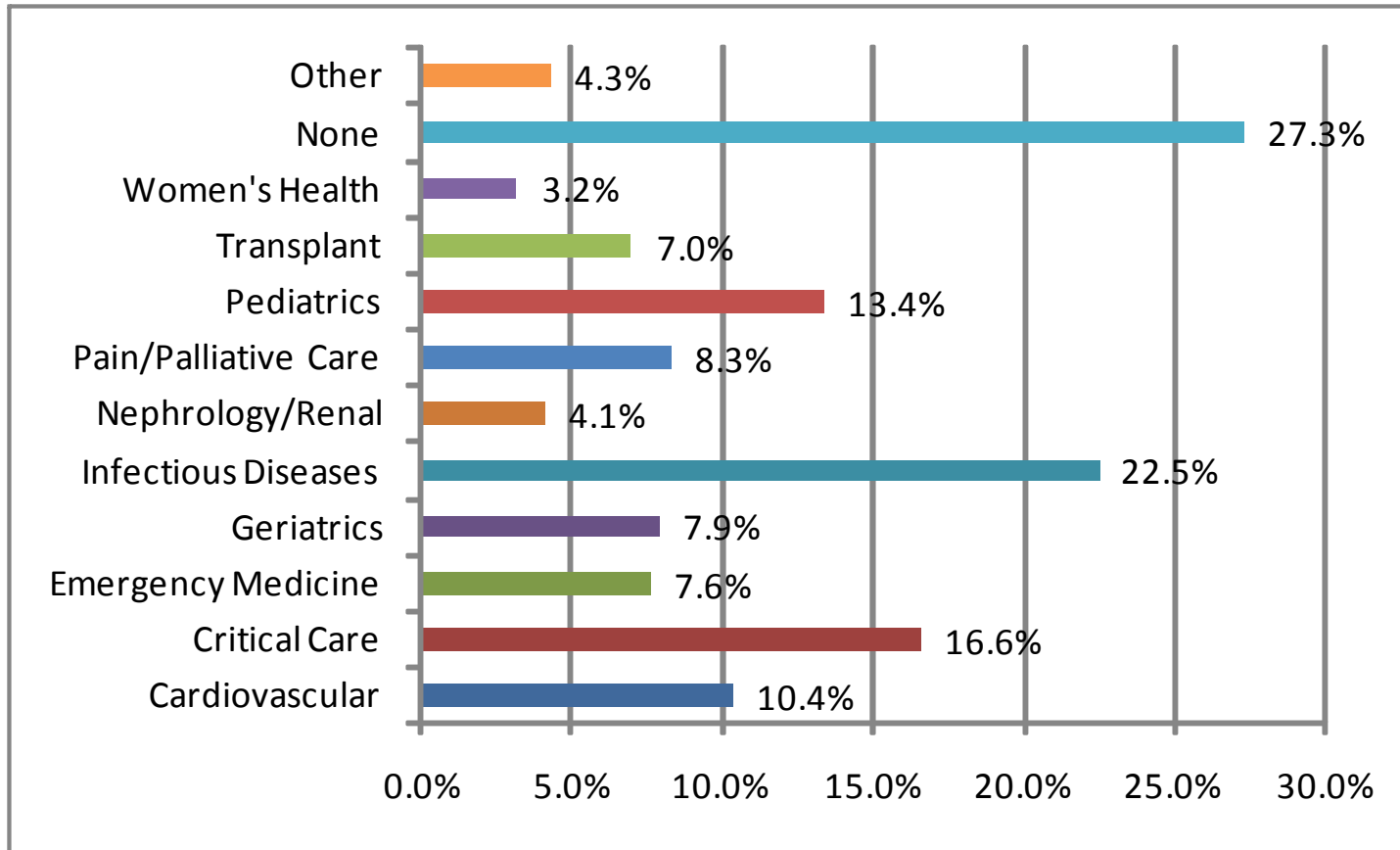


Total Respondents = 724



If new BPS specialty certifications are offered, I will likely choose to become certified in:

Total Respondents = 724



Appendix D-1

Report of the Role Delineation Study of Critical Care Pharmacy

Report of the Role Delineation Study of Critical Care Pharmacy

Prepared for



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

Prepared by



**Professional Examination Service
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April 2012

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Introduction

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

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

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

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

Methodology

Phase 1 – Development of the Description of Specialty Practice

Appointment of the Role Delineation Task Force

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

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

BPS received 134 nominations, and reviewed the CVs of all nominees prior to the selection of the task force.

In selecting the members of the role delineation task force, BPS took into consideration critical demographic and professional background variables to be represented in the group. BPS selected 9 subject-matter experts representing a range of practice settings and years of experience.

Pre-Meeting Data Collection Activity

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

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

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

Meeting 1 of the Task Force

In order to define the tasks and knowledge specific to the practice of critical care pharmacy, the role delineation task force met in Washington, DC in July 2011 for a 2-day meeting. One member of the task force was unable to attend the meeting, and resigned from the task force. Therefore, the final task force was comprised of 8 critical care pharmacy specialists. See Appendix 3 for a list of meeting attendees.

At the meeting, PES facilitated a discussion regarding the most useful structure for the delineation, and the process for developing the tasks and knowledge to be included in the critical care pharmacy role delineation. The task force adopted a three domain organizing structure for the delineation. The domains were *Clinical Skills and Therapeutic Management*, *Practice Administration and Development*, and *Information Management and Education*. Tasks performed and knowledge necessary for competent practice within each of these three domains were developed over the course of the meeting.

Immediately following this meeting, the role delineation was sent to all task force members for critical review. Task force members were asked to (1) provide solutions for any outstanding issues, (2) ensure that all tasks and knowledge required for effective practice were included in the delineation, (3) confirm that each statement was delineated as accurately and concisely as possible, and (4) ensure that each knowledge statement could be matched to at least one task statement and that a complete set of required knowledge had been identified for each task statement. Task force members then met for a series of virtual meetings in order to reconcile the comments and prepare a revised draft of the role delineation. This document was then disseminated to additional critical care pharmacists for review and comment.

Conduct of Independent Review

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

A total of 14 participants were selected from the pool of nominees assembled at the outset of the study. Selections were made so as to represent a range of areas of practice settings and experience. Of these, a total of 10 agreed to participate in the review. Reviewers were asked to evaluate the delineation for comprehensiveness, redundancy, clarity, consistency, and sequence. Appendix 4 contains a copy of the detailed instructions provided for performing the review.

A reminder e-mail was sent to reviewers prior to the submission deadline in order to encourage participation. A total of 9 of the 10 independent reviewers responded, for a 90% return rate, which is an above-average response rate for this type of activity.

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

Meeting 2 of the Task Force

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

Task force members, after thoughtful discussion, were able to make decisions regarding all suggested edits to the tasks and knowledge statements, and finalized the delineation of practice in preparation for a validation survey of pharmacists practicing in the critical care specialty. The role delineation finalized during meeting 2 of the task force consisted of 3 domains, 30 tasks, and 44 knowledge statements. The number of tasks and knowledge statements in each domain is displayed in Table 1.

Table 1
Structure of Critical Care Pharmacy Role Delineation

	Task Statements	Knowledge Statements
Domain 1: Clinical Skills and Therapeutic Management Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the healthcare team.	16	25
Domain 2: Practice Administration and Development Tasks related to advancing critical care pharmacy practice establishing implementing, and monitoring systems and policies to optimize the care of critically ill patients.	7	8
Domain 3: Information Management and Education Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of healthcare providers and trainees.	7	10
Total	30	44

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

Development of Survey Instrument

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

The specific rating scales used in the survey follow.

Tasks

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

Importance How important is the task to providing effective care to critically ill patients?
1=Not important, 2=Minimally important, 3=Moderately important, or 4=Very important

Domains

% of Time Of the time you spent providing pharmacy services to critically ill patients during the past year, what percentage did you spend performing the tasks in each domain?

Importance How important is the domain to providing effective care to critically ill patients?
1=Not important, 2=Minimally important, 3=Moderately important, 4=Highly important

Knowledge

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

Importance How important is the knowledge to providing effective care to critically ill patients?
1=Not important, 2=Minimally important, 3=Moderately important, or 4=Very important

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

Conduct of Survey Pilot Test

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

An additional 10 volunteers who had volunteered or been nominated to participate at the outset of the study but had not yet participated as task force members or independent reviewers were asked to participate in the pilot test of the survey. All task force members were also asked to participate. Therefore, a total of 18 pilot testers were sent invitations and personalized, password-protected links to the beta test version of the survey. Pilot testers were asked to

provide feedback regarding clarity of instructions, utility of rating scales, technical difficulties, and time to complete, as well as make any additional suggestions or comments to improve the survey experience. For a copy of the invitation sent to pilot testers, see Appendix 6.

Feedback was received from 11 participants for a return rate of about 61% — an above average response rate for this type of activity. PES reviewed the results of the pilot test and, based on the pilot feedback, made minor adjustments to the survey in advance of the large-scale administration.

Sampling Plan and Dissemination of Survey

The Board of Pharmacy Specialties (BPS) obtained the Critical Care Pharmacy survey sample from the following sources: the Society of Critical Care Medicine (SCCM), the American Society of Health-System Pharmacists (ASHP), and the American College of Clinical Pharmacy (ACCP).

After eliminating duplicates from across the sources, the final sample was comprised of 494 pharmacists identified as critical care pharmacy specialists.

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

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

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

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

Results of the Survey of Critical Care Pharmacy Practice

Return Rate

A total of 494 survey invitations were disseminated, and of these 66 could not be delivered due to invalid email addresses, leaving a valid sample size of 428. As seen in Table 2, a total of 226 pharmacists completed the survey for a return rate of about 53%. This is an excellent return rate for this type of survey.

Table 2
Survey Return Rate

Number of Invitations	Unable to Deliver	Valid Sample Size	Number of Responses	Return Rate
494	66	428	226	53%

Professional Background and Demographic Information

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

As seen in Table 3, respondents were highly engaged in the specialty of critical care pharmacy with an average of 72% of their work time spent providing pharmacy services to critically ill patients.

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

Mean	Median	Minimum	Maximum	Mode	SD
72%	80%	11%	100%	100%	(24.9)

Table 4 shows the percentage of work time spent providing pharmacy services to critical care patients in another way. This presentation expands upon Table 3. Table 4 shows that no respondents (0%) spent 10% or less of their time, 16 respondents (7%) spent 11-25% of their time, 48 respondents (21%) spent 26-50% of their time, 40 respondents (18%) spent 51-75% of their time, and 122 respondents (54%) spent 76-100% of their time providing pharmacy services for critically ill patients.

Table 4
Percentage of work time providing pharmacy services for critically ill patients

0%		1-10%		11-25%		26-50%		51-75%		76-100%	
N	%	N	%	N	%	N	%	N	%	N	%
0	0%	0	0%	16	7.1%	48	21.2%	40	17.7%	122	54.0%

Of the time spent providing pharmacy services to critically ill patients, an average of 64% was spent providing direct patient care (Table 5).

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

Mean	Median	Minimum	Maximum	Mode	SD
64%	70%	5%	100%	50%	(24.7)

Survey respondents had an average of 11 years of experience as a licensed pharmacist with the least being 2 years and the most 41 years (Table 6). Thirty-five percent of the sample had 1-5 years of experience, 24% had 6-10 years, 28% had 11-20 years, and 12% had more than 20 years as a licensed pharmacist (Table 7).

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

Mean	Median	Minimum	Maximum	Mode	SD
11	8	2	41	5	(8.2)

Table 7
Years as a licensed pharmacist

< 1 year		1-5 years		6-10 years		11 - 20 years		More than 20 years	
N	%	N	%	N	%	N	%	N	%
0	0%	80	35.4%	55	24.3%	64	28.3%	27	11.9%

Tables 8 and 9 show the results for years since licensure working with critically ill patients. Respondents had an average of 8 years of specialty experience, with 45% having 1-5 years of experience, 28% having 6-10 years of experience, 22% having 11-20 years of experience, and 5% having more than 20 years of experience in the specialty.

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

Mean	Median	Minimum	Maximum	Mode	SD
8	6	1	30	4	(6.1)

Table 9
Years in the critical care specialty since licensure

< 1 year		1-5 years		6-10 years		11 - 20 years		More than 20 years	
N	%	N	%	N	%	N	%	N	%
0	0%	101	45.1%	62	27.7%	50	22.3%	11	4.9%

Table 10 shows the setting in which respondents provided the majority of their patient care. The settings that were most represented in this survey were university hospital (36%), community teaching hospital (about 26%), and community hospital (25%). No other setting was represented by more than 10% of survey respondents.

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

	N	%
Community Hospital	57	25.3%
Community Teaching Hospital	58	25.8%
Government Hospital	9	4.0%
Private Teaching Hospital	18	8.0%
University Hospital	82	36.4%
Other (Please specify.)	1	.4%
Total	225	100%

In Table 11, the number and percentage of respondents working in ICUs of various sizes is displayed. The most respondents working in a hospital with 41-60 beds (22%) and 100 ICU beds (21%), and at least 10% of the respondent group worked in ICUs of each size.

Table 11
How many ICU beds are in your hospital?

	N	%
1-20	30	13.3%
21-40	37	16.4%
41-60	50	22.1%
61-80	34	15.0%
81-100	27	11.9%
More than 100	48	21.2%
Total	226	100%

Table 12 shows the populations for which survey respondents provided critical care pharmacy services. The most frequent were medical (76%), surgical (75%), pulmonary (66%), cardiology (57%), and neurosurgery (56%).

Table 12
For which patient populations do you provide critical care pharmacy services?
(Select all that apply.)

	N	%
Burn	29	12.8%
Cardiology	129	57.1%
Cardiothoracic Surgery	114	50.4%
Emergency Department	73	32.3%
Medical	172	76.1%
Neonatal	16	7.1%
Neurosurgery	127	56.2%
Pediatric	21	9.3%
Pulmonary	150	66.4%
Surgical	170	75.2%
Transplant	67	29.6%
Trauma	109	48.2%
Other (Please Specify.)	0	.0%

*Multiple responses permitted – percentages may not total 100%

Table 13 illustrates the percentage of patients in each age range. Only 5% of respondents' patients were under 18. Forty-nine percent were ages 18-64 and the other 47% were older than 65 years old.

Table 13
What percentage of your patients falls into each of the following age ranges?

	Mean	SD
Under 18	5.1	(13.3)
18 – 64	48.6	(16.7)
65+	46.5	(16.6)

Table 14 shows the highest pharmacy-related degree respondents had earned. Approximately 94% of respondents earned a Pharm.D.

Table 14
What is the highest pharmacy-related degree you have earned?

	N	%
Bachelor's degree	7	3.2%
Master's degree	4	1.8%
Pharm.D.	205	93.6%
Ph.D.	2	.9%
Other (Please specify.)	1	.5%
Total	219	100%

Table 15 shows residency program(s)/fellowships completed by respondents. Sixty-five percent indicated that they completed a PGY1 residency and 47% indicated that they completed a PGY2 critical care residency.

Table 15
Which of the following have you completed? (Select all that apply.)

	N	%
PGY1 Residency	143	65.0%
PGY2 Critical Care Residency	103	46.8%
PGY2 Residency (Not in critical care)	15	6.8%
Critical Care Research Fellowship	7	3.2%
Fellowship (Not in critical care)	6	2.7%
No Residency	38	17.3%
Other (Please specify.)	10	4.5%

*Multiple responses permitted – percentages may not total 100%

As seen in Table 16, of the approximately 80% of respondents who held a BPS specialty certification, 75% held the pharmacotherapy specialty certification.

Table 16
What BPS specialty certifications do you hold? (Select all that apply.)

	N	%
Ambulatory Care Pharmacy	0	.0%
Nuclear Pharmacy	0	.0%
Nutrition Support Pharmacy	12	5.5%
Oncology	0	.0%
Psychiatric Pharmacy	7	3.2%
Pharmacotherapy	165	75.0%
Added Qualification in Cardiology	2	.9%
Added Qualification in Infectious Diseases	2	.9%
None	43	19.5%

*Multiple responses permitted – percentages may not total 100%

Ratings for Domains

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

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

Percentage of Critical Care Work Time per Domain

The mean percentages of time participants spent in each domain are presented in Table 17. Respondents spent the most time in *Clinical Skills and Therapeutic Management* (64%), another 19% in *Information Management and Education*, and 17% in *Practice Administration and Development*. The standard deviations around each mean indicate that there was some individual variation in the time spent by respondents in each of the four domains.

Table 17
Of the time you spent providing pharmacy services to critically ill patients during the past year, what percentage did you spend performing the tasks in each domain?

	N	Mean	SD
Domain 1: Clinical Skills and Therapeutic Management – Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the healthcare team.	226	64%	(14.6)
Domain 2: Practice Administration and Development – Tasks related to advancing critical care pharmacy practice establishing implementing, and monitoring systems and policies to optimize the care of critically ill patients.	226	17%	(9.0)
Domain 3: Information Management and Education – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of healthcare providers and trainees.	226	19%	(11.8)

Table 18 presents the percentage of respondents spending 0%, 1 -25%, 26-50%, 51-75% and more than 75% of their work time in each domain. From this presentation of the results, it can be seen that Domain 1 is the only domain wherein more than 5% of respondents reported spending over 50% of their work time – 18% of respondents spent over 75% of their work time in Domain 1 alone.

Table 18
Percentage of work time per domain

			1-25%		26-50%		51-75%		76-100%	
	N	%	N	%	N	%	N	%	N	%
Domain 1: Clinical Skills and Therapeutic Management	0	.0%	6	2.7%	50	22.1%	130	57.5%	40	17.7%
Domain 2: Practice Administration and Development	1	.4%	194	85.8%	31	13.7%	0	.0%	0	.0%
Domain 3: Information Management and Education	0	.0%	173	76.5%	47	20.8%	6	2.7%	0	.0%

Domain Importance Ratings

Results related to the importance ratings for domains are shown in Table 19. The results are displayed in two ways. First, the percentage of respondents selecting *Not important*, *Minimally important*, *Moderately important*, or *Highly important* for each domain are displayed. Second, under the Total column, mean values were generated for by assigning numerical values to each for response option as follows: 1 = Not important, 2 = Minimally important, 3 = Moderately important, and 4 = Highly important.

Table 19
How important is the domain for providing effective care to critically ill patients?

	Not	Min	Mod	High	Total		
	%	%	%	%	N	M	SD
Domain 1: Clinical Skills and Therapeutic Management	.0%	.0%	.9%	99.1%	226	4.0	(.1)
Domain 2: Practice Administration and Development	.0%	7.5%	47.8%	44.7%	226	3.4	(.6)
Domain 3: Information Management and Education	.0%	2.7%	39.8%	57.5%	226	3.5	(.5)

Overall, the mean domain importance ratings were very high. A total of 99% of respondents selected highly important for Domain 1, and the mean rating for this domain was 4.0 on a 4-point scale. The second highest importance rating was 3.5 for Domain 3, and the lowest rating was for Domain 2 (3.4 indicating moderately to highly important). There were no differences in subgroup ratings in the mean importance ratings for domains that were greater than half a scale point (0.5).

Ratings for Tasks

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

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

Task Frequency Ratings

The percentage of respondents selecting each response option with respect to frequency of task performance is shown in Table 20, along with the mean, standard deviation, and number of respondents. The means were calculated after assigning numerical values to each response option as follows: 1=Never, 2=Quarterly or less, 3=Monthly, 4=Weekly, 5=Daily.

Of the 16 task statements in Domain 1, 15 were performed weekly to daily (mean frequency rating above 4.0), and 1 received a mean frequency rating of 3.8 (slightly less than weekly). For the 7 tasks included in Domain 2, 1 received a mean frequency rating above 4.0, 5 received a mean frequency rating between 3.0 and 3.5, and 1 received a mean rating below 3.0. Of the 7 statements included in Domain 3, 5 received a mean frequency ratings at or above 3.5, 1 received a mean frequency rating between 3.0 and 3.5, and 1 received a mean frequency rating below 3.0.

The two tasks performed least frequently were:

- 2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area. (Mean = 2.9)

- 3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process). (Mean = 2.4)

Table 20
Task Frequency Ratings

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
Domain 1: Clinical Skills and Therapeutic Management								
1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	.9%	1.3%	.4%	6.7%	90.7%	225	4.8	.6
1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	.4%	.9%	2.2%	11.6%	84.9%	225	4.8	.6
1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	2.2%	3.6%	1.8%	7.6%	84.9%	225	4.7	.9
1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.	2.3%	.9%	1.4%	4.1%	91.4%	222	4.8	.7
1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critic	.4%	.9%	1.3%	1.8%	95.6%	225	4.9	.5
1.6 Interpret, analyze, and integrate collected information for a critically ill patient.	.0%	.0%	1.3%	1.8%	96.9%	225	5.0	.3

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.	.0%	.4%	1.8%	3.1%	94.6%	224	4.9	.4
1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.	.0%	.0%	1.8%	2.7%	95.5%	223	4.9	.3
1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.	.0%	.9%	1.3%	7.6%	90.2%	225	4.9	.4
1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.	.0%	.9%	1.3%	7.1%	90.7%	225	4.9	.4
1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.	.0%	.0%	1.8%	4.4%	93.8%	225	4.9	.3
1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.	.0%	.0%	1.3%	5.8%	92.9%	225	4.9	.3
1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled	.9%	.4%	3.6%	16.9%	78.2%	225	4.7	.6
1.14 Participate in the management of the medical emergencies and resuscitation events.	4.5%	8.5%	17.0%	41.5%	28.6%	224	3.8	1.1
1.15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.	2.2%	4.4%	5.8%	24.9%	62.7%	225	4.4	.9

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
1. 16 Document direct patient care activities as appropriate.	4.0%	4.9%	5.8%	15.6%	69.8%	225	4.4	1.1
Domain 2: Practice Administration and Development								
2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.	1.8%	18.9%	33.8%	26.6%	18.9%	222	3.4	1.1
2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.	1.3%	31.3%	37.1%	19.6%	10.7%	224	3.1	1.0
2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).	3.6%	38.8%	25.4%	15.2%	17.0%	224	3.0	1.2
2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.	.5%	2.3%	2.7%	6.8%	87.8%	221	4.8	.6
2.5 Justify and document clinical and financial value of critical care pharmacy services.	12.1%	27.4%	15.7%	10.3%	34.5%	223	3.3	1.5
2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.	4.5%	40.2%	25.9%	15.2%	14.3%	224	2.9	1.1
2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.	11.7%	35.4%	17.5%	13.0%	22.4%	223	3.0	1.4
Domain 3: Information Management and Education								
3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.	1.8%	14.3%	29.0%	24.1%	30.8%	224	3.7	1.1

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.	4.9%	17.0%	23.3%	33.6%	21.1%	223	3.5	1.1
3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.	.9%	12.5%	21.4%	18.3%	46.9%	224	4.0	1.1
3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.	.9%	13.7%	18.3%	15.1%	52.1%	219	4.0	1.2
3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).	.5%	19.8%	37.8%	26.1%	15.8%	222	3.4	1.0
3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.	.4%	8.9%	23.2%	47.8%	19.6%	224	3.8	.9
3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).	12.5%	58.0%	16.1%	7.6%	5.8%	224	2.4	1.0

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

Task Importance Ratings

The percentage of respondents selecting each response option with respect to the importance of each task to providing effective care to critically ill patients is shown in Table 21 along with the mean, standard deviation, and number of respondents. The means were calculated after assigning numerical values to each response option as follows: 1 = Not important, 2 = Minimally important, 3 = Moderately important, and 4 = Very important.

Twenty-five tasks received mean importance ratings at or above 3.5, and 5 received mean importance ratings between 3.0 and 3.5. There were no tasks with mean importance ratings below 3.0.

Table 21
Task Importance Ratings

	Not	Min	Mod	Very	Total		
	%	%	%	%	N	Mean	SD
Domain 1: Clinical Skills and Therapeutic Management							
1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	.5%	.9%	12.8%	85.8%	219	3.8	.4
1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	.0%	.9%	18.3%	80.8%	219	3.8	.4
1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	1.4%	2.3%	14.7%	81.7%	218	3.8	.6
1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.	.9%	.5%	11.9%	86.7%	218	3.8	.4
1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critic	.9%	.0%	3.7%	95.4%	219	3.9	.3
1.6 Interpret, analyze, and integrate collected information for a critically ill patient.	.0%	.0%	.9%	99.1%	218	4.0	.1
1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.	.0%	.0%	5.5%	94.5%	219	3.9	.2
1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.	.0%	.0%	1.8%	98.2%	217	4.0	.1
1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.	.0%	.0%	7.8%	92.2%	218	3.9	.3

	Not	Min	Mod	Very	Total		
	%	%	%	%	N	Mean	SD
1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.	.0%	.0%	7.3%	92.7%	218	3.9	.3
1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.	.0%	.0%	3.2%	96.8%	216	4.0	.2
1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.	.0%	.5%	4.2%	95.4%	216	3.9	.2
1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled	.0%	2.3%	25.6%	72.1%	215	3.7	.5
1.14 Participate in the management of the medical emergencies and resuscitation events.	.9%	4.2%	26.4%	68.5%	216	3.6	.6
1.15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.	.9%	3.7%	21.9%	73.5%	215	3.7	.6
1.16 Document direct patient care activities as appropriate.	1.8%	10.0%	26.9%	61.2%	219	3.5	.7
Domain 2: Practice Administration and Development							
2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.	.0%	3.2%	37.6%	59.3%	221	3.6	.6
2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.	.0%	3.2%	28.4%	68.5%	222	3.7	.5
2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).	.5%	8.6%	42.5%	48.4%	221	3.4	.7
2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.	.0%	.9%	10.0%	89.1%	220	3.9	.4
2.5 Justify and document clinical and financial value of critical care pharmacy services.	3.2%	11.8%	36.2%	48.9%	221	3.3	.8
2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.	.0%	7.7%	38.7%	53.6%	222	3.5	.6
2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.	1.4%	7.2%	29.0%	62.4%	221	3.5	.7
Domain 3: Information Management and Education							
3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.	.0%	3.6%	38.7%	57.7%	222	3.5	.6
3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.	.9%	13.2%	42.7%	43.2%	220	3.3	.7

	Not	Min	Mod	Very	Total		
	%	%	%	%	N	Mean	SD
3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.	.0%	.5%	31.7%	67.9%	221	3.7	.5
3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.	.0%	2.8%	29.8%	67.4%	218	3.6	.5
3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).	1.4%	7.3%	39.5%	51.8%	220	3.4	.7
3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.	.9%	4.1%	24.8%	70.3%	222	3.6	.6
3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).	2.3%	13.1%	45.9%	38.7%	222	3.2	.8

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

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

Missing Tasks

After rating all of the tasks, participants were asked to indicate any additional tasks they perform as a critical care pharmacy specialist that may have been omitted from the survey. There were 32 write-in responses to this question. Prior to a task force meeting to review the survey results, these verbatim suggested additions were sent to members of the task force for review. Task force members were asked to determine whether any suggestions represented concepts truly missing from the task list. Write-in responses were deemed to be either more general or more specific instances of statements already contained in the delineation, content not suitable for testing, or outside the scope of specialty practice. Thus, the delineation of tasks was validated as comprehensive.

Task Validation Decisions

The task force met virtually to review the validation evidence collected in the role delineation survey. Task force members were asked to consider if the ratings for the tasks were sufficiently high to suggest that they be included in the final, validated description of critical care specialty practice. There was only one instance where a task statement received a mean frequency rating below a 2.5. This was task 3.7 *Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process)* which received a mean frequency rating of 2.4. The task force discussed this task statement, and based on the moderate importance rating of 3.2 and the nature of the task (by its nature, this task would typically be performed quarterly or less, and therefore have a low mean frequency rating), enough validation evidence existed to support inclusion of this statement in the role delineation of critical care pharmacy.

Ratings for Knowledge

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

Knowledge Frequency Ratings

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

Of the knowledge statements in Domain 1, 29 received mean frequency ratings at or above 4.0, and the remaining 7 knowledge statements had a mean frequency rating between 3.5 and 4.0. For the 8 knowledge statements included in Domain 2, 2 tasks received mean frequency ratings above 3.5, 2 had a mean rating of 3.0, and the other 4 had mean ratings below 3.0. Of the 10 knowledge statements included in Domain 3, 2 received mean frequency ratings above 3.5, 5 received mean frequency ratings between 3.0 and 3.5, and 3 received mean frequency ratings below 3.0.

The seven knowledge bases receiving mean frequency ratings below 3.0 were:

- k2.1 Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey) (Mean rating = 2.4)
- k2.2 Metrics for evaluating quality of critical care pharmacy services (e.g., lengths of ICU stay, mortality, cost-effectiveness) (Mean rating = 2.5)
- k2.3 Quality assurance and process improvement methods (Mean rating = 2.8)
- k2.10 Resources (e.g., financial, technological, human) necessary to care for critically ill patients (Mean rating = 2.9)
- k3.6 Regulatory/IRB requirements relative to conducting critical care research (Mean rating = 2.4)
- k3.9 Medical literature publication and review process (Mean rating = 2.7)
- k3.10 Opportunities for disseminating critical care knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters) (Mean rating = 2.6)

Table 22
Knowledge Frequency Ratings

	Never %	Quarterly or less %	Monthly %	Weekly %	Daily %	N	Total Mean	SD
Domain 1: Clinical Skills and Therapeutic Management								
Knowledge of:								
k1.1 Diagnosis, pathophysiology, epidemiology, risk factors, and treatment of conditions in critically ill patients in the following therapeutic areas:								
a. Pulmonary	.0%	.4%	3.5%	10.6%	85.4%	226	4.8	.5
b. Cardiovascular	.0%	.0%	1.8%	8.0%	90.3%	226	4.9	.4
c. Neurology and Neurological Injuries	.0%	4.0%	12.4%	32.7%	50.9%	226	4.3	.8
d. Psychiatry	1.8%	10.6%	26.1%	39.8%	21.7%	226	3.7	1.0
e. Renal	.0%	.0%	2.2%	10.2%	87.6%	225	4.9	.4
f. Hepato-Gastrointestinal	.0%	.9%	10.6%	34.1%	54.4%	226	4.4	.7
g. Immunology	.9%	12.9%	26.7%	41.3%	18.2%	225	3.6	1.0
h. Endocrine	.0%	1.3%	8.0%	26.2%	64.4%	225	4.5	.7
i. Hematology	.0%	1.8%	15.1%	36.9%	46.2%	225	4.3	.8
j. Infectious diseases	.0%	.0%	.9%	3.1%	96.0%	226	5.0	.3
k. Toxicology	.9%	13.7%	33.2%	40.3%	11.9%	226	3.5	.9
l. Surgery	1.3%	5.8%	13.3%	27.4%	52.2%	226	4.2	1.0
k1.2 Sedation, analgesia, delirium, and neuromuscular blockade	.0%	.4%	1.8%	6.2%	91.6%	225	4.9	.4
k1.3 Nutrition support in the critically ill patient	1.8%	5.8%	12.0%	28.0%	52.4%	225	4.2	1.0
k1.4 Alterations of pharmacodynamics and pharmacokinetics in the critically ill (e.g., effects of hypothermia, mechanical ventilation, volume resuscitation, organ dysfunction)	.0%	1.3%	3.1%	12.9%	82.7%	225	4.8	.6
k1.5 Drug interactions and adverse drug events common in critical care	.0%	.0%	.9%	14.2%	84.9%	225	4.8	.4
k1.6 Pharmacoeconomics (e.g., cost effectiveness, cost minimization)	3.6%	13.8%	23.2%	37.1%	22.3%	224	3.6	1.1

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k1.7 Sepsis/SIRS	.0%	.4%	2.7%	19.2%	77.7%	224	4.7	.5
k1.8 Advanced Cardiac Life Support (ACLS) principles	3.6%	8.9%	18.8%	41.5%	27.2%	224	3.8	1.1
k1.9 Devices commonly utilized in critical care (e.g., balloon pump, left ventricular assist device [LVAD], cooling devices, extracorporeal membrane oxygenation [ECMO])	4.9%	15.9%	24.8%	32.3%	22.1%	226	3.5	1.1
k1.10 Procedures commonly performed in critical care (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia)	.4%	5.8%	7.1%	31.9%	54.9%	226	4.3	.9
k1.11 Renal replacement therapy	3.1%	3.1%	14.2%	35.8%	43.8%	226	4.1	1.0
k1.12 Mechanical ventilation principles and monitoring techniques	.9%	5.8%	5.3%	19.1%	68.9%	225	4.5	.9
k1.13 Critical care monitoring techniques (e.g., hemodynamic, neurologic, cardiovascular)	.0%	1.3%	3.5%	10.2%	85.0%	226	4.8	.6
k1.14 Impact of alterations in anatomy and physiology due to trauma, surgery or congenital causes on medication therapy	2.2%	6.6%	11.1%	29.2%	50.9%	226	4.2	1.0
k1.15 Routes of administration for medications in critically ill patients	.0%	.0%	2.2%	5.8%	92.0%	225	4.9	.4
k1.16 Routes of administration for nutrition (enteral vs. parenteral) and alterations in absorption of nutrients in critically ill patients	.9%	5.3%	8.0%	22.2%	63.6%	225	4.4	.9
k1.17 Preventative and supportive care measures used in the care of critically ill patients	.0%	1.3%	4.9%	12.6%	81.2%	223	4.7	.6
k1.18 Fluid, electrolyte, and acid/base management in ICU patients	.0%	.0%	1.8%	11.6%	86.6%	224	4.8	.4
k1.19 Agents used for acute volume resuscitation and hemostasis (e.g., crystalloids, colloids, blood products, hemostatic agents)	.0%	1.3%	4.5%	18.3%	75.9%	224	4.7	.6
k1.20 Parenteral vasoactive and inotropic agents	.0%	.4%	1.3%	9.8%	88.4%	225	4.9	.4
k1.21 End of life care	2.2%	7.1%	24.0%	47.6%	19.1%	225	3.7	.9
k1.22 Impact of critical illness on pre-existing conditions (e.g. endocrine disorders, cardiovascular diseases, infectious diseases, respiratory diseases)	.0%	1.8%	5.3%	20.4%	72.4%	225	4.6	.7

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k1.23 Application of evidence-based critical care literature and clinical practice guidelines in designing a patient-specific plan of care	.0%	.9%	3.6%	14.2%	81.3%	225	4.8	.6
k1.24 Outcome indicators for pharmacotherapy of disease states common to ICU patients	1.4%	6.8%	18.1%	30.3%	43.4%	221	4.1	1.0
k1.25 Documentation processes used for critical care pharmacy services	6.3%	8.6%	11.7%	22.5%	50.9%	222	4.0	1.2
Domain 2: Practice Administration and Development								
Knowledge of:								
k2.1 Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey)	14.3%	50.0%	25.4%	4.9%	5.4%	224	2.4	1.0
k2.2 Metrics for evaluating quality of critical care pharmacy services (e.g., lengths of ICU stay, mortality, cost-effectiveness)	11.6%	43.8%	30.4%	10.7%	3.6%	224	2.5	1.0
k2.3 Quality assurance and process improvement methods	4.5%	39.0%	35.0%	15.2%	6.3%	223	2.8	1.0
k2.4 Evidence-based literature supporting the value of critical care pharmacy	4.5%	38.9%	26.7%	15.4%	14.5%	221	3.0	1.1
k2.5 Application of evidence-based critical care literature in designing institutional guidelines	1.8%	33.9%	36.7%	16.3%	11.3%	221	3.0	1.0
k2.6 Communication strategies	5.4%	16.3%	18.1%	19.5%	40.7%	221	3.7	1.3
k2.7 Resources (e.g., financial, technological, human) necessary to care for critically ill patients	11.3%	31.2%	23.5%	21.7%	12.2%	221	2.9	1.2
k2.8 Medication safety principles pertinent to patients requiring care in the ICU	.9%	11.7%	20.7%	27.0%	39.6%	222	3.9	1.1
Domain 3: Information Management and Education								
Knowledge of:								
k3.1 Principles and methods of educating pharmacists, fellows, residents, students, and other healthcare professionals	.9%	8.4%	17.8%	26.2%	46.7%	225	4.1	1.0
k3.2 Techniques for educating critically ill patients/caregiver	7.1%	17.4%	23.2%	33.5%	18.8%	224	3.4	1.2

	Never	Quarterly or less	Monthly	Weekly	Daily	Total		
	%	%	%	%	%	N	Mean	SD
k3.3 Published documents from professional societies (e.g., American Society of Health-System Pharmacists [ASHP], American College of Clinical Pharmacy [ACCP], Society of Critical Care Medicine [SCCM]) regarding the education and training of critical care pharmacists	9.9%	26.9%	23.8%	21.5%	17.9%	223	3.1	1.3
k3.4 Research design, methodology, and statistical analysis	5.0%	28.8%	33.3%	24.3%	8.6%	222	3.0	1.0
k3.5 Clinical application and limitations of published data and reports	2.2%	12.9%	27.1%	31.1%	26.7%	225	3.7	1.1
k3.6 Regulatory/IRB requirements relative to conducting critical care research	10.8%	53.8%	23.3%	10.3%	1.8%	223	2.4	.9
k3.7 Continuing professional development opportunities in critical care (e.g., professional organization membership, committee involvement, sources of continuing education, mentorship)	1.3%	28.7%	45.3%	16.1%	8.5%	223	3.0	.9
k3.8 Mentorship principles, techniques, and strategies	3.1%	31.7%	30.8%	19.2%	15.2%	224	3.1	1.1
k3.9 Medical literature publication and review process	9.5%	40.9%	29.5%	11.4%	8.6%	220	2.7	1.1
k3.10 Opportunities for disseminating critical care knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)	8.5%	48.7%	26.3%	10.3%	6.3%	224	2.6	1.0

Knowledge Importance Ratings

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

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

- k2.1 Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey) (Mean rating = 2.7)
- k3.6 Regulatory/IRB requirements relative to conducting critical care research (Mean rating = 2.8)

Of the remaining 52 knowledge statements, 23 received mean importance ratings between 3.0 and 3.5, and 29 received mean importance ratings at or above 3.5 on a 4-point scale.

Table 23
Knowledge Importance Ratings

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
Domain 1: Clinical Skills and Therapeutic Management							
Knowledge of:							
k1.1 Diagnosis, pathophysiology, epidemiology, risk factors, and treatment of conditions in critically ill patients in the following therapeutic areas:							
a. Pulmonary	.0%	1.4%	8.6%	90.0%	221	3.9	.4
b. Cardiovascular	.0%	.0%	3.7%	96.3%	219	4.0	.2
c. Neurology and Neurological Injuries	.0%	2.3%	23.5%	74.2%	221	3.7	.5
d. Psychiatry	.5%	25.0%	39.5%	35.0%	220	3.1	.8
e. Renal	.0%	.5%	9.1%	90.5%	220	3.9	.3
f. Hepato-Gastrointestinal	.0%	1.8%	32.4%	65.8%	219	3.6	.5
g. Immunology	.0%	20.8%	46.6%	32.6%	221	3.1	.7
h. Endocrine	.0%	3.2%	30.6%	66.2%	219	3.6	.5
i. Hematology	.0%	7.3%	39.1%	53.6%	220	3.5	.6
j. Infectious diseases	.0%	.0%	1.8%	98.2%	221	4.0	.1
k. Toxicology	.5%	7.7%	36.4%	55.5%	220	3.5	.7
l. Surgery	.5%	7.2%	37.1%	55.2%	221	3.5	.7
k1.2 Sedation, analgesia, delirium, and neuromuscular blockade	.0%	.0%	3.6%	96.4%	223	4.0	.2
k1.3 Nutrition support in the critically ill patient	.0%	8.5%	30.9%	60.5%	223	3.5	.6
k1.4 Alterations of pharmacodynamics and pharmacokinetics in the critically ill (e.g., effects of hypothermia, mechanical ventilation, volume resuscitation, organ dysfunction)	.0%	.5%	13.1%	86.5%	222	3.9	.4

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
k1.5 Drug interactions and adverse drug events common in critical care	.0%	.5%	10.9%	88.6%	220	3.9	.3
k1.6 Pharmacoeconomics (e.g., cost effectiveness, cost minimization)	1.8%	23.5%	45.2%	29.4%	221	3.0	.8
k1.7 Sepsis/SIRS	.0%	.0%	4.6%	95.4%	219	4.0	.2
k1.8 Advanced Cardiac Life Support (ACLS) principles	1.8%	4.5%	18.2%	75.5%	220	3.7	.6
k1.9 Devices commonly utilized in critical care (e.g., balloon pump, left ventricular assist device [LVAD], cooling devices, extracorporeal membrane oxygenation [ECMO])	.9%	15.2%	46.6%	37.2%	223	3.2	.7
k1.10 Procedures commonly performed in critical care (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia)	.0%	9.3%	37.8%	52.9%	225	3.4	.7
k1.11 Renal replacement therapy	.4%	1.8%	20.5%	77.2%	224	3.7	.5
k1.12 Mechanical ventilation principles and monitoring techniques	.9%	10.4%	33.8%	55.0%	222	3.4	.7
k1.13 Critical care monitoring techniques (e.g., hemodynamic, neurologic, cardiovascular)	.0%	3.1%	12.1%	84.8%	224	3.8	.5
k1.14 Impact of alterations in anatomy and physiology due to trauma, surgery or congenital causes on medication therapy	1.3%	9.3%	31.1%	58.2%	225	3.5	.7
k1.15 Routes of administration for medications in critically ill patients	.0%	2.2%	11.2%	86.5%	223	3.8	.4
k1.16 Routes of administration for nutrition (enteral vs. parenteral) and alterations in absorption of nutrients in critically ill patients	.4%	9.4%	24.2%	65.9%	223	3.6	.7
k1.17 Preventative and supportive care measures used in the care of critically ill patients	.0%	2.3%	19.4%	78.4%	222	3.8	.5
k1.18 Fluid, electrolyte, and acid/base management in ICU patients	.0%	.0%	11.3%	88.7%	222	3.9	.3
k1.19 Agents used for acute volume resuscitation and hemostasis (e.g., crystalloids, colloids, blood products, hemostatic agents)	.0%	2.2%	16.6%	81.2%	223	3.8	.5
k1.20 Parenteral vasoactive and inotropic agents	.0%	.0%	3.6%	96.4%	223	4.0	.2
k1.21 End of life care	1.3%	18.3%	45.1%	35.3%	224	3.1	.8
k1.22 Impact of critical illness on pre-existing conditions (e.g. endocrine disorders, cardiovascular diseases, infectious diseases, respiratory diseases)	.0%	5.8%	25.9%	68.3%	224	3.6	.6
k1.23 Application of evidence-based critical care literature and clinical practice guidelines in designing a patient-specific plan of care	.0%	.4%	13.5%	86.1%	223	3.9	.4
k1.24 Outcome indicators for pharmacotherapy of disease states common to ICU patients	1.3%	6.3%	42.0%	50.4%	224	3.4	.7
k1.25 Documentation processes used for critical care pharmacy services	4.5%	10.3%	43.8%	41.5%	224	3.2	.8
Domain 2: Practice Administration and Development							
Knowledge of:							
k2.1 Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey)	4.0%	35.0%	43.5%	17.5%	223	2.7	.8
k2.2 Metrics for evaluating quality of critical care pharmacy services (e.g., lengths of ICU stay, mortality, cost-effectiveness)	1.8%	20.8%	52.5%	24.9%	221	3.0	.7

	Not	Min	Mod	High	Total		
	%	%	%	%	N	Mean	SD
k2.3 Quality assurance and process improvement methods	.9%	17.1%	50.9%	31.1%	222	3.1	.7
k2.4 Evidence-based literature supporting the value of critical care pharmacy	1.4%	10.9%	42.5%	45.2%	221	3.3	.7
k2.5 Application of evidence-based critical care literature in designing institutional guidelines	.0%	4.6%	32.0%	63.5%	219	3.6	.6
k2.6 Communication strategies	1.4%	15.1%	35.2%	48.4%	219	3.3	.8
k2.7 Resources (e.g., financial, technological, human) necessary to care for critically ill patients	3.6%	25.8%	42.1%	28.5%	221	3.0	.8
k2.8 Medication safety principles pertinent to patients requiring care in the ICU	.0%	5.0%	31.1%	63.9%	219	3.6	.6
Domain 3: Information Management and Education							
Knowledge of:							
k3.1 Principles and methods of educating pharmacists, fellows, residents, students, and other healthcare professionals	.9%	7.3%	40.9%	50.9%	220	3.4	.7
k3.2 Techniques for educating critically ill patients/caregivers	4.1%	18.6%	41.4%	35.9%	220	3.1	.8
k3.3 Published documents from professional societies (e.g., American Society of Health-System Pharmacists [ASHP], American College of Clinical Pharmacy [ACCP], Society of Critical Care Medicine [SCCM]) regarding the education and training of critical care pharmacists	1.8%	13.6%	47.3%	37.3%	220	3.2	.7
k3.4 Research design, methodology, and statistical analysis	2.3%	16.7%	44.3%	36.7%	221	3.2	.8
k3.5 Clinical application and limitations of published data and reports	.9%	10.0%	36.2%	52.9%	221	3.4	.7
k3.6 Regulatory/IRB requirements relative to conducting critical care research	6.8%	29.9%	43.4%	19.9%	221	2.8	.8
k3.7 Continuing professional development opportunities in critical care (e.g., professional organization membership, committee involvement, sources of continuing education, mentorship)	1.8%	9.5%	46.8%	41.9%	222	3.3	.7
k3.8 Mentorship principles, techniques, and strategies	2.7%	17.6%	49.1%	30.6%	222	3.1	.8
k3.9 Medical literature publication and review process	3.2%	23.2%	46.8%	26.8%	220	3.0	.8
k3.10 Opportunities for disseminating critical care knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)	2.7%	21.2%	46.4%	29.7%	222	3.0	.8

Missing Knowledge

After participants rated the knowledge statements, they were asked to indicate any additional knowledge they use as a critical care pharmacy specialist that may have been omitted from the survey. There were only 6 write-in responses to this question. These verbatim suggested additions were reviewed by the task force, and the knowledge list was deemed to be comprehensive.

Knowledge Validation Decisions

Task force members were also asked to consider if the ratings for the knowledge statements were sufficiently high to suggest that they be included in the final, validated description of critical care specialty practice. There were only two instances where the mean frequency rating for the knowledge statements was below a 2.5. These were knowledge statements 2.1 *Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey)* and 3.6 *Regulatory/IRB requirements relative to conducting critical care research* which received mean frequency ratings of 2.4. Based on the retention of the task statements that these knowledge bases support and the relationship of the knowledge to tasks performed in practice (i.e., the knowledge is used to support tasks that performed infrequently), the task force determined that sufficient rationale existed to support inclusion of these statements in the role delineation of critical care pharmacy. For the final version of the updated and validated description of critical care pharmacy practice, see Appendix 10.

Development of Examination Specifications

Development of Domain Weights

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

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

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

PES calculated the domain weights as follows:

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

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

where

i = a single domain

k = a single respondent

n = the number of respondents

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

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

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

$$DW_i = D_i / \sum_{i=1}^3 D$$

Hypothetical examination specifications are presented for the total sample, and for those respondents spending less (< 50%) or more (\geq 50%) time providing pharmacy services to critically ill patients (Table 24).

Table 24
Hypothetical Test Specifications

	Total Sample	< 50% specialty work time	≥ 50% specialty work time
Domain 1: Clinical Skills and Therapeutic Management	66%	58%	68%
Domain 2: Practice Administration and Development	15%	15%	15%
Domain 3: Information Management and Education	19%	27%	17%

Recommended Examination Specifications

After examining the hypothetical, empirically-derived test specifications, the task force deemed the percentages derived from the total sample of survey respondents to be the most representative of specialty practice. Thus, the recommended examination specifications for a potential new specialty certification found in Table 25 are the percentages derived from the survey data of the total sample.

Table 25
Final Recommendations for Examination Specifications

	% of Exam
Domain 1: Clinical Skills and Therapeutic Management	66%
Domain 2: Practice Administration and Development	15%
Domain 3: Information Management and Education	19%
Total	100%

Summary and Recommendations

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

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

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

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

References

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

Appendix 1
SME Nomination Form

* 1. Name of Nominator

* 2. Nominator's e-mail

* 3. Name of Nominee

* 4. Nominee's Job Title

* 5. Nominee's Employer

* 6. Employer's Address

* 7. Employer's City, State, Zip

* 8. Nominee's Work Phone

* 9. Nominee's e-mail address

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

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

Task Force Member: (May 2011 to March 2012)

Serve on committee that creates domains, tasks, and knowledge statements comprising the critical care pharmacy delineation of practice. Attend a face-to-face meeting in Washington, DC on July 26 - 27, 2011. Participate in a pre-meeting data collection activity and a post-meeting homework assignment. Participate in virtual meetings from August 2011 to March 2012 to refine and finalize the delineation of critical care specialty practice.

Independent Review: (August/September 2011)

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

Survey Pilot Test: (November 2011)

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

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

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

***12. On average, what percentage of time does the nominee spend in providing critical care pharmacy services to patients?**

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

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

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

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

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

***16. How many years has the nominee worked in critical care pharmacy?**

***17. During the past 12 months, with which patient population did the nominee spend the MOST amount of time?**

- Pediatric
- Adolescent (13- 20)
- Adult (21- 65)
- Adult (65+)
- Both adult age groups (21 -65+)
- All of the above

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

- Nuclear Pharmacy
- Nutrition Support Pharmacy
- Oncology
- Pharmacotherapy
- Psychiatric Pharmacy
- None

Next >>

Appendix 2
Pre-meeting Data Collection Activity Screen Captures

BPS Critical Care Pharmacy Data Collection Activity

To make our work more efficient at our in-person meeting, we are asking you each to contribute your initial thoughts regarding the format and content of the Critical Care Pharmacy practice analysis document. Please provide your answers to these questions no later than **Monday, July 18, 2011**, so that we may review and compile the results into a summary report in advance of our July 26-27 meeting.

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

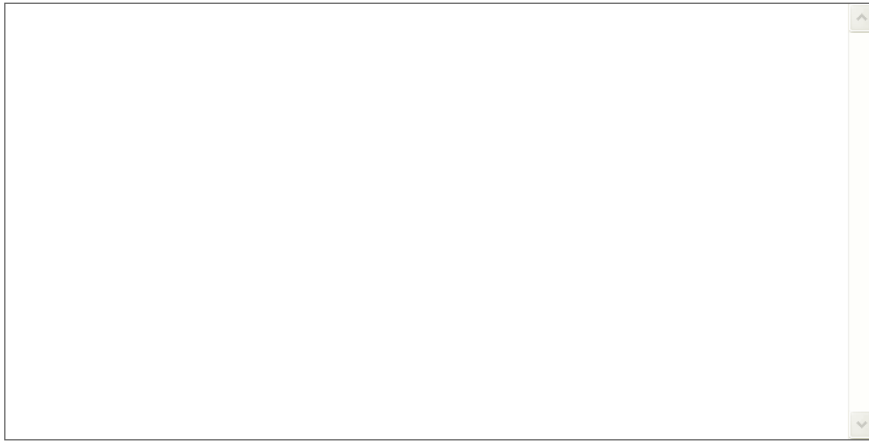
Name:

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

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

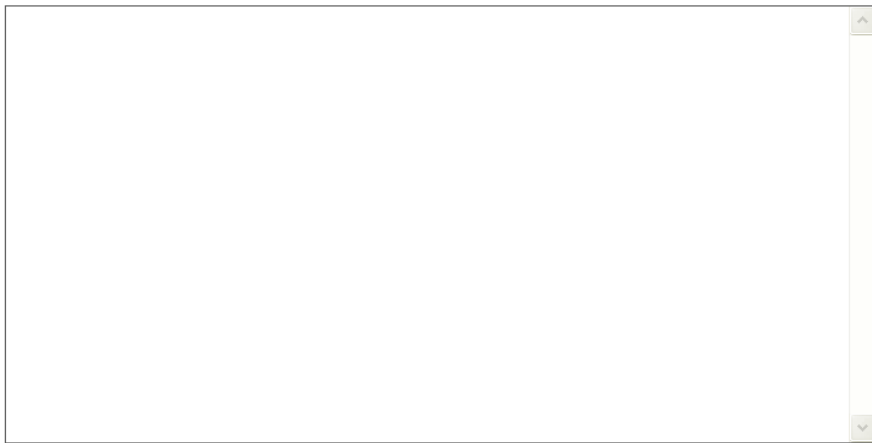
Tasks are discrete work elements within each domain, and represent actions taken or activities performed in the domain of practice. Tasks describe distinct, observable, and specific practice-related activities.

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

A large, empty rectangular text box with a thin black border and a vertical scrollbar on the right side, intended for entering specific tasks performed by a pharmacist specializing in critical care.

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

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

A large, empty rectangular text box with a thin black border and a vertical scrollbar on the right side, intended for describing specialized knowledge required for effective critical care practice.

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

Submit your responses

Appendix 3
Critical Care Pharmacy Task Force
Meeting #1 Attendees

BOARD OF PHARMACY SPECIALTIES

**Critical Care Pharmacy Role Delineation Study
Task Force Meeting 1
July 26 – 27, 2011**

Washington, DC

ATTENDEES

Task Force Members

Brad Boucher
Kamila Dell
Douglas N. Fish
Mary Hess
John Lewin
John Papadopoulos
Hal E. Richards
Lori Schirmer

Board of Pharmacy Specialties

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

Professional Examination Service

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

Appendix 4
Instructions for Independent Review

Critical Care Pharmacy

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

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

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

The tasks and knowledge in the role delineation are organized into three domains: Clinical Skills and Therapeutic Management, Practice Administration and Development, and Information Management and Education. Please think about the following when you review the outline:

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

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

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

Thank you very much.

Appendix 5
Survey Screen Captures

Save and exit

Responses for all *previous* pages will be saved.

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

 %

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

 %

Next

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Need help? Send an email to BPSCriticalCare@proexam.org

Progress Meter 6%

Save and exit

Responses for all previous pages will be saved.

Structure of Survey

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

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

- Domain 1: Clinical Skills and Therapeutic Management
- Domain 2: Practice Administration and Development
- Domain 3: Information Management and Education

The survey is organized into the following four sections:

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

Next

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Need help? Send an email to BPSCriticalCare@proexam.org

Progress Meter 9%

Section 1 — Tasks

For each task, please make the following two ratings:

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

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

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

	How frequently did you perform the task in the past 12 months?					How important is the task to providing effective care to critically ill patients?			
	Never	Quarterly or less	Monthly	Weekly	Daily	Not	Min	Mod	Very
Domain 1: Clinical Skills and Therapeutic Management									
Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Save and exit

Responses for all *previous* pages will be saved.


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

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

Next

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 31%
Progress Meter

Section 2 — Domain Ratings

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

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

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

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

	% of Time	Importance			
		Not	Min	Mod	High
Domain 1: Clinical Skills and Therapeutic Management – Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the healthcare team.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Domain 2: Practice Administration and Development – Tasks related to advancing critical care pharmacy practice establishing implementing, and monitoring systems and policies to optimize the care of critically ill patients.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Domain 3: Information Management and Education – Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of healthcare providers and trainees.	<input type="text"/> %	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sum	<input type="text"/> 0 %				

Next



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bps Board of Pharmacy Specialties Save and exit

Responses for all previous pages will be saved.

Section 3 — Knowledge Ratings

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

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

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

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

	How frequently did you use the knowledge in the past 12 months?					How important is the knowledge to providing effective care to critically ill patients?				
	Never	Quarterly or less	Monthly	Weekly	Daily	Not	Min	Mod	High	
Domain 1: Clinical Skills and Therapeutic Management										
Knowledge of:										
Diagnosis, pathophysiology, epidemiology, risk factors, and treatment of conditions in critically ill patients in the following therapeutic areas:										
• Pulmonary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Cardiovascular	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Neurology and Neurological Injuries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Psychiatry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Renal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Hepato-Gastrointestinal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Immunology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Endocrine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Hematology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Infectious diseases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Toxicology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Surgery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Done Internet 90%

Save and exit

Responses for all previous pages will be saved.

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

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

Next

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Progress Meter 75%

Section 4 — Demographic Questionnaire

How many years have you worked as a licensed pharmacist?

Years

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

Years

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

- Community Hospital
- Community Teaching Hospital
- Government Hospital
- Private Teaching Hospital
- University Hospital
- Other (Please specify.)

How many ICU beds are in your hospital?

- 1-20
- 21-40
- 41-60
- 61-80
- 81-100
- More than 100

For which patient populations do you provide critical care pharmacy services? (Select all that apply.)

- Burn
- Cardiology
- Cardiothoracic Surgery
- Emergency Department
- Medical
- Neonatal
- Neurosurgery
- Pediatric
- Pulmonary
- Surgical
- Transplant
- Trauma
- Other (Please Specify.)

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

Age Range	% of Your Patients
Under 18	<input type="text"/>
18-64	<input type="text"/>
65+	<input type="text"/>
Sum	<input type="text" value="0"/>

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

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

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

- PGY1 Residency
- PGY2 Critical Care Residency
- PGY2 Residency (Not in critical care)
- Critical Care Research Fellowship

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

- PGY1 Residency
- PGY2 Critical Care Residency
- PGY2 Residency (Not in critical care)
- Critical Care Research Fellowship
- Fellowship (Not in critical care)
- No Residency
- Other (Please specify.)

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

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

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 97%
Progress Meter

Done

Internet



90%

Save and exit

Responses for all *previous* pages will be saved.

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

Enter your information below to be entered in the drawing.

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

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

Next

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Progress Meter 100%

Appendix 6
Pilot Test Invitation

Dear <<First>>:

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

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

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

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

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

<<URL>>

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

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

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

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

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

Appendix 7
Survey Invitation and Reminder

Dear <<First>>:

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

If you are currently practicing in the specialty of critical care, we are asking you to complete an online role delineation survey. We anticipate the survey taking about 20 minutes to complete. Your responses to the survey questions will be entirely confidential and only aggregated results will be reported.

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

The link below will take you to the survey:

<<URL>>

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

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

Board of Pharmacy Specialties
Critical Care Pharmacy Task Force

Dear <<First>>:

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

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

We anticipate the survey taking about 20 minutes to complete. Your responses to the survey questions will be entirely confidential and only aggregated results will be reported.

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

The link below will take you to the survey:

<<URL>>

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

Please complete this survey by January 25, 2012

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

Board of Pharmacy Specialties
Critical Care Pharmacy Task Force

Appendix 8
Subgroup Analysis for Domain Ratings

Percentage of Time Ratings for Domains by Subgroups

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

	< 50% CC Time n=35		≥ 50% CC Time n=191	
	M	SD	M	SD
Domain 1: Clinical Skills and Therapeutic Management	54.9%	17.7	65.2%	13.4
Domain 2: Practice Administration and Development	16.5%	11.5	16.6%	8.5
Domain 3: Information Management and Education	28.6%	17.8	18.3%	9.5

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

	1-5 yrs n=101		6-10 yrs n=62		11-20 yrs n=50		20+ yrs n=11	
	M	SD	M	SD	M	SD	M	SD
Domain 1: Clinical Skills and Therapeutic Management	64.1%	12.9	64.5%	15.5	62.3%	16.9	59.1%	14.3
Domain 2: Practice Administration and Development	16.1%	8.3	16.8%	9.2	18.1%	10.3	13.6%	8.7
Domain 3: Information Management and Education	19.8%	10.8	18.6%	11.8	19.6%	12.9	27.3%	14.6

Importance Ratings for Domains by Subgroups

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

	< 50% CC Time n=35		≥ 50% CC Time n=191	
	M	SD	M	SD
	Domain 1: Clinical Skills and Therapeutic Management	4.0	.2	4.0
Domain 2: Practice Administration and Development	3.2	.6	3.4	.6
Domain 3: Information Management and Education	3.4	.6	3.6	.5

**Domain Importance by
Years of Experience Working with Critically Ill Patients**

	1-5 yrs n=101		6-10 yrs n=62		11-20 yrs n=50		20+ yrs n=11	
	M	SD	M	SD	M	SD	M	SD
	Domain 1: Clinical Skills and Therapeutic Management	4.0	.0	4.0	.1	4.0	.0	3.9
Domain 2: Practice Administration and Development	3.3	.6	3.4	.6	3.4	.7	3.3	.8
Domain 3: Information Management and Education	3.6	.5	3.5	.6	3.6	.5	3.5	.5

Appendix 9
Subgroup Analysis for Task Ratings

**Task Frequency Ratings by
Percentage of Time Providing Pharmacy Services to Critically Ill Patients**

	< 50% CC Time n=35	≥ 50% CC Time n=191
	M	M
Domain 1: Clinical Skills and Therapeutic Management		
1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	4.6	4.9
1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	4.5	4.8
1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	4.2	4.8
1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.	4.4	4.9
1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critic	4.6	5.0
1.6 Interpret, analyze, and integrate collected information for a critically ill patient.	4.7	5.0
1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.	4.7	5.0
1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.	4.7	5.0
1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.	4.5	4.9
1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.	4.6	4.9
1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.	4.7	5.0
1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.	4.7	5.0

	< 50% CC Time n=35	≥ 50% CC Time n=191
	M	M
1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled)	4.2	4.8
1.14 Participate in the management of the medical emergencies and resuscitation events.	2.8	4.0
1.15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.	3.9	4.5
1.16 Document direct patient care activities as appropriate.	3.8	4.5
Domain 2: Practice Administration and Development		
2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.	3.1	3.5
2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.	2.7	3.1
2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).	2.7	3.1
2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.	4.5	4.8
2.5 Justify and document clinical and financial value of critical care pharmacy services.	2.8	3.4
2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.	2.9	3.0
2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.	2.7	3.0
Domain 3: Information Management and Education		
3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.	3.6	3.7
3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.	3.5	3.5
3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.	3.9	4.0
3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.	4.1	4.0
3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).	3.3	3.4

	< 50% CC Time n=35	≥ 50% CC Time n=191
	M	M
3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.	3.6	3.8
3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).	2.3	2.4

**Task Frequency Ratings by
Years of Experience Working with Critically Ill Patients**

	1-5 yrs n=101	6-10 yrs n=62	11-20 yrs n=50	20+ yrs n=11
	M	M	M	M
Domain 1: Clinical Skills and Therapeutic Management				
1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	4.9	4.9	4.8	5.0
1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	4.9	4.7	4.7	4.8
1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	4.7	4.7	4.6	5.0
1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.	4.8	4.8	4.8	5.0
1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critic	5.0	4.9	4.9	5.0
1.6 Interpret, analyze, and integrate collected information for a critically ill patient.	5.0	4.9	4.9	5.0
1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.	4.9	4.9	4.9	5.0
1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.	4.9	4.9	4.9	5.0
1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.	4.9	4.9	4.8	5.0
1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.	4.9	4.8	4.9	5.0
1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.	4.9	4.9	4.9	5.0
1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.	4.9	4.9	4.9	5.0

	1-5 yrs n=101	6-10 yrs n=62	11-20 yrs n=50	20+ yrs n=11
	M	M	M	M
1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled	4.7	4.8	4.7	4.2
1.14 Participate in the management of the medical emergencies and resuscitation events.	3.9	3.7	3.8	3.4
1. 15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.	4.4	4.3	4.4	4.5
1. 16 Document direct patient care activities as appropriate.	4.5	4.4	4.3	4.9
Domain 2: Practice Administration and Development				
2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.	3.4	3.5	3.3	3.5
2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.	3.0	3.0	3.2	3.2
2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).	3.1	2.9	3.0	3.0
2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.	4.8	4.9	4.8	4.9
2.5 Justify and document clinical and financial value of critical care pharmacy services.	3.5	3.1	3.3	2.3
2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.	3.1	2.9	2.8	3.5
2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.	3.0	3.0	2.9	3.7
Domain 3: Information Management and Education				
3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.	3.7	3.7	3.6	4.0
3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.	3.4	3.5	3.6	3.5
3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.	4.0	3.8	4.1	4.1
3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.	4.0	3.8	4.1	4.6

	1-5 yrs n=101	6-10 yrs n=62	11-20 yrs n=50	20+ yrs n=11
	M	M	M	M
3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).	3.4	3.2	3.5	3.7
3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.	3.8	3.7	3.9	3.5
3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).	2.3	2.3	2.4	2.9

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

	< 50% CC Time n=35	≥ 50% CC Time n=191
	M	M
Domain 1: Clinical Skills and Therapeutic Management		
1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	3.7	3.9
1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	3.8	3.8
1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	3.5	3.8
1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.	3.7	3.9
1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critic	3.8	4.0
1.6 Interpret, analyze, and integrate collected information for a critically ill patient.	4.0	4.0
1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.	3.9	3.9
1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.	3.9	4.0
1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.	3.9	3.9
1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.	3.9	3.9
1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.	3.9	4.0
1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.	3.9	4.0
1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled	3.6	3.7

	< 50% CC Time n=35	≥ 50% CC Time n=191
	M	M
1.14 Participate in the management of the medical emergencies and resuscitation events.	3.3	3.7
1.15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.	3.5	3.7
1.16 Document direct patient care activities as appropriate.	3.4	3.5
Domain 2: Practice Administration and Development		
2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.	3.5	3.6
2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.	3.8	3.6
2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).	3.3	3.4
2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.	3.7	3.9
2.5 Justify and document clinical and financial value of critical care pharmacy services.	3.2	3.3
2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.	3.6	3.4
2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.	3.4	3.6
Domain 3: Information Management and Education		
3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.	3.6	3.5
3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.	3.3	3.3
3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.	3.6	3.7
3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.	3.6	3.7
3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).	3.3	3.4
3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.	3.6	3.7

	< 50% CC Time n=35	≥ 50% CC Time n=191
	M	M
3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).	3.2	3.2

**Task Importance Ratings by
Years of Experience Working with Critically Ill Patients**

	1-5 yrs n=101	6-10 yrs n=62	11-20 yrs n=50	20+ yrs n=11
	M	M	M	M
Domain 1: Clinical Skills and Therapeutic Management				
1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.	3.8	3.9	3.8	3.9
1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.	3.8	3.8	3.9	3.7
1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.	3.8	3.7	3.8	3.8
1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.	3.8	3.8	3.8	3.9
1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critic	4.0	3.9	3.9	3.9
1.6 Interpret, analyze, and integrate collected information for a critically ill patient.	4.0	4.0	4.0	3.9
1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.	3.9	3.9	4.0	3.8
1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.	4.0	4.0	4.0	3.9
1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.	3.9	3.9	3.9	3.8
1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.	3.9	3.9	3.9	3.9
1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.	4.0	4.0	4.0	3.9
1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.	3.9	3.9	4.0	3.9

	1-5 yrs n=101	6-10 yrs n=62	11-20 yrs n=50	20+ yrs n=11
	M	M	M	M
1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled	3.6	3.8	3.7	3.6
1.14 Participate in the management of the medical emergencies and resuscitation events.	3.7	3.5	3.6	3.6
1.15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.	3.6	3.6	3.8	3.9
1.16 Document direct patient care activities as appropriate.	3.6	3.4	3.4	3.9
Domain 2: Practice Administration and Development				
2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.	3.6	3.4	3.6	3.7
2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.	3.6	3.6	3.8	3.8
2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).	3.4	3.4	3.4	3.4
2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.	3.8	3.9	4.0	3.9
2.5 Justify and document clinical and financial value of critical care pharmacy services.	3.4	3.2	3.3	3.3
2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.	3.5	3.4	3.4	3.6
2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.	3.6	3.5	3.4	3.7
Domain 3: Information Management and Education				
3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.	3.5	3.5	3.6	3.7
3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.	3.2	3.2	3.4	3.5
3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.	3.7	3.6	3.7	3.5
3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.	3.6	3.7	3.7	3.5

	1-5 yrs n=101	6-10 yrs n=62	11-20 yrs n=50	20+ yrs n=11
	M	M	M	M
3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).	3.4	3.4	3.5	3.5
3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.	3.7	3.6	3.7	3.1
3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).	3.3	3.1	3.2	3.0

Appendix 10
Final Critical Care Pharmacy Role Delineation

Domain 1: Clinical Skills and Therapeutic Management *Tasks related to the comprehensive management of a critically ill patient including collecting, interpreting, and integrating pertinent clinical data; and designing, implementing, monitoring, and modifying patient-specific plans of care for critically ill patients in collaboration with the healthcare team.*

- 1.1 Collect and organize the medical history of a critically ill patient including history of present illness, past medical history, past surgical history, social history, family history, and allergies.
- 1.2 Perform comprehensive review and assessment of a critically ill patient's current and past medications, including prescription, over the counter (OTC), and complementary and alternative medicines.
- 1.3 Perform or obtain physical examination results and other pertinent assessments (e.g., pain, sedation, delirium) to comprehensively assess a critically ill patient's physiological condition and severity of illness.
- 1.4 Collect and organize relevant patient vital signs and physical exam findings for a critically ill patient.
- 1.5 Collect and organize relevant data from laboratory studies (e.g., chemistry, microbiology, pathology, hematology, serum drug concentration), imaging studies, procedures (e.g., biopsies, drain placements, therapeutic taps, bronchoscopy), and advanced critical care monitoring (e.g., ICP measurements, hemodynamic monitoring parameters, mechanical ventilator settings, ECGs).
- 1.6 Interpret, analyze, and integrate collected information for a critically ill patient.
- 1.7 Identify and prioritize current or potential patient-specific medical, medication, and nutrition-related problems for a critically ill patient.
- 1.8 Design, recommend and implement therapeutic regimens for a critically ill patient utilizing patient-specific data and best available evidence.
- 1.9 Collaborate as a member of a multidisciplinary team to establish and prioritize patient-specific therapeutic goals and plans for a critically ill patient.
- 1.10 Design and recommend a monitoring plan to assess a critically ill patient's response to therapeutic regimens and progress toward therapeutic goals.
- 1.11 Monitor a critically ill patient and evaluate therapeutic and adverse outcomes.
- 1.12 Modify plans of care for a critically ill patient based on therapeutic and adverse outcomes, and progress toward therapeutic goals.
- 1.13 Facilitate the administration of medications to critically ill patients including assessment of available administration routes, intravenous compatibilities, stabilities, and available medication delivery technologies (e.g., smart pumps, patient controlled analgesia, nebulizers).
- 1.14 Participate in the management of the medical emergencies and resuscitation events.
- 1.15 Facilitate continuity of care by communicating pertinent patient information to healthcare professionals within the ICU and when transitioning into or out of the ICU.
- 1.16 Document direct patient care activities as appropriate.

Knowledge

- k1.1 Diagnosis, pathophysiology, epidemiology, risk factors, and treatment of conditions in critically ill patients in the following therapeutic areas:
- a) Pulmonary
 - b) Cardiovascular
 - c) Neurology and Neurological Injuries
 - d) Psychiatry
 - e) Renal
 - f) Hepato-Gastrointestinal
 - g) Immunology
 - h) Endocrine
 - i) Hematology
 - j) Infectious diseases
 - k) Toxicology
 - l) Surgery
- k1.2 Sedation, analgesia, delirium, and neuromuscular blockade
- k1.3 Nutrition support in the critically ill patient
- k1.4 Alterations of pharmacodynamics and pharmacokinetics in the critically ill (e.g., effects of hypothermia, mechanical ventilation, volume resuscitation, organ dysfunction)
- k1.5 Drug interactions and adverse drug events common in critical care
- k1.6 Pharmacoeconomics (e.g., cost effectiveness, cost minimization)
- k1.7 Sepsis/SIRS
- k1.8 Advanced Cardiac Life Support (ACLS) principles
- k1.9 Devices commonly utilized in critical care (e.g., balloon pump, left ventricular assist device [LVAD], cooling devices, extracorporeal membrane oxygenation [ECMO])
- k1.10 Procedures commonly performed in critical care (e.g., bronchoscopy, central line placements, intubation, therapeutic hypothermia)
- k1.11 Renal replacement therapy
- k1.12 Mechanical ventilation principles and monitoring techniques
- k1.13 Critical care monitoring techniques (e.g., hemodynamic, neurologic, cardiovascular)
- k1.14 Impact of alterations in anatomy and physiology due to trauma, surgery or congenital causes on medication therapy
- k1.15 Routes of administration for medications in critically ill patients

- k1.16 Routes of administration for nutrition (enteral vs. parenteral) and alterations in absorption of nutrients in critically ill patients
- k1.17 Preventative and supportive care measures used in the care of critically ill patients
- k1.18 Fluid, electrolyte, and acid/base management in ICU patients
- k1.19 Agents used for acute volume resuscitation and hemostasis (e.g., crystalloids, colloids, blood products, hemostatic agents)
- k1.20 Parenteral vasoactive and inotropic agents
- k1.21 End of life care
- k1.22 Impact of critical illness on pre-existing conditions (e.g. endocrine disorders, cardiovascular diseases, infectious diseases, respiratory diseases)
- k1.23 Application of evidence-based critical care literature and clinical practice guidelines in designing a patient-specific plan of care
- k1.24 Outcome indicators for pharmacotherapy of disease states common to ICU patients
- k1.25 Documentation processes used for critical care pharmacy services

Domain 2: Practice Administration and Development. *Tasks related to advancing critical care pharmacy practice establishing implementing, and monitoring systems and policies to optimize the care of critically ill patients.*

- 2.1 Develop, promote and expand pharmacy services to optimize drug-related outcomes for critically ill patients.
- 2.2 Develop and implement institutional policies and guidelines (including disease and drug therapy protocols, critical care pathways, formulary proposals) to meet identified needs and facilitate the care of critically ill patients.
- 2.3 Monitor and evaluate compliance with, and impact of, policies and guidelines (e.g., institutional, evidence based).
- 2.4 Establish and sustain collaborative professional relationships with other members of the interdisciplinary critical care team.
- 2.5 Justify and document clinical and financial value of critical care pharmacy services.
- 2.6 Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.
- 2.7 Promote the role and optimal use of critical care pharmacists to key stakeholders.

Knowledge:

- k2.1 Needs assessment techniques (e.g., gap analysis, medication use survey, best practices survey)
- k2.2 Metrics for evaluating quality of critical care pharmacy services (e.g., lengths of ICU stay, mortality, cost-effectiveness)
- k2.3 Quality assurance and process improvement methods
- k2.4 Evidence-based literature supporting the value of critical care pharmacy

- k2.5 Application of evidence-based critical care literature in designing institutional guidelines
- k2.6 Communication strategies
- k2.7 Resources (e.g., financial, technological, human) necessary to care for critically ill patients
- k2.8 Medication safety principles pertinent to patients requiring care in the ICU

Domain 3: Information Management and Education. *Tasks related to retrieval, generation, interpretation, and dissemination of knowledge related to critical care pharmacy, and the education of healthcare providers and trainees.*

- 3.1 Educate healthcare professionals and other stakeholders concerning issues related to the care of critically ill patients.
- 3.2 Educate critically ill patients and caregivers on issues related to medications and nutrition support.
- 3.3 Provide critical care education and training for practicing pharmacists, fellows, residents, student pharmacists, or students in other health professions.
- 3.4 Mentor pharmacists, fellows, residents, or students in critical care pharmacy practice.
- 3.5 Participate in continuous professional development related to critical care pharmacy practice (e.g., professional organizations, continuing education, clinical pharmacy networks).
- 3.6 Retrieve and critically evaluate biomedical literature with regard to study design methodology, statistical analysis, and applicability of study results in the critical care population.
- 3.7 Contribute to the critical care body of knowledge (e.g., participate in research, deliver poster/platform presentations, publish, participate in the peer review process).

Knowledge

- k3.1 Principles and methods of educating pharmacists, fellows, residents, students, and other healthcare professionals
- k3.2 Techniques for educating critically ill patients/caregivers
- k3.3 Published documents from professional societies (e.g., American Society of Health-System Pharmacists [ASHP], American College of Clinical Pharmacy [ACCP], Society of Critical Care Medicine [SCCM]) regarding the education and training of critical care pharmacists
- k3.4 Research design, methodology, and statistical analysis
- k3.5 Clinical application and limitations of published data and reports
- k3.6 Regulatory/IRB requirements relative to conducting critical care research

- k3.7 Continuing professional development opportunities in critical care (e.g., professional organization membership, committee involvement, sources of continuing education, mentorship)
- k3.8 Mentorship principles, techniques, and strategies
- k3.9 Medical literature publication and review process
- k3.10 Opportunities for disseminating critical care knowledge and scholarly activity (e.g., presentations, manuscripts, newsletters, abstracts, posters)

Appendix D-2

NAPLEX Blueprint



NABP

NATIONAL ASSOCIATION OF
BOARDS OF PHARMACY

NAPLEX Blueprint

As a direct result of a national analysis conducted by NABP, a new NAPLEX blueprint went into effect March 1, 2010. The analysis consisted of an evaluation of current pharmacy practice outcomes and an expert review of the current NAPLEX blueprint content. An analysis such as this is customarily performed on a regular basis to ensure that the blueprint, which guides the content of the NAPLEX, is current with the knowledge and skills necessary to safely and effectively practice entry-level pharmacy.

One of the more noteworthy changes to the blueprint included the addition of pharmacoeconomics to three competency statements to appropriately reflect its incorporation into the practice of pharmacy today with respect to patient care outcomes. The blueprint was validated through a survey of practicing pharmacists across the United States and Canada. Analysis of the survey resulted in changes to the percentage of examination questions allotted to two of the three major content areas of the blueprint.

New Passing Standard

The final step of the NAPLEX blueprint review involved convening a panel of subject matter experts and practicing pharmacists from across the country to participate in a standard-setting study. Throughout the study, the panel focused on the level of knowledge and performance related to pharmacy practice that is expected of a pharmacist in order to protect the health and welfare of the public. This type of study helps to ensure that the performance standard is valid and appropriate for contemporary practice standards.

The NAPLEX Competency Statements

The NAPLEX Competency Statements provide a blueprint of the topics covered on the examination. They offer important information about the knowledge, judgment, and skills you are expected to demonstrate as an entry-level pharmacist. A strong understanding of the Competency Statements will aid in your preparation to take the examination.

Area 1 Assess Pharmacotherapy to Assure Safe and Effective Therapeutic Outcomes (Approximately 56% of Test)

- *1.1.0 Identify, interpret, and evaluate patient information to determine the presence of a disease or medical condition, assess the need for treatment and/or referral, and identify patient-specific factors that affect health, pharmacotherapy, and/or disease management.*
- **1.1.1** Identify and assess patient information including medication, laboratory, and disease state histories.

- **1.1.2** Identify patient specific assessment and diagnostic methods, instruments, and techniques and interpret their results.
- **1.1.3** Identify and define the etiology, terminology, signs, and symptoms associated with diseases and medical conditions and their causes and determine if medical referral is necessary.
- **1.1.4** Identify and evaluate patient genetic, and biosocial factors, and concurrent drug therapy, relevant to the maintenance of wellness and the prevention or treatment of a disease or medical condition.
- **1.2.0** *Evaluate information about pharmacoeconomic factors, dosing regimen, dosage forms, delivery systems and routes of administration to identify and select optimal pharmacotherapeutic agents, for patients*
- **1.2.1** Identify specific uses and indications for drug products and recommend drugs of choice for specific diseases or medical conditions.
- **1.2.2** Identify the chemical/pharmacologic classes of therapeutic agents and describe their known or postulated sites and mechanisms of action.
- **1.2.3** Evaluate drug therapy for the presence of pharmacotherapeutic duplications and interactions with other drugs, food, and diagnostic tests.
- **1.2.4** Identify and evaluate potential contraindications and provide information about warnings and precautions associated with a drug product's active and inactive ingredients.
- **1.2.5** Identify physicochemical properties of drug substances that affect their solubility, pharmacodynamic and pharmacokinetic properties, pharmacologic actions, and stability.
- **1.2.6** Evaluate and interpret pharmacodynamic and pharmacokinetic principles to calculate and determine appropriate drug dosing regimens.
- **1.2.7** Identify appropriate routes of administration, dosage forms, and pharmaceutical characteristics of drug dosage forms and delivery systems, to assure bioavailability and enhance therapeutic efficacy.
- **1.3.0** *Evaluate and manage drug regimens by monitoring and assessing the patient and/or patient information, collaborating with other health care professionals, and providing patient education to enhance safe, effective, and economic patient outcomes.*
- **1.3.1** Identify pharmacotherapeutic outcomes and endpoints.
- **1.3.2** Evaluate patient signs and symptoms, and the findings of monitoring tests and procedures to determine the safety and effectiveness of pharmacotherapy. Recommend needed followup evaluations or tests when appropriate.
- **1.3.3** Identify, describe, and provide information regarding the mechanism of adverse reactions, allergies, side effects, iatrogenic, and drug-induced illness, including their management and prevention.
- **1.3.4** Identify, prevent, and address methods to remedy medication non-adherence, misuse, or abuse.
- **1.3.5** Evaluate current drug regimens and recommend pharmacotherapeutic alternatives or modifications.

Area 2 Assess Safe and Accurate Preparation and Dispensing of Medications (Approximately 33% of Test)

- **2.1.0** *Demonstrate the ability to perform calculations required to compound, dispense, and administer medication.*
- **2.1.1** Calculate the quantity of medication to be compounded or dispensed; reduce and enlarge formulation quantities and calculate the quantity or ingredients needed to compound the proper amount of the preparation.
- **2.1.2** Calculate nutritional needs and the caloric content of nutrient sources.
- **2.1.3** Calculate the rate of drug administration.
- **2.1.4** Calculate or convert drug concentrations, ratio strengths, and/or extent of ionization.
- **2.2.0** *Demonstrate the ability to select and dispense medications in a manner that promotes safe and effective use.*
- **2.2.1** Identify drug products by their generic, brand, and/or common names.
- **2.2.2** Identify whether a particular drug dosage strength or dosage form is commercially available and whether it is available on a nonprescription basis.
- **2.2.3** Identify commercially available drug products by their characteristic physical attributes.

- **2.2.4** Assess pharmacokinetic parameters and quality assurance data to determine equivalence among manufactured drug products, and identify products for which documented evidence of inequivalence exists.
- **2.2.5** Identify and provide information regarding appropriate packaging, storage, handling, administration, and disposal of medications.
- **2.2.6** Identify and provide information regarding the appropriate use of equipment and apparatus required to administer medications.
- **2.3.0** *Demonstrate the knowledge to prepare and compound extemporaneous preparations and sterile products.*
- **2.3.1** Identify techniques, procedures, and equipment related to drug preparation, compounding, and quality assurance.
- **2.3.2** Identify the important physicochemical properties of a preparation's active and inactive ingredients.
- **2.3.3** Identify the mechanism of and evidence for the incompatibility or degradation of a product or preparation and methods for achieving its stability.

Area 3 Assess, Recommend, and Provide Health care Information that Promotes Public Health (Approximately 11% of Test)

- **3.1.0** *Identify, evaluate, and apply information to promote optimal health care.*
- **3.1.1** Identify the typical content of specific sources of drug and health information for both health care providers and consumers, and recommend appropriate resources to address questions or needs.
- **3.1.2** Evaluate the suitability, accuracy, and reliability of clinical and pharmacoeconomic data by analyzing experimental design, statistical tests, interpreting results, and formulating conclusions.
- **3.2.0** *Recommend and provide information to educate the public and healthcare professionals regarding medical conditions, wellness, dietary supplements, and medical devices.*
- **3.2.1** Recommend and provide health care information regarding the prevention and treatment of diseases and medical conditions, including emergency patient care and vaccinations.
- **3.2.2** Recommend and provide health care information regarding nutrition, lifestyle, and other non-drug measures that promote health or prevent the progression of a disease or medical condition.
- **3.2.3** Recommend and provide information regarding the documented uses, adverse effects, and toxicities of dietary supplements.
- **3.2.4** Recommend and provide information regarding the selection, use, and care of medical/surgical appliances and devices, self-care products, and durable medical equipment, as well as products and techniques for self-monitoring of health status and medical conditions.

Appendix F-1

ASHP Accreditation Standard for PGY2 Residency Programs

ASHP ACCREDITATION STANDARD FOR POSTGRADUATE YEAR TWO (PGY2) PHARMACY RESIDENCY PROGRAMS

Part I - Introduction

Definition: Postgraduate year two of pharmacy residency training is an organized, directed, accredited program that builds upon the competencies established in postgraduate year one of residency training. The second-year residency program is focused in a specific area of practice. The PGY2 program increases the resident's depth of knowledge, skills, attitudes, and abilities to raise the resident's level of expertise in medication therapy management and clinical leadership in the area of focus. In those practice areas where board certification exists, graduates are prepared to pursue such certification.

Purpose of this Standard: The *ASHP Accreditation Standard for Postgraduate Year Two (PGY2) Pharmacy Residency Programs* (hereinafter the Standard) establishes criteria for systematic training of pharmacists in advanced areas of pharmacy practice. Its contents delineate the requirements for PGY2 residencies, which build upon the foundation provided through completion of an accredited Doctor of Pharmacy degree program and an accredited postgraduate year one (PGY1) residency program.

Purpose of PGY2 Residencies: PGY2 residency programs are designed to develop accountability; practice patterns; habits; and expert knowledge, skills, attitudes, and abilities in the respective advanced area of pharmacy practice. PGY2 residencies build upon the broad-based competencies achieved in a PGY1 residency, deepening the resident's ability to provide care in the most complex of cases or in the support of care through practice leadership. Therefore, PGY2 residencies provide residents with opportunities to function independently as practitioners by conceptualizing and integrating accumulated experience and knowledge and transforming both into improved medication therapy for patients. A resident who completes successfully an accredited PGY2 residency should possess competencies that enable attainment of board certification in the practice area, where board certification for the practice area exists.

Organization and Application of the Standard: Seven guiding principles provide the framework for the Standard. Each principle is restated at the beginning of the applicable segment of the Standard that outlines the specific requirements corresponding to the principle. The requirements serve as the basis for evaluating a residency program for accreditation and are followed by an interpretive narrative for those requirements needing more explanation.

PGY2 pharmacy residencies are offered in a variety of practice environments and may focus on specific patient populations or disease states. Therefore, a corresponding set of educational goals and objectives¹ has been developed for many of the practice settings and areas of practice (e.g., critical care, drug information, geriatrics, oncology, pharmacy practice management, primary care). Each takes into account the unique elements of the

practice site and the focused area of practice. To structure the residency, the program must use the set of educational goals and objectives that best corresponds to the practice site and the focused area of practice. These educational goals and objectives must be used with this Standard, and the appropriate selection and use of them will be evaluated in site surveys for accreditation.

Throughout the Standard use of the auxiliary verbs *will* and *must* implies an absolute requirement, whereas use of *should* and *may* denotes a recommended guideline.

The Standard sets forth the criteria used in the evaluation of practice sites that apply for accreditation. The accreditation program is conducted under the authority of the ASHP Board of Directors and is supported through formal partnerships with several other pharmacy practice associations. The *ASHP Regulations on Accreditation of Pharmacy Residencies*² sets forth the policies governing the accreditation program and describes the procedures for seeking accreditation.

Part II - Overview of the Principles of PGY2 Pharmacy Residencies

Principle 1: The resident will be a pharmacist having sufficiently broad knowledge, skills, attitudes, and abilities in pharmacy practice necessary for further professional development at an advanced level of pharmacy practice.

Principle 2: The pharmacy residency program will provide an exemplary environment conducive to resident learning.

Principle 3: The resident will be committed to attaining the program's educational goals and objectives and will support the organization's mission and values.

Principle 4: The resident's training will be designed, conducted, and evaluated using a systems-based approach.

Principle 5: The residency program director (RPD) and preceptors will be professionally and educationally qualified pharmacists who are committed to providing effective training of residents.

Principle 6: The organization conducting the residency will meet accreditation standards, regulatory requirements, and other nationally applicable standards and will have sufficient resources to achieve the purposes of the residency program.

Principle 7: The pharmacy and pharmacy services related to the advanced area of practice will be organized effectively and will deliver comprehensive, safe, and effective services.

Part III - Interpretation of the Principles

Principle 1: Qualifications of the Resident (The resident will be a pharmacist having sufficiently broad knowledge, skills, attitudes, and abilities in pharmacy practice necessary for further professional development at an advanced level of pharmacy practice.)

Requirement:

- 1.1 The applicant must have completed an accredited PGY1 pharmacy residency program.

Interpretation of Requirement 1.1: The entering PGY2 resident must have a sound foundation in the broader aspects of pharmacy services to enable the achievement of the more advanced educational goals and objectives developed for each PGY2 pharmacy residency. PGY1 residency training enables the attainment of these entering competencies.

- 1.2 The applicant must be a licensed pharmacist. In addition, the applicant must be licensed, or be eligible for licensure, in the state or jurisdiction in which the residency program is conducted. Consequences of failure to obtain appropriate licensure must be addressed as a policy issue by the organization conducting the residency.

Interpretation of Requirement 1.2: Since residency instruction is predicated upon accepting full responsibility and accountability for the care of patients, residents must obtain licensure to practice as a pharmacist, consistent with the requirements for pharmacists within the organization conducting the residency. Therefore, licensure in the state or jurisdiction in which the residency program is conducted must be obtained either prior to beginning the residency program or very soon afterwards.

- 1.3 Residency applicant qualifications will be evaluated by the residency program director (RPD) through an established, formal procedure that includes an assessment of the applicant's ability to achieve the educational goals and objectives selected for the program. Further, the criteria used to evaluate applicants must be documented and understood by all involved in the evaluation and ranking process.

Interpretation of Requirement 1.3: A formal, criteria-based process to evaluate and rank program applicants must be in place. Possible criteria should include, but might not be limited to: assessment of the applicant's academic performance; attainment of appropriate knowledge, skills, attitudes, and abilities needed to achieve the stated educational goals and objectives selected for the residency program; and, letters of recommendation from faculty and employers. On-site personal interviews should be conducted. Ultimately, it is the responsibility of the

RPD to assess the applicant's baseline knowledge, skills, attitudes, and abilities to determine that the applicant has met the qualifications for admission to the residency program.

- 1.4 Residents making application to residency programs that have applied for accreditation or that are accredited by ASHP must participate in and adhere to the rules of the Resident Matching Program (RMP) process.

Principle 2: Obligations of the Program to the Resident (The pharmacy residency program will provide an exemplary environment conducive to resident learning.)

Requirements:

- 2.1 Programs must be a minimum of twelve months and a full-time practice commitment or equivalent.
- 2.2 The residency program director (RPD) must ensure that neither the educational outcomes of the program nor the welfare of the resident or the welfare of patients are compromised by excessive reliance on residents to fulfill service obligations. Providing residents with a sound academic and clinical education must be planned and balanced with concerns for patient safety and resident well-being. Programs must comply with the current duty hour standards of the Accreditation Council for Graduate Medical Education (ACGME)³.

Interpretation of Requirement 2.2 (added April 2011): Alternatively, from July 1, 2011 through June 30, 2013, programs will be granted a temporary exemption waiver from the current ACGME standard, and allowed to follow ACGME Common Program Requirements, VI – Resident Duty Hours in the Learning and Working Environment, effective July 1, 2007.

- 2.3 ASHP-accredited, provisionally accredited, and application-submitted residency programs must adhere to the rules of the Resident Matching Program (RMP).
- 2.4 RPDs must provide residents who are accepted into the program with a letter outlining their acceptance to the program. Information on the terms and conditions of the appointment must also be provided in a manner consistent with that provided to pharmacists within the organization conducting the residency. Acceptance by residents of these terms and conditions must be documented prior to the beginning of the residency.
- 2.5 The residency program must provide a sufficient complement of professional and technical pharmacy staff to ensure appropriate supervision and preceptor guidance to all residents.

- 2.6 The residency program must provide residents an area in which to work, access to appropriate technology, access to extramural educational opportunities (e.g., Midyear Clinical Meeting, other pharmacy association meetings, a regional residency conference), and sufficient financial support to fulfill the responsibilities of the program.
- 2.7 Policies concerning professional, family, and sick leave and the effect such leaves would have on the resident's ability to complete the residency program must be documented.
- 2.8 The RPD will award a certificate of residency to those who complete the program. Reference must be made in the residency certificate that the program is accredited by ASHP and, if appropriate, its corresponding partner. The certificate must be issued in accordance with the provisions of the *ASHP Regulations on Accreditation of Pharmacy Residencies*² and signed by the RPD and the chief executive officer of the organization. A certificate must not be issued to anyone who does not complete the program's requirements.
- Interpretation of Requirement 2.8: For large corporate entities in which it is impractical to involve the chief executive officer in signing residency certificates, it is the intent of this requirement that an appropriate executive with ultimate authority over the residency join the RPD in signing the certificate of residency.
- 2.9 The RPD must ensure the program's compliance with the provisions of the current version of the *ASHP Regulations on Accreditation of Pharmacy Residencies*².

Principle 3: Obligations of the Resident to the Program (The resident will be committed to attaining the program's educational goals and objectives and will support the organization's mission and values.)

Requirements:

- 3.1 Residents' primary professional commitment must be to the residency program.

Interpretation of Requirement 3.1: A residency is a full-time obligation. Residents must manage their activities, external to the residency, so as not to interfere with the program defined in this Standard. It is permissible to admit on a part-time basis a resident who is employed by the residency site, another employer, or enrolled concurrently in a degree program, provided a clear distinction can be made between employment or academic responsibilities and the requirements of the residency. ASHP assumes no authority for evaluation of an academic program taken concurrently with a residency program. In any case, residents are responsible for making any changes necessary to meet the requirements for successful completion of the residency.

- 3.2 Residents must be committed to the values and mission of the organization conducting the residency program.
- 3.3 Residents must be committed to completing the educational goals and objectives established for the program.
- 3.4 Residents must seek constructive verbal and documented feedback that directs their learning.
- 3.5 Residents must be committed to making active use of the constructive feedback provided by residency program preceptors.

Principle 4: Requirements for the Design and Conduct of the Residency Program

(The resident's training will be designed, conducted, and evaluated using a systems-based approach.)

To ensure training efficiency and effectiveness, the program must use a systems-based approach to training design, delivery, and evaluation. Such an approach requires that there be a direct correlation among the expectations of resident performance, the type of instruction provided, and the evaluation of resident performance. The requirements in Principle 4 specify the products of a systems-based approach that may be examined during an onsite accreditation survey but, beyond specifying broad RPD and preceptor participation in program decisions do not specify a particular process for producing these products. RPDs are free to develop their own systems-based approach to training or rely on the guidance and tools in the ASHP-endorsed *Residency Learning System (RLS)* and associated materials.^{4,5}

Requirements:

- 4.1 Program Design. The RPD and, when applicable, program preceptors will collaborate to design the residency program. The resulting design will include the following elements:
 - a. The program will document: its purpose (the type of practice for which the residents are to be prepared); its outcomes (the residency graduates' capabilities); its educational goals (broad, sweeping statements of abilities); and, educational objectives (observable, measurable statements of resident performance, the sum of which ensure achievement of the educational goal) for each educational goal. The program's purpose will be reflected in the program's choice of outcomes. For each outcome there must be educational goals that further explain the capabilities specified by the outcome. For each goal there must be a set of educational objectives that specifies the resident performance to be measured.
 - b. At the beginning of the resident's program, RPDs must document an individualized set of program outcomes, educational goals, and educational

objectives for each resident. In doing so, PGY2 residencies in advanced areas of pharmacy practice must draw upon the program outcomes, educational goals, and educational objectives that have been developed by ASHP specifically for that practice area¹ (e.g., critical care, drug information, geriatrics, oncology, primary care). RPDs may establish additional program outcomes, educational goals, and educational objectives that reflect the site's strengths.

For PGY2 residencies in advanced areas of clinical pharmacy practice for which ASHP has not developed a complete set of program outcomes, educational goals, and educational objectives, a generic set of program outcomes, educational goals, and educational objectives (*Program Outcomes, Educational Goals, and Educational Objectives for PGY2 Residencies in an Advanced Area of Pharmacy Practice*¹) is available. This generic set of advanced clinical practice goals and objectives is provided as a required framework for programs that must develop their own Standard-mandated, area-specific, complete set of program outcomes, educational goals, and educational objectives. Also, RPDs for programs in non-clinical practice areas lacking ASHP-developed program outcomes, educational goals, and educational objectives must develop a complete set for their residencies. In both cases, RPDs must provide ASHP's Accreditation Service Division their complete set of program outcomes, educational goals, and educational objectives at the time of application.

Interpretation of Requirement 4.1.b: The published Residency Learning System (RLS) lists of outcomes, educational goals, and educational objectives also include instructional objectives to assist, when needed, in teaching. Instructional objectives are not required and are not meant to be evaluated.

- c. The program will create a structure (the designation of types, lengths, and sequence of learning experiences) that facilitates educational goal and objective achievement. The educational goals and objectives, including those for residents' projects, will be assigned for teaching to a single learning experience or a sequence of learning experiences to allow sufficient practice for their achievement by residents.
- d. Preceptors will create a description of their learning experience, and a list of activities to be performed by residents in the learning experience, that demonstrates adequate opportunity to learn the educational goals and objectives assigned to the learning experience.
- e. The program will create a competency-based approach to evaluation of resident performance of the program's educational goals and objectives, resident self-assessment of their performance, and resident evaluation of preceptor performance and of the program. The strategy will be employed uniformly by all preceptors. This three-part, competency-based approach will include the following:

- (1) Preceptors conduct and document a criteria-based, summative assessment of each resident's performance of each of the respective program-selected educational goals and objectives assigned to the learning experience. This evaluation must be conducted at the conclusion of the learning experience (or at least quarterly for longitudinal learning experiences), reflect the resident's performance at that time, and be discussed by the preceptor with the resident and RPD. The resident, preceptor, and RPD must document their review of the summative evaluations.
- (2) Each preceptor provides periodic opportunities for the resident to practice and document criteria-based, formative self-evaluation of aspects of their routine performance and to document criteria-based, summative self-assessments of achievement of the educational goals and objectives assigned to the learning experience. The latter will be completed on the same schedule as required of the preceptor by the assessment strategy and will include an end-of-the-year component.
- (3) Residents complete an evaluation of the preceptor and of the learning experience at the completion of each learning experience (or at least quarterly in longitudinal learning experiences.) Residents should discuss their evaluations with the preceptor and must provide their evaluations to the RPD.

- 4.2 Program Delivery. To achieve systems-based training the program's design must be implemented fully, with ongoing attention to fulfillment of both preceptor and resident roles and responsibilities. In delivering the program the following must occur and be documented:
- a. The RPD and, when applicable, preceptors will conduct essential orientation activities. Residents will be oriented to the program to include: its purpose; the applicable accreditation regulations and standards; designated learning experiences; and the evaluation strategy. When necessary, the RPD will orient staff to the residency program. Preceptors will orient residents to their learning experiences, including reviewing and providing written copies of the learning experience educational goals and objectives, associated learning activities, and evaluation strategies.
 - b. The RPD and, when applicable, preceptors will customize the training program for the resident based upon an assessment of the resident's entering knowledge, skills, attitudes, and abilities and the resident's interests. Any discrepancies in assumed entering knowledge, skills, attitudes, or abilities will be accounted for in the resident's customized plan. Similarly, if a criteria-based assessment of the resident's performance of one or more of the required educational objectives is performed and judged to indicate full achievement of the objective(s), the program is encouraged to modify the resident's program accordingly. This would result in changes to both the resident's educational goals and objectives and to the schedule for assessment of resident performance. The resulting customized plan must maintain consistency with the program's stated purpose and outcomes. Customization to account for specific interests must not interfere with achievement of the program's

educational goals and objectives. The customized plan and any modifications to it, including the resident's schedule, must be shared with the resident and all preceptors.

- c. Preceptors will provide ongoing, criteria-based verbal and, when needed, documented feedback on resident performance. Documented feedback will be used if there is limited direct contact with the preceptor (e.g., when non-pharmacist preceptors are utilized for learning experiences late in the residency) or verbal feedback alone is not effective in improving performance.
- d. Preceptors will ensure that all aspects of the program's plan for assessment of resident performance, preceptor performance, and resident self-evaluation are completed.
- e. RPDs and, when applicable, preceptors will establish a process for tracking residents' progress toward achievement of their educational goals and objectives. Overall progress toward achievement of the program's outcomes through performance of the programs educational goals and objectives will be assessed at least quarterly, and any necessary adjustments to residents' customized plans, including remedial action(s), will be documented and implemented.

4.3 Program Evaluation and Improvement. Program evaluation and improvement activities will be directed at enhancing achievement of the program's choice of outcomes. RPDs will evaluate potential preceptors based on their desire to teach and their aptitude for teaching (as differentiated from formal didactic instruction) and provide preceptors with opportunities to enhance their teaching skills. Further, RPDs will devise and implement a plan for assessing and improving the quality of preceptor instruction including, but not limited to, consideration of the residents' documented evaluations of preceptor performance. At least annually, RPDs and, when applicable, preceptors will consider overall program changes based on evaluations, observations, and other information.

4.4 Tracking of Graduates: The RPD should evaluate whether the residency produces the type of practitioner described in the program's purpose statement. (Information tracked may include initial employment, changes in employment, board certification, etc.)

Principle 5: Qualifications of the Residency Program Director (RPD) and Preceptors (The RPD and preceptors will be professionally and educationally qualified pharmacists who are committed to providing effective training of residents.)

Requirements of the residency program director:

5.1 RPDs must be licensed pharmacists with demonstrated expertise in the chosen area of advanced practice, as substantiated by all of the following: (a.) an ASHP-accredited PGY2 residency in the advanced practice area, followed by a minimum of three years of practice experience or equivalent in the advanced practice area

[i.e., five years of practice experience in the advanced area with demonstrated mastery of the knowledge, skills, attitudes, and abilities expected of one who has completed a PGY2 residency]; (b.) board certification in the specialty [when certification is offered in that specific advanced area of practice]; and, (c.) maintenance of an active practice in the respective advanced practice area.

Interpretation of Requirement 5.1: For the purposes of the board certification obligation of this requirement, specialties are those recognized by the Board of Pharmaceutical Specialties (BPS), i.e., nuclear pharmacy, nutrition support pharmacy, oncology pharmacy, pharmacotherapy, psychiatric pharmacy, ambulatory care, and those designated with added qualifications. Thus, a residency program director of a PGY2 pharmacotherapy residency must be a board certified pharmacotherapy specialist (BCPS) and a residency program director of a PGY2 oncology pharmacy residency program must be a board certified oncology pharmacist (BCOP).

Interpretation of Requirement 5.1: (Added April 2011) For newly approved BPS pharmacy specialties, this requirement will be enforced on the first day of January two years after the first offering of the certification examination.

- 5.2 RPDs serve as leaders of programs, responsible not only for precepting residents, but also for the evaluation and development of all other preceptors in their programs. Therefore, RPDs must have documented evidence of their own ability to teach effectively in the clinical practice environment (e.g., through student and/or resident evaluations).
- 5.3 Each residency program must have a single RPD who must be a pharmacist from a practice site involved in the program or from a sponsoring organization.
- 5.4 A single RPD must be designated for multiple-site residencies or for a residency offered by a sponsoring organization in cooperation with one or more practice sites. The responsibilities of the RPD must be defined clearly, including lines of accountability for the residency and to the residency training site. Further, the designation of this individual to be RPD must be agreed to in writing by responsible representatives of each participating organization.
- 5.5 RPDs must have demonstrated their ability to direct and manage a pharmacy residency (e.g., previous involvement as a preceptor in an ASHP-accredited residency program, management experience, previous academic experience as a course coordinator).
- 5.6 RPDs must have a sustained record of contribution and commitment to pharmacy practice that must be characterized by a minimum of four of the following:
 - a. Documented record of improvements in and contributions to the respective area of advanced pharmacy practice.

- b. Appointments to appropriate drug policy and other committees of the organization.
- c. Formal recognition by peers as a model practitioner (e.g., board certification, fellow status).
- d. A sustained record of contributing to the total body of knowledge in pharmacy practice through publications in professional journals and/or presentations at professional meetings.
- e. Serving regularly as a reviewer of contributed papers or manuscripts submitted for publication.
- f. Demonstrated leadership in advancing the profession of pharmacy through active service in professional organizations at the local, state, and national levels.
- g. Demonstrated effectiveness in teaching (e.g., through student and/or resident evaluations, teaching awards).

Requirements of preceptors: (The RPD should document criteria for pharmacists to be preceptors. The following requirements may be supplemented with other criteria.)

- 5.7 Pharmacist preceptors must be licensed and have completed an ASHP-accredited PGY2 residency followed by a minimum of one year of pharmacy practice in the advanced practice area. Alternatively, licensed pharmacists who have not completed an ASHP-accredited PGY2 residency may be preceptors but must demonstrate mastery of the knowledge, skills, attitudes, and abilities expected of one who has completed a PGY2 residency in the advanced practice area and have a minimum of three years of practice in the advanced area.
- 5.8 Preceptors must have training and experience in the area of pharmacy practice for which they serve as preceptors, must maintain continuity of practice in that area, and must be practicing in that area at the time residents are being trained.
- 5.9 Preceptors must have a record of contribution and commitment to pharmacy practice characterized by a minimum of four of the following:
 - a. Documented record of improvements in and contributions to the respective area of advanced pharmacy practice (e.g., implementation of a new service, active participation on a committee/task force resulting in practice improvement, development of treatment guidelines/protocols).
 - b. Appointments to appropriate drug policy and other committees of the department/organization.
 - c. Formal recognition by peers as a model practitioner (e.g., board certification, fellow status).
 - d. A sustained record of contributing to the total body of knowledge in pharmacy practice through publications in professional journals and/or presentations at professional meetings.
 - e. Serving regularly as a reviewer of contributed papers or manuscripts submitted for publication.

- f. Demonstrated leadership in advancing the profession of pharmacy through active participation in professional organizations at the local, state, and national levels.
 - g. Demonstrated effectiveness in teaching (e.g., through student and/or resident evaluations, teaching awards).
- 5.10 Preceptors must demonstrate a desire and an aptitude for teaching that includes mastery of the four preceptor roles fulfilled when teaching clinical problem solving (instructing, modeling, coaching, and facilitating). Further, preceptors must demonstrate abilities to provide criteria-based feedback and evaluation of resident performance. Preceptors must continue to pursue refinement of their teaching skills.
- 5.11 Non-pharmacist preceptors (e.g., physicians, physician assistants, certified nurse practitioners) may be utilized for select learning experiences. A pharmacist preceptor must work closely with the non-pharmacist preceptor to select educational goals and objectives for the learning experience, as well as participate actively in the criteria-based evaluation of the resident's performance.

Interpretation of Requirement 5.11: A resident who has completed a PGY1 pharmacy residency will have learned from pharmacist preceptors who modeled pharmacy practice skills and who provided regular feedback. For PGY2 pharmacy residents, (who have completed an ASHP-accredited PGY1 residency program) when sufficient pharmacist modeling has occurred, the RPD and preceptors agree that the resident is ready for independent practice, and the resident has demonstrated a level of competence that permits preceptor oversight by someone other than a pharmacist (evaluations conducted at the end of previous learning experiences must reflect such readiness to practice independently), it is recognized that the preceptor's primary role may move to facilitation rather than role-modeling during resident learning experiences.

Principle 6: Minimum Requirements of the Site Conducting the Residency Program

(The organization conducting the residency will meet accreditation standards, regulatory requirements, and other nationally applicable standards and will have sufficient resources to achieve the purposes of the program.)

Requirements:

- 6.1 As appropriate, residency programs must be conducted only in practice settings that have sought and accepted outside appraisal of facilities and patient care practices. The external appraisal must be conducted by a recognized organization appropriate to the practice setting.
- a. A health-system (inclusive of all components of the system that provide patient care) that offers or that participates in offering a pharmacy residency must be accredited by applicable organizations [e.g., The Joint Commission,

American Osteopathic Association (AOA), National Committee for Quality Assurance (NCQA), Det Norske Veritas (DNV)].

- b. A college of pharmacy that participates in offering a pharmacy residency must be accredited by the Accreditation Council for Pharmacy Education (ACPE).
- c. Other practice settings that offer a pharmacy residency must have demonstrated substantial compliance with applicable professionally developed and nationally applied standards.

Interpretation 6.1 (added April 2011): If a hospital is state-certified as a Medicare and/or Medicaid single provider institution, the state's review process will meet the intent of this section.

- 6.2 Residency programs must be conducted only in those practice settings where management and professional staff have: committed to seek excellence in patient care; demonstrated substantial compliance with professionally developed and nationally applied practice and operational standards; and, sufficient resources to achieve the educational goals and objectives selected for the residency program.
- 6.3 Two or more practice sites, or a sponsoring organization (e.g., college of pharmacy, health system) working in cooperation with one or more practice sites, may provide a pharmacy residency.
 - a. Pharmacy residencies are dependent on the availability of a sufficient patient population base and professional practice experience to satisfy the requirements of the residency program.
 - b. Sponsoring organizations must maintain authority and responsibility for the quality of their residency programs.
 - c. A mechanism must be established that designates and empowers an individual to be responsible for directing the residency program and for achieving consensus regarding the evaluation and ranking of applicants for the residency.
 - d. Sponsoring organizations and practice sites must have contractual arrangement(s) or signed agreement(s) that define clearly the responsibilities for all aspects of the residency program.
 - e. Each of the practice sites that provide residency training must meet the requirements set forth in Requirement 6.2 and the pharmacy's service requirements in Principle 7.

Interpretation of Requirement 6.3: Application for accreditation of a health-system or corporate-based, multiple-site pharmacy residency must be submitted in the name of the principal practice site (i.e., the practice site in which the majority of the residency program is centered).

In the case of a sponsoring organization (e.g., college of pharmacy, health system) that has a contractual arrangement with one or more practice settings to provide residency training, the application must be completed by the sponsoring organization.

The sponsoring organization, in making application for accreditation, must submit with the application the signed agreement(s) with the practice site(s) that define clearly the relationship, the governance, and the responsibility that will be borne by the organization and the practice site(s) for all aspects of the residency program.

Since the sponsoring organization may delegate day-to-day responsibility for the residency program to the practice site(s), the site(s) will be required to submit routine reports to the sponsoring organization. Some method of on-site inspection by a representative of the sponsoring organization must be in place to insure that the terms of the agreement are being met.

All reports and inspections must be documented and signed by representatives of all parties bound by the agreement and will be made available to the accreditation survey team.

Principle 7: Qualifications of the Pharmacy (The pharmacy and the pharmacy services related to the advanced area of practice will be organized effectively and will deliver comprehensive, safe, and effective services.)

The most current edition of the ASHP *Best Practices for Health-System Pharmacy*, available at www.ashp.org, (and, when necessary, other pharmacy association guides to professional practice that apply to specific practice sites) will be utilized in evaluating any patient care site(s) or other practice operation (e.g., drug information service) providing pharmacy residency training.

Requirements:

- 7.1 The pharmacy must be led and managed by a professionally competent, legally qualified pharmacist. This person is referred to in this accreditation standard as the chief pharmacist and is responsible for insuring compliance with requirements for the pharmacy as outlined in this Principle.
- 7.2 The pharmacy must be an integral part of the health-care delivery system at the practice site in which the residency program is offered, as evidenced by the following:
 - a. The scope of pharmacy services provided to patients at the practice site is based upon an assessment of pharmacy functions needed to provide care to all patients served by the practice site.
 - b. The services are of a scope and quality commensurate with identified patient needs.
 - c. The pharmacy is involved in the overall planning of patient care services for the practice setting.

- d. Pharmacy services extend to all areas of the practice site in which medications for patients are prescribed, dispensed, administered, and monitored.
 - e. Pharmacists are responsible around-the-clock for the procurement, preparation, distribution, and control of all medications used, including those that are investigational.
- 7.3 The chief pharmacist must provide effective leadership and management for the achievement of short- and long-term goals of the pharmacy and the organization relating to medication use and medication-use policies. The chief pharmacist must ensure that the following elements associated with a well-managed pharmacy are in place (as appropriate to the practice setting):
- a. A pharmacy mission statement.
 - b. A written document describing the scope and depth of pharmacy services.
 - c. A well-defined pharmacy organizational structure.
 - d. A description of pharmacy services provided.
 - e. Strategic planning documents. Documented short- and long-term pharmacy goals.
 - f. Current policies and procedures that are readily available to staff participating in service provision.
 - g. Position descriptions for all categories of pharmacy personnel.
 - h. Systems to document pharmacy workload, financial performance, and patient care outcomes data.
 - i. Pharmacy involvement with key committees involving medications and patient care.
 - j. A quality improvement plan.
- 7.4 The pharmacy:
- a. Complies with all applicable federal, state, and local laws, codes, statutes, and regulations governing pharmacy practice.
 - b. Demonstrates substantial compliance with national practice standards and guidelines.
 - c. Regularly reviews and develops plans to conform to new practice standards or guidelines.
 - d. Has sought and accepted outside appraisals of its facilities and patient care practices.
- 7.5 The pharmacy must provide a safe and effective drug distribution system for all medications used within the practice site. This system must include the following components (as applicable to the practice setting):
- a. A unit-dose drug distribution service.
 - b. An intravenous admixture and sterile product service.
 - c. An investigational drug service.
 - d. An extemporaneous compounding service.
 - e. A system for the safe use of drug samples.
 - f. A system for the safe use of emergency medications.
 - g. A controlled substance floor stock system.

- h. A controlled floor stock system.
 - i. An outpatient drug distribution service.
- 7.6 The pharmacy must provide the necessary patient care services in a manner consistent with practice site and patient needs.
- a. The following patient care services or activities must be provided in collaboration with other health-care professionals to optimize medication therapy for patients:
 - (1) Membership on interdisciplinary teams in the patient care areas associated with the residency program.
 - (2) Development of treatment protocols, critical pathways, order sets, and other systems approaches involving medications for patients on involved services.
 - (3) Participation in collaborative practice agreements with other providers and management of patients following collaborative practice agreements, treatment protocols, critical pathways, etc.
 - (4) Prospective participation in the development of individualized treatment plans for patients of involved services.
 - (5) Identification of medication-related problems.
 - (6) Review of the appropriateness and safety of medication orders.
 - (7) Design and implementation of medication-therapy monitoring plans.
 - (8) Documentation of all significant patient care recommendations and resulting actions, treatment plans, and/or progress notes in the appropriate section of the patient's medical record or the organization's clinical information system.
 - (9) Written and oral consultations regarding medication-therapy selection and management.
 - (10) Patient disease and/or medication management consistent with laws, regulations, and practice site policy.
 - (11) Medication administration consistent with laws, regulations, and practice site policy.
 - (12) Preventive and wellness programs.
 - (13) A system to ensure and support continuity-of-care.
 - b. Essential drug information activities that must be provided by pharmacy staff and the residents include, but are not limited to, the following (as applicable to the practice setting):
 - (1) Developing and maintaining a formulary.
 - (2) Publishing periodic newsletters or bulletins for health-care providers on timely medication-related matters and medication policies.
 - (3) Preparing medication therapy monographs based on an analytical review of pertinent biomedical literature, including a safety assessment and a comparative therapeutic and economic assessment of each new agent for formulary addition or deletion.
 - (4) Establishing and maintaining a system for retrieving drug information from the literature.

- (5) Responding to drug information inquiries from health-care providers.
- (6) Conducting educational programs about medications, medication therapy, and other medication-related matters for health-care providers.
- (7) Participating in the development or modification of policies related to:
 - (a) medications;
 - (b) medication-use evaluation;
 - (c) adverse drug event prevention, monitoring, and reporting; and
 - (d) appropriate methods to assess ongoing compliance with such policies.

- 7.7 The pharmacy must provide leadership and participate with other health professionals in the following systems to ensure safe and effective patient care outcomes and to continuously improve the medication-use system used by the practice site (as applicable to the practice setting):
- a. A system to support and actively participate in decision-making concerning the pharmacy and therapeutics function, including the preparation and presentation of drug-therapy monographs.
 - b. A system to review medication-use evaluations and to implement new policies or procedures to improve the safe and effective use of medications.
 - c. A system to review adverse drug event reports and to implement new policies and procedures to improve medication safety.
 - d. A system to evaluate routinely the quality of the pharmacy services provided.
- 7.8 The pharmacy must have personnel, facilities, and other resources to carry out a broad scope of pharmacy services (as applicable to the practice setting). The pharmacy's:
- a. Facilities are constructed, arranged, and equipped to promote safe and efficient work.
 - b. Packaging equipment is adequate to prepare medications for unit-dose dispensing or compliance packaging.
 - c. Automated medication systems and software support a safe medication-use system.
 - d. Computerized systems support a safe medication-use system.
 - e. Professional and technical staff is sufficient in number and of the diversity to ensure that the department can provide the level of service required by all patients served. In instances where resources limit the delivery of pharmacy services to all patients receiving medication therapy, mechanisms are in place to identify those patients who might benefit most from these services, and a plan is in place to work toward meeting these needs.
 - f. Professional staff members seek professional enrichment and demonstrate their interest in continuing competence.
 - g. Technical and clerical staff complement is sufficient to handle all functions that can be assigned appropriately to them.
- 7.9 Pharmacy services must be provided to all patients of the organization (or practice) that are in the PGY2 residency's practice area. Additional considerations are (as applicable to the practice setting):

- a. A sufficient patient population (both in terms of the number of patients and the variety of disease states) must be available in all areas required for instruction in the PGY2 residency program.
- b. Pharmacists providing advanced practice services must be essential members of interdisciplinary teams in the patient care areas associated with the residency program.
- c. Pharmacists providing advanced practice pharmacy services must participate in the development of treatment protocols, critical pathways, order sets, and other systems approaches involving medications for patients on involved services.
- d. For patients of involved advanced practice services, pharmacists must engage in collaborative practice agreements with other providers and should be authorized to manage patients following collaborative practice agreements, treatment protocols, critical pathways, etc.
- e. Pharmacists providing advanced practice pharmacy services must participate prospectively in the development of individualized treatment plans for patients of involved services.

Interpretation of Requirement 7.9: It is not acceptable to simulate residency experiences to substitute for nonexistent pharmacy services. The pharmacy service area(s) in which residency training is provided must be an active service that functions 12 months a year. However, the service does not need to be provided by the same individual all 12 months of the year.

GLOSSARY

Certification. A voluntary process by which a nongovernmental agency or an association grants recognition to an individual who has met certain predetermined qualifications specified by that organization. This formal recognition is granted to designate to the public that the individual has attained the requisite level of knowledge, skill, or experience in a well defined, often specialized, area of the total discipline. Certification usually requires initial assessment and periodic reassessments of the individual's qualifications.⁶

Chief Pharmacist. The person who has ultimate responsibility for the residency practice site/pharmacy in which the residency program is conducted. (In some settings this person is referred to, for example, as the *director of pharmacy*, the *pharmacist-in-charge*, the *chief of pharmacy services*, etc.) In a multiple-site residency, a sponsoring organization must be identified to assume ultimate responsibility for coordinating and administering the program.

Customization. The process by which a residency's generic plan for training (program outcomes; educational goals; educational objectives; structure; learning activities; extent of modeling, coaching, and facilitation; and, assessment strategy for preceptor and self-evaluation) are modified to account for the strengths, weaknesses, and interests of the resident to help ensure that each resident's training is optimal.

Multiple-site residency. a residency site structure in which multiple organizations or practice sites are involved in the residency program. Examples include programs in which: residents spend greater than 25% of the program away from the sponsoring organization/main site at another single site; or there are multiple residents in a program and they are home-based in separate sites.

1. To run a multiple-site residency there must be a compelling reason for offering the training in a multiple-site format (that is, the program is improved substantially in some manner). For example:
 - a. RPD has expertise, however the site needs development (for example, site has a good variety of patients, and potentially good preceptors, however the preceptors may need some oversight related to the residency program; or services need to be more fully developed);
 - b. quality of preceptorship is enhanced by adding multiple sites;
 - c. increased variety of patients/disease states to allow wider scope of patient interactions for residents;
 - d. increased administrative efficiency to develop more sites to handle more residents across multiple sites/geographic areas;
 - e. synergy of the multiple sites increases the quality of the overall program;
 - f. allows the program to meet all of the requirements (that could not be done in a single site alone); and
 - g. ability to increase the number of residents in a quality program.
2. A multiple-site residency program conducted in multiple hospitals that are part of a health-system that is considering CMS pass-through funding should conduct a thorough review of 42CFR413.85 and have a discussion with the finance department to ensure eligibility for CMS funding.
3. In a multiple-site residency program, a sponsoring organization must be identified to assume ultimate responsibility for coordinating and administering the program. This includes:
 - a. designating a single residency program director (RPD);
 - b. establishing a common residency purpose statement to which all residents at all sites are trained;
 - c. assuring a core program structure and consistent required learning experiences;
 - d. assuring the core required learning experiences are comparable in scope, depth, and complexity for all residents, if home based at separate sites.;
 - e. assuring a uniform evaluation process and common evaluation tools are used across all sites;
 - f. assuring there are consistent requirements for successful completion of the program;
 - g. designating a site coordinator to oversee and coordinate the program's implementation at each site that is used for more than 25% of the learning experiences in the program (for one or more residents); and,

- h. assuring the program has an established, formalized approach to communication that includes at a minimum the RPD and site coordinators to coordinate the conduct of the program across all sites.

Preceptor. An expert pharmacist who gives practical experience and training to a pharmacy resident. Preceptors have responsibility for the evaluation of resident performance.

Residency program director. The pharmacist responsible for direction, conduct, and oversight of the residency program. In a multiple-site residency, the residency program director is a pharmacist designated in a written agreement between the sponsoring organization and all of the program sites..

Service commitments. Clinical and operational practice activities. May be defined in terms of the number of hours, types of activities, or a set of educational goals and objectives.⁷

Single-site residency. A residency site structure in which the practice site assumes total responsibility for the residency program. In a single-site residency, a minimum of 60% of the resident's training program occurs at the site (that is, the locations must be within walking distance and be part of the same health system); however, residents may spend assigned time in short elective learning experiences off-site (that is, a one-month rotation offsite does not make a program a multiple-site residency). Conversely, if more than 25% of the remainder of the residency is conducted at one different site, the program will be considered a multiple-site program.

Site. The actual practice location where the residency experience occurs.

Sponsoring organization. The organization assuming ultimate responsibility for the coordination and administration of the residency program. The sponsoring organization is charged with ensuring that the resident experiences are educationally sound and are conducted in a quality practice environment. The sponsoring organization is also responsible for submitting the accreditation application and ensuring periodic evaluations are conducted. If several organizations share responsibility for the financial and management aspects of the residency (e.g., school of pharmacy, health-system, and individual site), the organizations must mutually designate one organization as the sponsoring organization.

Site coordinator: A preceptor in a multiple-site residency program who is designated to oversee and coordinate the program's implementation at an individual site that is used for more than 25% of the learning experiences. This individual may also serve as a preceptor in the program. A site coordinator must:

1. be a licensed pharmacist who meets the minimum requirements to serve as a preceptor (meets the criteria identified in Principle 5.9 of the appropriate pharmacy residency accreditation standard);
2. practice at the site at least ten hours per week;
3. have the ability to teach effectively in a clinical practice environment; and
4. have the ability to direct and monitor residents' and preceptors' activities at the site (with the RPD's direction).

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Approved by the ASHP Board of Directors, September 23, 2005. Developed by the ASHP Commission on Credentialing. Supersedes the "ASHP Accreditation Standard for Specialized Residency Training (with Guide to Interpretation)", approved April 27, 1994. For currently existing programs this revision of the accreditation standard takes effect January 1, 2007. Until that time the current standard, which was approved April 27, 1994, is in force. Glossary revised and approved by the Board of Directors on September 23, 2010.

Appendix F-2

ASHP Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Critical Care



Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Critical Care

Overview of PGY2 Pharmacy Residencies in Critical Care

The PGY2 residency in critical care pharmacy is designed to transition PGY1 residency graduates from generalist practice to specialized practice that meets the needs of critically ill patients. PGY2 residency graduates exit equipped to be fully integrated members of the interdisciplinary critical care team, able to make complex medication and nutrition support recommendations in this fast-paced environment. Training focuses on developing resident capability to deal with range of diseases and disorders that occur in the critically ill. Special emphasis is placed on the complexities of multiple organ system failure and the difficulties imposed on care when patients require life-sustaining equipment.

Graduates of the critical care residency are experienced in short-term research in the critical care environment and excel in their ability to teach other health professionals and those in training to be health professionals. They also acquire the experience necessary to exercise leadership for critical care practice in the health system.

Explanation of the Contents of This Document:

Each of the document's objectives has been classified according to educational taxonomy (cognitive, affective, or psychomotor) and level of learning. An explanation of the taxonomies is available elsewhere.¹

The order in which the required educational outcomes are presented in this document does not suggest relative importance of the outcome, amount of time that should be devoted to teaching the outcome, or sequence for teaching.

The educational outcomes, goals, and objectives are divided into those that are required and those that are elective. The required outcomes, including all of the goals and objectives falling under them, must be included in the design of all programs. The elective outcomes are provided for those programs that wish to add to the required outcomes. Programs selecting an elective outcome are not required to include all of the goals and objectives falling under that outcome. In addition to the potential elective outcomes contained in this document, programs are free to create their own elective outcomes with associated goals and objectives. Other sources of

¹ Nimmo, CM. Developing training materials and programs: creating educational objectives and assessing their attainment. In: Nimmo CM, Guerrero R, Greene SA, Taylor JT, eds. Staff development for pharmacy practice. Bethesda, MD: ASHP; 2000.

elective outcomes may include elective educational outcomes in the list provided for PGY1 pharmacy residencies and educational outcomes for training in other PGY2 areas. Each of the goals falling under the program's selection of program outcomes (required and elective) must be evaluated at least once during the resident's year.

Educational Outcomes (Outcome): Educational outcomes are statements of broad categories of the residency graduates' capabilities.

Educational Goals (Goal): Educational goals listed under each educational outcome are broad sweeping statements of abilities.

Educational Objectives (OBJ): Resident achievement of educational goals is determined by assessment of the resident's ability to perform the associated educational objectives below each educational goal.

Instructional Objectives (IO): Instructional objectives are the result of a learning analysis of each of the educational objectives. They are offered as a resource for preceptors encountering difficulty in helping residents achieve a particular educational objective. The instructional objectives falling below the educational objectives suggest knowledge and skills required for successful performance of the educational objective that the resident may not possess upon entering the residency year. Instructional objectives are teaching tools only. They are not required in any way nor are they meant to be evaluated.

Required Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Critical Care
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Outcome R1: Demonstrate leadership and practice management skills.

Goal R1.1: Exhibit essential personal skills of a practice leader.

OBJ R1.1.1: (Characterization) Practice self-managed continuing professional development with the goal of improving the quality of one's own performance through self-assessment and personal change.

IO: State the criteria for judging one's performance of tasks that are critical in one's own practice.

OBJ R1.1.2: (Characterization) Demonstrate commitment to the professional practice of critical care pharmacy through active participation in the activities of local, state, and/or national professional organizations concerned with the health care of critically ill patients.

IO: Compare and contrast the relevance to critical care practice of the variety of professional associations associated with critical care practice.

OBJ R1.1.3: (Characterization) Demonstrate the ability to make considered but rapid decisions in intense situations where time is at a minimum.

Goal R1.2: Contribute to the critical care practice area's leadership and management activities.

OBJ R1.2.1: (Application) Use effective negotiation skills to resolve conflicts.

OBJ R1.2.2: (Synthesis) Use group participation skills when leading or working as a member of a committee or informal work group.

Goal R1.3: Exercise practice leadership.

OBJ R1.3.1: (Characterization) Demonstrate a commitment to advocacy for the optimal care of patients through the assertive and persuasive presentation of patient care issues to members of the health care team, the patient, and/or the patient's representative(s).

OBJ R1.3.2: (Comprehension) Explain the nature of mentoring in pharmacy, its potential connection with achievement, and the importance of willingness to serve as mentor to appropriate individuals.

OBJ R1.3.3: (Characterization) Demonstrate a caring attitude toward critically ill patients and their representative(s).

IO: Explain the impact of fear, anger, depression, loss, grief, and their opposites on the health professional's approach to patient care.

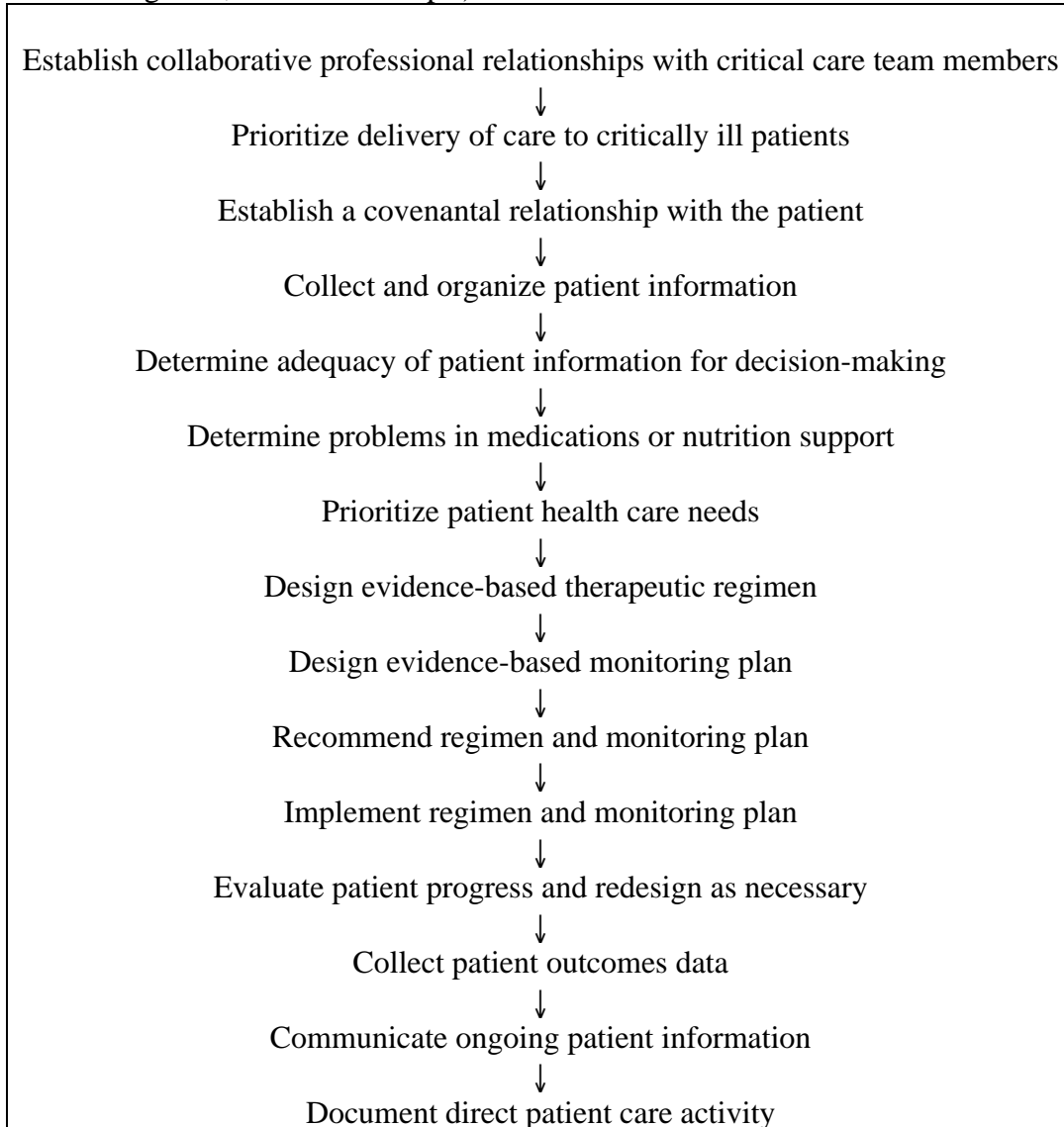
IO: Discuss end of life issues and their implications that are relevant in caring for a critically ill patient.

IO: Explain the importance of the fact that seemingly unconscious patients may be aware or partially aware of their surroundings.

OBJ R1.3.4: (Comprehension) Explain the general processes of establishing and maintaining a critical care pharmacy residency program.

Outcome R2: Optimize the outcomes of critically ill patients by providing evidence-based medication therapy as an integral part of an interdisciplinary team.

(When provided as part of the practice of direct patient care, this outcome always involves a series of integrated, interrelated steps.)



Goal R2.1: Establish collaborative professional relationships with other members of the interdisciplinary critical care team.

OBJ R2.1.1: (Synthesis) Implement a strategy that establishes cooperative, collaborative, communicative, and effective working relationships with other members of the interdisciplinary critical care team.

IO: Explain the professional dynamics of the different services that contribute to care in the critical care unit.

IO: Explain the interpersonal dynamics of each member of the critical care team attending a specific patient.

- IO: *Explain how urgency affects the communication patterns of teams caring for critically ill patients.*
- IO: *Explain situations in which the critical care pharmacist may need to “earn” credibility with the critical care team.*
- Goal R2.2: Prioritize the delivery of care to critically ill patients.
 - OBJ R2.2.1: (Synthesis) Devise a plan for deciding which critical care patients to focus on if given limited time and multiple patient care responsibilities.
 - IO: *Explain factors to weigh when determining priority for care among patients who are critically ill.*
- Goal R2.3: Act in accordance with a covenantal relationship with the patient.
 - OBJ R2.3.1: (Synthesis) Formulate a strategy to guide care for a critically ill patient and interaction with the patient’s family that reflects the acceptance of a covenant with the patient for that patient’s care.
 - IO: *Explain barriers to the formation of the traditional patient/pharmacist professional relationship in the critical care environment.*
 - IO: *Explain ways to interact with patients who cannot communicate verbally.*
 - IO: *Explain the potential for patient awareness among those who seemingly are not conscious.*
- Goal R2.4: Collect and analyze pertinent patient information.
 - OBJ R2.4.1: (Analysis) Collect and organize all patient-specific information needed to identify, prevent, and resolve medication and specialized nutrition support-related problems in order to provide appropriate evidence-based recommendations in critically ill patients with complex conditions. (See Appendix for medical problems.)
 - IO: *Explain the impact on information gathering of the patient who is not able to communicate.*
 - IO: *Explain the importance of considering the function of multiple organ systems when collecting information on critically ill patients.*
 - IO: *Explain epidemiology, risk factors, etiology, pathophysiology, signs and symptoms, clinical course, and treatment of diseases commonly encountered in the critical care environment as listed in the appendix.*
 - IO: *Explain the mechanism of action, pharmacoeconomics, pharmacogenomics, indications, contraindications, interactions, adverse reactions, and therapeutics of medications and specialized nutrition support used in the critical care environment.*
 - IO: *Explain how altered pharmacokinetics and pharmacodynamics need to be considered in developing dosing regimens for critically ill patients.*
 - IO: *Explain the meaning of the results of diagnostic tests and physiologic monitoring commonly performed in the critical care environment.*
 - IO: *Explain the specific disease processes, routes of administration (enteral vs. parenteral), and alterations in absorption of nutrients involved in providing specialized nutrition support.*
 - OBJ R2.4.2: (Evaluation) Assess the information base created for a critically ill patient for adequacy to identify problems and design a therapeutic regimen.
 - IO: *Explain circumstances in which there may not be sufficient information to make therapeutic recommendations for a critically ill patient.*

IO: Explain criteria for judging sufficiency of patient information for making therapeutic decisions.

OBJ R2.4.3: (Analysis) Determine the presence of any of the following problems in a critically ill patient's current medication or specialized nutrition support therapy:

1. Medication or specialized nutrition support used with no medical indication
2. Patient has acute or chronic (e.g., steroid dependence) medical conditions for which there is no medication or specialized nutrition support prescribed
3. Medication or specialized nutrition support prescribed inappropriately for a particular medical condition
4. Current medication therapy or specialized nutrition support regimen contains something inappropriate (dose, dosage form, duration, schedule, route of administration, method of administration)
5. There is therapeutic duplication
6. Medication to which the patient is allergic has been prescribed
7. There are adverse drug or device-related events or potential for such events
8. There are clinically significant drug-drug, drug-disease, drug-nutrient, or drug-laboratory test interactions or potential for such interactions
9. Medical condition is complicated by social, recreational, nonprescription, or nontraditional (e.g., herbal) drug use by the patient
10. Patient not receiving full benefit of prescribed medication therapy or specialized nutrition support (e.g., system error)

IO: Explain why the critical care pharmacist needs to anticipate therapeutic dilemmas and formulate appropriate alternatives.

OBJ R2.4.4: (Analysis) Prioritize a critically ill patient's health care needs.

IO: Explain factors to consider when prioritizing the problems of critically ill patients.

Goal R2.5: Design evidence-based therapeutic regimens for critically ill patients.

OBJ R2.5.1: (Synthesis) Specify therapeutic goals for a critically ill patient incorporating the principles of evidence-based medicine that integrate patient-specific data, disease and medication-specific information, ethics, and, when possible, quality-of-life considerations.

IO: Explain ethical, cultural, and religious issues that may need consideration when setting pharmacotherapeutic goals for critically ill patients.

IO: Explain the realistic limits of treatment(s) on outcomes for critically ill patients.

IO: Explain how a critically ill patient's life expectancy or functional outcome might affect the setting of therapeutic goals.

OBJ R2.5.2: (Synthesis) Design a regimen that meets the evidence-based therapeutic goals established for a critically ill patient; integrates patient-specific information, disease and drug information, ethical issues and, when possible, quality-of-life issues; and considers pharmacoeconomic principles.

- IO: Explain patient safety concerns that may arise when members of the interdisciplinary team caring for critically ill patients are required to make complex care decisions under tight time constraints.*
- IO: Explain difficulties in making evidence-based patient care decisions when there is limited or poor quality evidence available.*
- IO: Explain how to integrate efficacy, safety, and cost considerations in a regimen for a critically ill patient.*
- IO: Explain limitations on routes of medication administration available for critically ill patients.*
- IO: Explain how multiple organ system dysfunction influences the selection of medications and specialized nutrition support for critically ill patients.*
- IO: Explain reasons for the likelihood that the critically ill patient's medication regimen will be significantly more complex than the regimens of patients in other areas of the health-system.*
- IO: Explain the difficulty of balancing multiple complex therapies in the medication regimen of a critically ill patient.*
- IO: Explain the confounding effect of the use of devices (e.g., mechanical ventilation, right heart catheter) on therapy decisions for critically ill patients.*

Goal R2.6: Design evidence-based monitoring plans for critically ill patients.

OBJ R2.6.1: (Synthesis) Design an evidenced-based monitoring plan for a critically ill patient's therapeutic regimen that effectively evaluates achievement of the patient-specific goals.

- IO: State monitoring parameters for pharmacotherapy regimens commonly prescribed for critically ill patients.*
- IO: Explain the relationship between the standard value ranges for parameters and the influence on those ranges by diseases encountered in the critical care environment.*
- IO: Explain the limitations of physiological parameters derived from various monitoring devices used in the critical care environment.*
- IO: Explain issues of monitoring frequency in the design of care plans for critically ill patients.*

Goal R2.7: Recommend regimens and monitoring plans for critically ill patients.

OBJ R2.7.1: (Application) Recommend an evidence-based therapeutic regimen and corresponding monitoring plan in a way that is systematic, logical, accurate, timely, and secures consensus from the critical care interdisciplinary team.

- IO: Explain various approaches that can be used in different situations with different team constituents to secure consensus for a recommended regimen.*

Goal R2.8: When appropriate, implement selected aspects of critical care patients' regimens and/or monitoring plans.

OBJ R2.8.1 (Application) When appropriate, order a therapeutic regimen for a critically ill patient according to the health system's procedures.

- IO: Explain requirements for a situation in which it is appropriate for the pharmacist to initiate a medication-therapy regimen.*

- OBJ R2.8.2: (Application) When appropriate, follow organizational procedures to implement (e.g., order tests) the monitoring plan.
- Goal R2.9: Evaluate critically ill patients' progress and redesign regimens and monitoring plans.
- OBJ R2.9.1: (Evaluation) Accurately assess the critically ill patient's progress toward the therapeutic goal(s) and the absence of adverse drug events.
- IO: *Explain the need to consider multiple organ system dysfunction when interpreting a group of individual parameter measurements.*
- IO: *Explain the importance of the analysis of trends over time in monitoring parameter measurements of critically ill patients.*
- IO: *Determine instances in the critical care environment in which there is urgency in communicating the results of monitoring to the prescriber.*
- IO: *Explain the types of medication errors and adverse drug events that might occur in the high pressure environment of critical care.*
- OBJ R2.9.2: (Synthesis) Redesign an evidence-based therapeutic plan for a critically ill patient as necessary based on evaluation of monitoring data and therapeutic outcomes.
- OBJ R2.9.3: (Application) Collect outcomes data based on the patient's response to therapy.
- IO: *Explain the impact of having outcomes data that demonstrates significant reductions in adverse drug events leading to cost savings when pharmacists participate on critical care multidisciplinary teams.*
- Goal R2.10: Communicate ongoing patient information.
- OBJ R2.10.1: (Application) When given a patient who is transitioning out of the critical care setting, communicate pertinent pharmacotherapeutic information to the receiving health care professionals.
- Goal R2.11: Document direct patient care activities appropriately.
- OBJ R2.11.1: (Analysis) Appropriately select direct patient-care activities for documentation.

Outcome R3: Demonstrate excellence in the provision of training, including preceptorship, or educational activities for health care professionals and health care professionals in training.

- Goal R3.1: Provide effective education or training to health care professionals and health care professionals in training.
- OBJ R3.1.1: (Comprehension) Explain the differences in effective educational strategies for health care professionals and for various levels of health care professionals in training.
- OBJ R3.1.2: (Synthesis) Design an assessment strategy that appropriately measures the specified objectives for education or training and fits the learning situation.
- OBJ R3.1.3: (Application) Use skill in the four preceptor roles employed in practice-based teaching (direct instruction, modeling, coaching, and facilitation).
- OBJ R3.1.4: (Application) Use skill in case-based teaching.
- OBJ R3.1.5: (Application) Use public speaking skills to speak effectively in large and small group situations.

Outcome R4: Demonstrate the skills necessary to conduct a critical care pharmacy research project.

Goal R4.1: Conduct a critical care practice research project using effective project management skills.

OBJ R4.1.1: (Synthesis) Identify a topic of significance for a critical care pharmacy research project.

IO: Explain the types of resident projects (e.g., prospective, retrospective, clinical trials) that will meet residency program project requirements and timeframe.

IO: Explain how one determines if a potential project topic is of significance in one's particular practice setting.

IO: Explain how to conduct an efficient and effective literature search for a project.

IO: Explain how to generate a research question(s) to be answered by an investigation.

OBJ R4.1.2: (Synthesis) Formulate a feasible design for a critical care pharmacy research project.

IO: Explain the elements of a project proposal.

IO: Explain how to identify those individuals who will be affected by the conduct of the project and strategies for gaining their cooperation.

IO: Explain how to determine a timeline with suitable milestones that will result in project completion by an agreed upon date.

IO: Explain the ethics of research on human subjects and the role of the IRB.

IO: Explain various methods for constructing data collection tools.

OBJ R4.1.3: (Synthesis) Secure any necessary approvals, including IRB and funding, for one's design of a project.

IO: Explain how to identify those key stakeholders who must approve a particular project.

IO: Explain the components that make up a budget for a project.

IO: Explain the role of the organization's IRB in the approval process.

OBJ R4.1.4: (Synthesis) Implement a critical care pharmacy research project as specified in its design.

IO: Explain strategies for keeping one's work on a project at a pace that matches with the projected timeline.

IO: When given a particular approved residency project, explain methods for organizing and maintaining project materials and documentation of the project's ongoing implementation.

IO: Explain methods for data analysis.

OBJ R4.1.5: (Synthesis) Effectively present the results of a critical care pharmacy research project.

OBJ R4.1.6: (Synthesis) Successfully employ accepted manuscript style to prepare a final report of a critical care pharmacy research project.

IO: When given a particular residency project ready for presentation, explain the type of manuscript style appropriate to the project and criteria to be met when using that style.

OBJ R4.1.7: (Evaluation) Accurately assess the impact, including sustainability if applicable, of the residency project.

Outcome R5: Participate in the management of medical emergencies.

Goal R5.1: Participate in the management of medical emergencies.

OBJ R5.1.1: (Application) Exercise skill as a team member in the management of medical emergencies as exhibited by certification in the American Heart Association Advanced Cardiac Life Support and, if applicable, Pediatric Advanced Life Support.

<p style="text-align: center;">Elective Educational Outcomes, Goals, and Objectives for Postgraduate Year Two (PGY2) Pharmacy Residencies in Critical Care</p>

Outcome E1: Perform quality improvement activities aimed at enhancing the safety and effectiveness of medication-use processes in the critical care area.

- Goal E1.1: Identify opportunities for improvement of aspects of the critical care area's medication-use process.
- OBJ E1.1.1: (Comprehension) Explain the critical care area's medication-use processes and patients' vulnerability to medication errors and/or adverse drug events (ADEs).
 - OBJ E1.1.2: (Analysis) Analyze the structure and process and measure outcomes of the critical care environment's medication-use processes.
 - OBJ E1.1.3: (Evaluation) Identify potential opportunities for improvement in the critical care area's medication-use processes by comparing the medication-use system to relevant best practices.
- Goal E1.2: Design and implement quality improvement changes to the critical care area's medication-use processes.
- OBJ E1.2.1: (Synthesis) Lead the identification of need for, development of, implementation of, and evaluation of an evidence-based treatment guideline/protocol related to individual and/or population-based care of critically ill patients.
 - OBJ E1.2.2: (Synthesis) Design and implement pilot interventions to change problematic or potentially problematic aspects of the medication-use processes with the objective of improving quality.
- Goal E1.3: Evaluate critically ill patients' medication orders and/or profiles.
- OBJ E1.3.1: (Evaluation) Interpret the appropriateness of a critically ill patient's medication order following existing standards of practice and the organization's policies and procedures.
 - OBJ E1.3.2: (Evaluation) Assess a critically ill patient's medication profile for appropriateness following existing standards of practice and the organization's policies and procedures.
- Goal E1.4: Participate in the health system's formulary process for pharmacotherapeutic agents used in critically ill patients.
- OBJ E1.4.1: (Synthesis) Prepare monographs for pharmacotherapeutic agents used in critically ill patients to make formulary status recommendations.
 - OBJ E1.4.2: (Synthesis) Make recommendations for pharmacotherapeutic class decisions based on comparative reviews concerning the critical care population.
 - OBJ E1.4.3: (Comprehension) Explain the heightened expectations of a specialist's presentation of formulary recommendations.

Outcome E2: Provide formalized critical care medication-related information.

- Goal E2.1: Provide concise, applicable, comprehensive, and timely responses to formalized requests for drug information pertaining to the critically ill from patients, health care providers, and the public.

- OBJ E2.1.1: (Analysis) Discriminate between the requesters' statement of need and the actual drug information need by asking for appropriate additional information.
IO: Explain the characteristics of a clearly stated clinical question.
- OBJ E2.1.2: (Synthesis) Formulate a systematic, efficient, and thorough procedure for retrieving drug information.
IO: Explain the strengths and weaknesses of manual and electronic methods of retrieving biomedical literature.
IO: State sources of evidence-based meta-analysis reviews.
IO: Compare the characteristics of each of the available resources for biomedical literature.
- OBJ E2.1.3: (Analysis) Determine from all retrieved biomedical literature the appropriate information to evaluate.
- OBJ E2.1.4: (Evaluation) Evaluate the usefulness of biomedical literature gathered.
IO: Assess the potential for bias of the author or preparer of all forms of drug information.
IO: Determine whether a study's methodology is adequate to support its conclusions.
IO: Determine whether the endpoint established for a study is appropriate.
IO: Explain methods used to test study end point (e.g., pulmonary function studies).
IO: Explain the effects on study outcomes of various methods of patient selection (e.g., volunteers, patients, or patients with different disease severity).
IO: Explain the effects of various methods of blinding (e.g., double-blind, single-blind, open-research designs) on study outcomes.
IO: Explain the effects on study outcomes of various methods of drug assay and quality assurance procedures (e.g., high performance liquid chromatography, assay coefficient of variations).
IO: Explain the types of pharmacotherapy studies (e.g., kinetic, economic, dynamic) and the kind(s) of data analysis appropriate for each.
IO: Explain how the choice of statistical methods used for data analysis (e.g., t test, analysis of variance) affects the interpretation of study results and conclusions.
IO: Determine if a study's findings are clinically significant.
IO: Explain the strengths and limitations of different study designs.
- OBJ E2.1.5: (Evaluation) Determine whether a study's conclusions are supported by the study results.
IO: Explain how data from a study can be applied to expanded patient populations.
- OBJ E2.1.6: (Synthesis) Formulate responses to drug information requests based on analysis of the literature.
- OBJ E2.1.7: (Synthesis) Provide appropriate responses to drug information questions that require the pharmacist to draw upon his or her knowledge base.

OBJ E2.1.8: (Evaluation) Assess the effectiveness of drug information recommendations.

IO: Explain all factors that must be assessed to determine the effectiveness of a response.

Outcome E3: Demonstrate additional leadership and practice management skills.

Goal E3.1: Exhibit additional personal skills of a practice leader.

OBJ E3.1.1: (Complex Overt Response) Speak clearly and distinctly in grammatically correct English or the alternate primary language of the practice site.

OBJ E3.1.2: (Application) Use listening skills effectively in performing job functions.

IO: Explain the use of body language in listening to others.

IO: Explain verbal techniques to enhance listening to others.

OBJ E3.1.3: (Application) Use correct grammar, punctuation, spelling, style, and formatting conventions in preparing all written communications.

OBJ E3.1.4: (Analysis) When communicating, use an understanding of effectiveness, efficiency, customary practice and the recipient's preferences to determine the appropriate type of, and medium and organization.

IO: Accurately identify the primary theme or purpose of one's written or oral communication.

IO: Accurately determine what information will provide credible background to support or justify the primary theme of one's written or oral communication.

IO: Properly sequence ideas in written and oral communication.

IO: Accurately determine the depth of communication appropriate to one's audience.

IO: Accurately determine words and terms that are appropriate to one's audience.

IO: Accurately determine one's audience's needs.

IO: Accurately identify the length of communication that is appropriate to the situation.

IO: Explain the importance of assessing the listener's understanding of the message conveyed.

IO: Explain how to assess the level of health literacy of a patient.

IO: State sources of patient information that are adjusted for various levels of health literacy.

IO: Explain techniques for persuasive communications.

IO: Explain guidelines for the preparation of statements to be distributed to the media.

Goal E3.2: Contribute to the critical care practice area's leadership and management activities.

OBJ E3.2.1: (Synthesis) Develop an effective proposal for a new critical care pharmacy service.

IO: Discuss clinical, humanistic, and economic outcome strategies that can be utilized to justify critical care pharmacy services.

IO: Explain issues underlying the need to document outcomes of critical care pharmacy services.

IO: Explain documentation strategies that can be utilized to justify critical care pharmacy services.

OBJ E3.2.2: (Synthesis) Formulate strategies that result in the effective implementation of a new critical care pharmacy service.

Outcome E4: Contribute the critical care pharmacy perspective to planning for and/or management of mass casualty events.

Goal E4.1: Participate in the planning and implementation of plans for the management of mass casualty events.

OBJ E4.1.1: (Comprehension) Explain the critical care pharmacist's role in the development of plans for the management of mass casualty events at the organizational, local, state, and national levels.

OBJ E4.1.2: (Synthesis) Participate in the development or revision of the critical care elements of organizational plans for the management of mass casualty events.

IO: Explain the essential critical care-related components of an organization's plan for the management of mass casualty events.

IO Explain who should be involved in the development of an organization's plan for the management of mass casualty events.

OBJ E4.1.3: (Synthesis) Exercise skill in the delivery of staff training as specified in the organization's emergency preparedness plans.

OBJ E4.1.4: (Synthesis) If needed, provide services and programs as specified in the organization's emergency preparedness plan.

Outcome E5: Demonstrate skills required to function in an academic setting.

Goal E5.1 Understand faculty roles and responsibilities.

OBJ E5.1.1 (Comprehension) Explain variations in the expectations of different colleges/schools of pharmacy for teaching, practice, research, and service.

IO Discuss how the different missions of public versus private colleges/schools of pharmacy can impact the role of faculty members.

IO Discuss maintaining a balance between teaching, practice, research and service.

IO Discuss the relationships between scholarly activity and teaching, practice, research and service.

OBJ E5.1.2 (Analysis) Explain the role and influence of faculty in the academic environment.

IO Explain the responsibilities of faculty in governance structure (e.g. the faculty senate, committee service).

IO Describe the responsibilities of faculty (e.g. curriculum development and committee service) related to teaching, practice, research, and service roles.

OBJ E5.1.3 (Comprehension) Describe the academic environment.

IO Describe how the decisions by university and college administration impact the faculty.

IO Discuss outside forces (e.g. change in the profession, funding source, accreditation requirements) that impact administrator and faculty roles.

OBJ E5.1.4 (Comprehension) Describe the types and ranks of faculty appointments.

- IO Explain the various types of appointments (e.g. non-tenure, tenure-track, and tenured faculty).*
- IO Differentiate among the various ranks of faculty (e.g. instructor, assistant professor, associate professor, full professor).*
- IO Discuss the role and implications of part-time and adjunct faculty as schools continue to expand and faculty shortages occur.*
- OBJ E5.1.5 (Comprehension) Discuss the promotion and tenure process for each type of appointment.
 - IO Identify the types of activities that are considered in the promotion process.*
 - IO Identify the types of activities that are considered for tenure.*
- OBJ E5.1.6 (Application) Identify resources available to help develop academic skills.
 - IO Explain the role of academic-related professional organizations (e.g. AACCP) in faculty professional development.*
 - IO Identify resources to help develop teaching skills and a teaching philosophy.*
- OBJ E5.1.7 (Comprehension) Explain the characteristics of a typical affiliation agreement between a college of pharmacy and a practice site (e.g., health system, hospital, clinic, retail pharmacy).
 - IO Explain how the political environments of either a college or a practice site may affect the other.*
- Goal E5.2 Exercise teaching skills essential to pharmacy faculty.
 - OBJ E5.2.1 (Synthesis) Develop an instructional design for a class session, module, or course.
 - IO Construct a student-centered syllabus.*
 - IO Construct educational objectives for a class session, module, or course that is appropriate to the audience.*
 - IO Identify appropriate instructional strategies for the class session, module, or course to achieve the objectives.*
 - IO Consider assessment tools that measure student achievement of the educational objectives.*
 - OBJ E5.2.2 (Synthesis) Prepare and deliver didactic instruction on a topic relevant to the specialized area of pharmacy residency training.
 - IO Identify educational technology that could be used for a class session, module, or course (e.g., streaming media, course management software, audience response systems).*
 - IO Create instructional materials appropriate for the topic and audience.*
 - IO Identify strategies to deal with difficult learners.*
 - IO Given feedback from teaching evaluations (e.g. student and or peer), devise a plan to incorporate improvements in future instruction.*
 - OBJ E5.2.3 (Application) Develop and deliver cases for workshops and exercises for laboratory experiences.
 - IO Identify the appropriate level of case-based teachings for small group instruction.*
 - IO Identify appropriate exercises for laboratory experiences.*

- IO Provide appropriate and timely feedback to improve performance.*
- OBJ E5.2.4 (Application) Serve as a preceptor or co-preceptor utilizing the four roles employed in practice-based teaching (direct instruction, modeling, coaching and facilitation).
- IO Assess the learner's skill level to determine the appropriate preceptor strategy for providing practice-based teaching.*
- IO Given performance-based criteria, identify ways to provide constructive feedback to learners.*
- IO Develop strategies to promote professional behavior.*
- IO Identify strategies to deal with difficult learners in the practice setting.*
- IO Given a diverse learner population, identify strategies to interact with all groups with equity and respect.*
- OBJ E5.2.5 (Analysis) Develop a teaching experience for a practice setting (e.g., introductory or advanced pharmacy experience).
- IO Create educational goals and objectives to be achieved.*
- IO Develop activities that will allow achievement of identified educational goals and objectives.*
- IO Identify how and when feedback should be provided.*
- IO Identify other preceptors for the experience, if appropriate.*
- IO Determine training that might be needed for the preceptors to deliver student education.*
- IO Identify potential challenges of precepting and providing patient care services simultaneously.*
- OBJ E5.2.6 (Synthesis) Design an assessment strategy that appropriately measures the specified educational objectives for the class session, module, course, or rotation.
- IO Identify appropriate techniques for assessing learning outcomes in various educational settings [e.g., written examinations, oral examinations, practical examinations, Objective Structured Clinical Examination (OSCE)].*
- IO Develop examination questions to assess the knowledge, skills, attitudes and behaviors that are appropriate to the learner's level and topic.*
- IO Discuss the various methods for administering examination questions (e.g., computerized testing, paper testing).*
- OBJ E5.2.7 (Evaluation) Create a teaching portfolio.
- IO Define the concept of a teaching portfolio and describe its primary purpose*
- IO Outline the steps in building a teaching portfolio.*
- IO Develop a personal teaching philosophy to guide one's teaching efforts and facilitate student learning.*
- OBJ E5.2.8 (Evaluation) Compare and contrast methods to prevent and respond to academic and profession dishonesty.
- IO Evaluate physical and attitudinal methods to prevent academic dishonesty.*
- IO Discuss methods of responding to incidents of academic dishonesty.*
- IO Discuss the role of academic honor committees in cases of academic dishonesty.*

- IO Identify examples and methods to address unprofessional behavior in learners.*
- OBJ E5.2.9 (Comprehension) Explain the relevance of copyright laws to developing teaching materials.
 - IO Discuss copyright regulations as related to reproducing materials for teaching purposes.*
 - IO Discuss copyright regulations as related to linking and citing on-line materials.*

Appendix

Didactic discussions, reading assignments, case presentations, written assignments, and direct patient care experience will allow the critical care resident to understand and appreciate the implications of medication therapy on the following areas of emphasis:

- I. Organ-System Related
 - A. Pulmonary
 1. Acute respiratory distress syndrome/acute lung injury
 2. Status asthmaticus
 3. Acute COPD exacerbation
 4. Pulmonary embolism
 5. Pneumothorax and hemothorax
 6. Drug-induced pulmonary diseases
 - B. Cardiovascular
 1. Arrhythmias
 2. Pulmonary edema/congestive heart failure exacerbations
 3. Acute coronary syndromes
 4. Hypertensive emergencies
 5. Acute aortic dissection
 6. Pericardial tamponade
 7. Shock and related problems
 - a. cardiogenic
 - b. septic
 - c. hypovolemic/hemorrhagic
 - d. anaphylactic
 - e. neurogenic (spinal)
 - C. Renal
 1. Acute renal failure
 2. Acid-base imbalance
 3. Fluid and electrolyte disorders
 4. Rhabdomyolysis
 5. Contrast-induced nephropathy
 6. Drug-induced kidney diseases
 - D. Neurology
 1. Status epilepticus
 2. Intracranial pressure management
 3. Traumatic brain injury
 4. Ischemic stroke
 5. Subarachnoid hemorrhage
 6. Intracerebral hemorrhage
 7. Spinal cord injury
 8. Critical illness polyneuropathy
 9. Diabetes insipidus
 10. Syndrome of inappropriate antidiuretic hormone
 11. Cerebral salt wasting

- E. Gastrointestinal
 - 1. Acute upper and lower gastrointestinal bleeding
 - 2. Severe pancreatitis
 - 3. Fistulas
 - 4. Ileus
- F. Hepatic
 - 1. Liver failure
 - 2. Hepatorenal syndrome
 - 3. Complications of cirrhosis
 - 4. Drug-induced liver diseases
- G. Dermatology
 - 1. Burns
 - 2. Stevens Johnson syndrome
 - 3. Toxic epidermal necrolysis
 - 4. Erythema multiforme
- H. Immunology
 - 1. Acute transplant rejection
 - 2. Graft-versus-host disease
 - 3. Systemic inflammatory response disease (SIRS)
- I. Endocrine
 - 1. Relative adrenal insufficiency
 - 2. Diabetic ketoacidosis/nonketotic coma
 - 3. Thyroid storm/ICU hypothyroid states
 - 4. Hypoglycemia & hyperglycemia
- J. Hematology
 - 1. Coagulopathies
 - 2. Drug-induced hematologic disorders
 - 3. Drug-induced thrombocytopenia
 - 4. Anemia of critical illness
 - 5. Blood loss and blood component replacement
- K. Psychiatry
 - 1. ICU psychosis
 - 2. Sleep disturbances
 - 3. Neuroleptic malignant syndrome
 - 4. Substance abuse /alcohol withdrawal syndromes

II. Specific Considerations

- A. Infectious Diseases
 - 1. CNS infections
 - 2. Complicated intra-abdominal infections
 - 3. Infections in the immunocompromised host
 - 4. Pneumonia
 - 5. Endocarditis
 - 6. Sepsis
 - 7. Wound infection

- 8. ICU fever
- B. Pharmacokinetics and Pharmacodynamics
- C. Toxicological emergencies
- D. Pediatric and Neonatal Considerations (optional)
- E. Bioterrorism and Mass Casualty Events

III. Supportive Care

- A. Nutrition
 - 1. Enteral nutrition
 - 2. Parenteral nutrition
 - 3. Nutrition considerations in special patient populations
 - 4. Immune-modulation
- B. Analgesia
- C. Sedation
- D. Delirium
- E. Neuromuscular blocking agents (rapid sequence intubation, ICU paralysis)
- F. Venous thromboembolism prophylaxis
- G. Stress ulcer prophylaxis
- H. Bowel regimens
- I. Devices
 - 1. Intravascular devices
 - 2. Mechanical ventilation
 - 3. Continuous renal replacement therapies
 - 4. Chest tubes
 - 5. Sequential compression devices
 - 6. Intra-arterial balloon pumps and LVADs
 - 7. Ventriculostomies
 - 8. Peripheral nerve stimulators
 - 9. Bispectral index

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The effective date for implementation of these educational outcomes, goals and objectives is commencing with the entering resident class for 2008.

Appendix F-3

ACCP Guidelines for Clinical Research and Fellowship Programs

ACCP Guidelines for Clinical Research Fellowship Training Programs

Definition

A research fellowship is a directed, highly individualized, postgraduate training program designed to prepare the participant to function as an independent investigator.

Introduction

The purpose of fellowship training programs is to develop competency and expertise in the scientific research process, including hypothesis generation and development, study design, protocol development, grantsmanship, study coordination, data collection, analysis, and interpretation, technical skills development, presentation of results, and manuscript preparation and publication. A fellowship candidate is expected to possess appropriate practice skills relevant to the knowledge area of the fellowship. Such skills may be obtained through prior practice experience or completion of a residency program.

Under the close direction, instruction and supervision of a qualified investigator-preceptor, the fellow receives a highly individualized learning experience, utilizing the fellow's research interests and knowledge needs as a focus for his/her education and training. Fellowships are typically offered through schools/colleges of pharmacy, academic health centers, the pharmaceutical industry, and/or specialized care institutions. A fellowship graduate should be capable of conducting independent and collaborative research and functioning as principal investigator.

Training Program Requirements

1. A minimum of 3,000 hours of the fellowship training time should be devoted to research-related activities over a minimum period of two years.
2. Administrative institutional support for the preceptor's research program and the fellowship training program.
3. Availability of advanced educational opportunities (e.g., graduate level coursework) in research-related topics. Such coursework may include, but is not limited to, courses in research design and methods, biostatistics, ethical issues, pharmacokinetics, pharmacodynamics, pharmacoeconomics, and others as appropriate to the specific fellow and program.
4. Availability of appropriate facilities (e.g., laboratory and/or clinical) to conduct research.
5. Availability of qualified personnel to teach clinical, laboratory, and/or computer technology-based research skills.
6. Ready access to scientific literature and computer facilities.

Preceptor Qualifications

1. A clinical scientist with an established and on-going record of independent research accomplishments and expertise in the area of specialization related to the fellowship, which may be exemplified by:
 - a. fellowship training, a graduate degree, and/or equivalent experience;
 - b. principal or primary investigator on research grants and/or projects; and
 - c. published research papers in peer-reviewed scientific literature on which the preceptor is the primary or senior author.
2. Active collaborative research relationships with other scientists.

Fellowship Applicant Criteria

1. Masters or doctoral degree in a health science discipline required
2. Residency or equivalent clinical experience preferred.
3. Demonstrated interest in or an aptitude for a career in research.

Fellowship Experiences

Ideally, a research fellow should initiate and complete at least one original research project. However, it is recognized that this may not be possible in every case. Whether through the completion of one project from start to finish or through participation in multiple projects, the fellow should obtain extensive experience in:

1. Development of at least one scientific hypothesis
2. Development of experimental methods to test the developed hypothesis.
3. Preparation of a protocol and submission of the protocol to the appropriate institutional review committee.
4. Grantsmanship, including identification of appropriate funding sources for specific projects and the preparation and submission of a grant for extramural funding consideration.
5. Study design and coordination and data collection.
6. Statistical analysis of data.
7. Data analysis and interpretation
8. Development of clinical, laboratory, and/or computer-based research skills as appropriate to the specific training program
9. Abstract preparation and submission
10. Presentation of research at peer-reviewed scientific meetings
11. Manuscript preparation and submission for publication in peer-reviewed journals.
12. Participation in journal clubs, research workshops, and/or seminar series.
13. Instruction in biomedical science ethics.

Approved by the ACCP Board of Regents, October 22, 2004

Appendix G-1

Critical Care Pharmacy Bibliography

Critical Care Pharmacy Practice Bibliography

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Appendix G-2

Selected Critical Care Pharmacy Literature

Appendix G-3

ACPE P.L.A.N. Programming



P.L.A.N. Search Results

Accreditation Council for Pharmacy Education

20 North Clark Street, Suite 2500 Chicago, Illinois 60602-5109

Phone (312) 664-3575 Fax (312) 664-7008 <http://www.acpe-accredit.org>

Title	UAN	Hours (CEUs)	City	Activity Type - LIVE
(ACHS #2075) 8th Annual Critical Care Conference	0797-0000-12-001-L04-P	7.25 (0.725)	Rancho Mirage	Knowledge
10th Annual UC Davis Pulmonary and Critical Care Conference	0277-0000-12-181-L01-P	6 (0.6)	Sacramento	Knowledge
2nd Annual Adult Critical Care Symposium	0266-0000-12-552-L04-P	13.5 (1.35)	Danville/www.geisinger.edu/800-272-6692	Knowledge
Critical Care Medicine and Medication Safety Part I	0163-9999-12-091-L04-P	1 (0.1)	Gainesville	Knowledge
Critical Care Medicine Part II	0163-9999-12-100-L01-P	1 (0.1)	Gainesville	Knowledge
Critical Care Medicine Part III	0163-9999-12-106-L01-P	1 (0.1)	Gainesville	Knowledge
Critical Care Medicine Part IV	0163-9999-12-118-L01-P	1 (0.1)	gainesville	Knowledge
Critical Care Medicine Part IV	0163-9999-12-133-L01-P	1 (0.1)	Gainesville	Knowledge
Critical Care Medicine Part V	0163-9999-12-124-L01-P	1 (0.1)	Gainesville	Knowledge
Fellowship Directors Luncheon: Teaching and Implementing Quality Improvement in	0236-0000-12-84-L01-P	1.25 (0.125)	Houston	Knowledge
Interactive Case Discussions with the Experts	0236-0000-12-83-L04-P	2 (0.2)	Houston	Knowledge
Joint Session SCCM/ESICM	0236-0000-12-85-L01-P	1 (0.1)	Houston	Knowledge
Late-Breaker	0236-0000-12-86-L01-P	1 (0.1)	Houston	Knowledge
Pediatric Multiprofessional Critical Care Board Review Course	0236-0000-12-301-L01-P	34.25 (3.425)	www.sccm.org	Knowledge
Residency Project Pearls (2)	0053-9999-12-032-L01-P	1 (0.1)	Tulsa	Knowledge
The Use of Parenteral and Enteral Therapy in the Critically Ill Adult	0133-0000-12-012-L01-P	1.5 (0.15)	Lafayette	Knowledge
The Use of Parenteral and Enteral Therapy in the Critically Ill Adult	0133-0000-12-012-L01-T	1.5 (0.15)	Lafayette	Knowledge
Title	UAN	Hours (CEUs)	City	Activity Type - HOMESTUDY
Acute Lung Injury Linked to Cognition Issues (32067)	0052-9999-12-828-H04-P	0.25 (0.025)		Knowledge
Heavy Sedation Not Needed for ICU Vent Patients (31760)	0052-9999-12-666-H04-P	0.25 (0.025)		Knowledge
Hyperglycemia Predicts Death in Pneumonia (32993)	0052-9999-12-1290-H04-P	0.25 (0.025)		Knowledge
ICU Care May Be Too Intensive, Survey Finds (30418)	0052-9999-11-3030-H04-P	0.25 (0.025)		Knowledge
ICU Nurses Favor Personal Touch in Telemedicine (30553)	0052-9999-12-052-H04-P	0.25 (0.025)		Knowledge
Low Blood Sugar Raises Risk of Death in ICU (34863)	0052-9999-12-2142-H04-P	0.25 (0.025)		Knowledge
No Mortality Benefit for Heparin in Acute Setting (30419)	0052-9999-11-3028-H04-P	0.25 (0.025)		Knowledge
Pediatric ICUs May Not Be Used to Potential (32264)	0052-9999-12-915-H04-P	0.25 (0.025)		Knowledge
Proxies Put Rosy Tint on Grim Prognoses (31567)	0052-9999-12-566-H04-P	0.25 (0.025)		Knowledge
Tight Glucose Control No Help for CICU Babies (34640)	0052-9999-12-2063-H04-P	0.25 (0.025)		Knowledge
Tight Glycemic Control Slows Premies' Growth (31706)	0052-9999-12-635-H04-P	0.25 (0.025)		Knowledge
Whole-Body CT Misses Some Trauma Injuries (31487)	0052-9999-12-534-H04-P	0.25 (0.025)		Knowledge



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Phone (312) 664-3575 Fax (312) 664-7008 <http://www.acpe-accredit.org>

Title	UAN	Hours (CEUs)	City	Activity Type - LIVE
Sepsis Updates-2012 Guidelines	0163-0000-12-195-L01-P	1 (0.1)	Orlando	Application
Systemic Lupus Erythemetosis	0163-9999-12-031-L01-P	1 (0.1)	Weston	Application
Systemic Lupus Erythemetosis	0163-9999-12-031-L01-T	1 (0.1)	Weston	Application
Telemedicine's Impact on Safety and Quality	0236-0000-12-100-L04-P	1.5 (0.15)	Mt. Prospect	Application
The Pharmacotherapy Preparatory Review and Recertification Course -- Fluids,	0217-0000-12-020-L01-P	3 (0.3)	Reno/www.accp.com	Application
Update on the Treatment of Sepsis: Goal Directed Therapy	0163-9999-12-030-L01-P	1 (0.1)	Weston	Application
Update on the Treatment of Sepsis: Goal Directed Therapy	0163-9999-12-030-L01-T	1 (0.1)	Weston	Application
Title	UAN	Hours (CEUs)	City	Activity Type - HOMESTUDY
Building a Process for Improvement Initiatives in your ICU	0236-0000-12-230-H05-P	7 (0.7)		Application
Congress Review 2012	0236-0000-12-240-H01-P	1 (0.1)		Application
Step-by-step: Building a Process for Improvement in Your ICU	0236-0000-12-450-H05-P	7 (0.7)		Application
The Pharmacotherapy Preparatory Review and Recertification Course -- Fluids,	0217-0000-12-020-H01-P	3 (0.3)		Application

Appendix G-4

Sample Educational Program Materials

Adult Multiprofessional Critical Care Board Review Course

REGISTER TODAY FOR THE MOST COMPREHENSIVE BOARD
REVIEW COURSE IN CRITICAL CARE! SEE PAGE 9, VISIT
WWW.SCCM.ORG/BOARDREVIEW OR CALL SCCM
CUSTOMER SERVICE AT +1 847 827-6888.



Founding Director

Henry Masur, MD, FCCM
Clinical Professor of Medicine
George Washington University
School of Medicine
Washington, DC, USA



Founding Director

Joseph E. Parrillo, MD, FCCM
Cooper University Hospital/UMC
Camden, New Jersey, USA

Your source for the most comprehensive board preparation in critical care

The 2011 Adult Multiprofessional Critical Care Board Review Course (MCCBRC) will provide the most comprehensive review in the diagnosis, monitoring and management of critically ill patients. Led by Founding Directors Joseph E. Parrillo, MD, FCCM, and Henry Masur, MD, FCCM, this course will include interactive board preparation sessions using audience response technology and feature practice board questions, answers and rationales. World-class faculty will focus on preparing fellows and attendings for their critical care certification and recertification. The course also will provide an excellent update for any critical care professional seeking the most current review of the field.



Comprehensive care!

The Adult MCCBRC is designed for practitioners who are preparing for the critical care subspecialty exams, as well as those seeking a review on critical care. This course will benefit:

- Advanced Practice Nurses
- Anesthesiologists
- Cardiologists
- Critical Care Fellows
- Critical Care Nurses
- Emergency Medicine Practitioners
- Intensivists
- Internists
- Neurologists
- Pulmonologists
- Respiratory Care Practitioners
- Surgeons

Register today to benefit from SCCM's high-quality programming and effective study materials. SCCM offers a complete board review preparation solution:

Comprehensive Learning Experience

Receive four and a half days of extensive coverage of core concepts in adult critical care, including cardiology, endocrinology, gastrointestinal disorders, infectious diseases, monitoring, neurology, nutrition, respiratory care, sepsis, and more. Each comprehensive session is presented by a distinguished team of multiprofessionals.

Accurate Skills Assessment

Daily interactive board preparation sessions will consist of practice board questions, answers and rationales. Monitor your progress through audience response system technology and receive accurate feedback regarding areas that may need further refinement.

Valuable Study Resources

As a registered participant, you will receive the course syllabus, online access to practice questions and networking opportunities with colleagues and world-renowned experts in critical care.



2011 Critical Care Board Exam Dates

American Board of Anesthesiology

www.theaba.org

Initial Certification:

October 1, 2011

Recertification:

October 8-22, 2011

American Board of Internal Medicine

www.abim.org

Exam Dates:

November 9, 2011

November 14-18, 2011

for candidates with a documented disability

American Board of Surgery

www.absurgery.org

Certification:

September 12, 2011

Recertification:

September 12-24, 2011

American College of Osteopathic Internists

www.acoi.org

Subspecialty and Added Qualifications Certification and Recertification Exams:
August 27, 2011

Internal Medicine Certification

Computerized Exam:

September 15, 2011

Internal Medicine

Recertification

Computerized Exam:

September 16, 2011



Invited Faculty



Founding Director

Henry Masur, MD, FCCM

Clinical Professor of Medicine
George Washington University
School of Medicine
Washington, DC, USA



Founding Director

Joseph E. Parrillo, MD, FCCM

Cooper University Hospital/UMC
Camden, New Jersey, USA

Richard G. Barton, MD

University of Utah School of Medicine
Salt Lake City, Utah, USA

Cherylee W. Chang, MD

The Queen's Medical Center
Honolulu, Hawaii, USA

Richard Childs, MD

National Heart, Lung, and Blood Institute
National Institutes of Health
Bethesda, Maryland, USA

R. Phillip Dellinger, MD, FCCM

Cooper University Hospital
Camden, New Jersey, USA

E. Wesley Ely, MD, FCCM

Vanderbilt University Medical Center
Nashville, Tennessee, USA

Robert Fontana, MD

University of Michigan
Ann Arbor, Michigan, USA

Jeffrey S. Guy, MD

Vanderbilt University Medical Center
Nashville, Tennessee, USA

Bradley Knight, MD

Northwestern University
Chicago, Illinois, USA

James A. Kruse, MD

Bassett Healthcare
Cooperstown, New York, USA

Pamela A. Lipsett, MD, MHPE, FCCM

Johns Hopkins Medical Institutions
Baltimore, Maryland, USA

Neil R. MacIntyre, MD

Duke University Medical Center
Durham, North Carolina, USA

Aldo J. Peixoto, MD

Yale University and West Haven VAMC
West Haven, Connecticut, USA

Marc J. Shapiro, MD, FCCM

State University of New York-Stony Brook
Stony Brook, New York, USA

Antoinette Spevetz, MD, FCCM

Cooper University Hospital
Camden, New Jersey, USA

Anthony F. Suffredini, MD, FCCM

National Institutes of Health
Bethesda, Maryland, USA

Robert D. Truog, MD, FCCM

The Children's Hospital
Boston, Massachusetts, USA

Stephen Trzeciak, MD

Cooper University Hospital
Camden, New Jersey, USA

Robert A. Weinstein, MD

John H. Stroger Hospital of Cook County
Chicago, Illinois, USA

Steven W. Werns, MD

Cooper University Hospital
Camden, New Jersey, USA

Jeanine P. Wiener-Kronish, MD

Massachusetts General Hospital
Boston, Massachusetts, USA

Janice L. Zimmerman, MD, FCCM

Methodist Hospital
Houston, Texas, USA



Continuing Education

For additional information, please contact SCCM at +1 847 827-6869 or email education@sccm.org.

Target Audience

This course is designed as a comprehensive review in the diagnosis, monitoring and management of the critically ill patient as well as to provide preparation for the critical care subspecialty examination.

This continuing education offering is intended to meet the needs of any healthcare provider involved in the care of critically ill patients, including advanced practice nurses, anesthesiologists, cardiologists, critical care fellows, critical care nurses, emergency medicine practitioners, intensivists, internists, neurologists, pulmonologists, respiratory care practitioners, and surgeons.

Type of Activity

This activity was prepared as board preparation material and will focus on increasing knowledge-based content.

Competencies

SCCM supports recommendations that will promote lifelong learning through continuing education. SCCM promotes activities that encourage the highest quality in education that will enhance knowledge, competence or performance in critical care practice. This activity will meet the following:

- Patient- and Family-Centered Care
- Practice Applications
- Communication
- Quality Improvement

Course Objectives

1. Discuss relevant clinical topics to prepare for the critical care subspecialty board examination
2. Assess the scientific foundations and literature evidence for the diagnosis, monitoring and management of patients with critical illness
3. Compare information amongst multiprofessional practitioners involved in the practice of critical care medicine

Physicians - Accreditation Statement: The Society of Critical Care Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. Designation Statement: The Society of Critical Care Medicine designates this live educational activity for a maximum of 40.5 *AMA PRA Category 1 credits*[™]. Each physician should claim only those hours of credit that he/she actually spent in the educational activity.

Nurses - This program has been approved by the California Board of Registered Nursing, Provider No. 8181, for up to 40.5 contact hours.



Pharmacists - The Society of Critical Care Medicine is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a provider of continuing pharmacy education. This course provides up to 40.5 contact hours of continuing education credit (0236-0000-11-300-L01-P). Pharmacists must complete the online verification form to confirm sessions attended. Upon submitting the online verification information to SCCM, a statement of credit can be downloaded by the participant.

Respiratory Therapists - Application has been made to the American Association for Respiratory Care (AARC) for CRCE Category 1 credit.



Agenda

Tuesday, August 16, 2011

7:00 A.M. - 8:00 A.M.

CONTINENTAL BREAKFAST

8:00 a.m. - 8:15 a.m.

Welcome and Opening Remarks

Henry Masur, MD, FCCM; Joseph E. Parrillo, MD, FCCM

8:15 a.m. - 8:45 a.m.

How to Prepare for Certification and Recertification

Antoinette Spevetz, MD, FCCM

8:45 a.m. - 9:15 a.m.

Pancreatitis: Medical and Surgical Management

Pamela A. Lipsett, MD, FCCM

9:15 a.m. - 9:45 a.m.

Prevention of Gastrointestinal Bleeding in the ICU

Pamela A. Lipsett, MD, FCCM

9:45 A.M. - 10:00 A.M.

BREAK

10:00 a.m. - 10:30 a.m.

Mechanical Ventilation I: Nomenclature, Physiology

Neil R. MacIntyre, MD

10:30 a.m. - 11:00 a.m.

Mechanical Ventilation II: Ventilator Options

Neil R. MacIntyre, MD

11:00 a.m. - 11:45 a.m.

Mechanical Ventilation III: Management of Acute Respiratory Failure

E. Wesley Ely, MD, FCCM

11:45 a.m. - 12:15 p.m.

Cardiac Resuscitation

Stephen Trzeciak, MD

12:15 P.M. - 1:30 P.M.

LUNCH ON OWN

1:30 p.m. - 2:30 p.m.

Board Review Session I

E. Wesley Ely, MD, FCCM; Neil R. MacIntyre, MD; Henry Masur, MD, FCCM; Joseph E. Parrillo, MD, FCCM; Stephen Trzeciak, MD

2:30 p.m. - 3:15 p.m.

Delirium in the ICU: Causes and Management

E. Wesley Ely, MD, FCCM

3:15 P.M. - 3:30 P.M.

BREAK

3:30 p.m. - 4:30 p.m.

Fulminant Hepatic Failure and Variceal Bleeding: Current Management

Robert Fontana, MD

4:30 p.m. - 5:00 p.m.

Sedation and Analgesia: Practical Drug Selection and Pharmacology

Jeanine P. Wiener-Kronish, MD

5:00 p.m. - 5:30 p.m.

Airway Management in the ICU

Jeanine P. Wiener-Kronish, MD

5:30 p.m. - 6:30 p.m.

Difficult Ventilator Management Problems

E. Wesley Ely, MD, FCCM; Neil R. MacIntyre, MD

Wednesday, August 17, 2011

6:15 A.M. - 7:00 A.M.

CONTINENTAL BREAKFAST

7:00 a.m. - 8:00 a.m.

Shock: Overview

Joseph E. Parrillo, MD, FCCM

8:00 a.m. - 8:30 a.m.

Noninvasive Ventilation: What Is the Role in the ICU?

Neil R. MacIntyre, MD

8:30 a.m. - 9:15 a.m.

ST Elevation Myocardial Infarctions

Steven W. Werns, MD

9:15 a.m. - 10:15 a.m.

Acute Respiratory Distress Syndrome

Neil R. MacIntyre, MD

10:15 A.M. - 10:30 A.M.

BREAK

10:30 a.m. - 11:00 a.m.

Life-Threatening Bronchospasm

Neil R. MacIntyre, MD

11:00 a.m. - 11:30 a.m.

Non-ST Elevation Myocardial Infarctions

Steven W. Werns, MD

11:30 a.m. - 12:15 p.m.

Community-Acquired Pneumonia: Cases You Should Know

Anthony F. Suffredini, MD, FCCM

12:15 P.M. - 1:30 P.M.

LUNCH ON OWN

1:30 p.m. - 2:30 p.m.

Board Review Session II

Henry Masur, MD, FCCM; Joseph E. Parrillo, MD, FCCM; Aldo J. Peixoto, MD; Steven W. Werns, MD

2:30 p.m. - 3:15 p.m.

Acute Renal Failure: Diagnosis and Management

Aldo J. Peixoto, MD

3:15 P.M. - 3:30 P.M.

BREAK

3:30 p.m. - 4:00 p.m.

Electrolyte Emergencies

Aldo J. Peixoto, MD

4:00 p.m. - 4:15 p.m.

Complex Acid-Base Disorders

Aldo J. Peixoto, MD

4:15 p.m. - 5:00 p.m.

Cases You Should Know How to Manage

Aldo J. Peixoto, MD

5:00 p.m. - 6:00 p.m.

Septic Shock

Joseph E. Parrillo, MD, FCCM

Thursday, August 18, 2011

6:15 A.M. - 7:00 A.M.

CONTINENTAL BREAKFAST

7:00 a.m. - 8:00 a.m.

Hyperglycemic Syndromes and Lactic Acidosis

R. Phillip Dellinger, MD, FCCM

8:00 a.m. - 8:30 a.m.

Bleeding and Coagulation Disorders

Janice L. Zimmerman, MD, FCCM

8:30 a.m. - 9:15 a.m.	Ten Frequent Errors in the Evaluation and Management of Pulmonary Emboli <i>R. Phillip Dellinger, MD, FCCM</i>
9:15 a.m. - 9:45 a.m.	Analysis and Therapy of Supraventricular Arrhythmias-I <i>Bradley Knight, MD</i>
9:45 a.m. - 10:15 a.m.	Analysis and Therapy of Supraventricular Arrhythmias-II <i>Bradley Knight, MD</i>
10:15 A.M. - 10:30 A.M.	BREAK
10:30 a.m. - 11:00 a.m.	Hypertensive Emergencies <i>Janice L. Zimmerman, MD, FCCM</i>
11:00 a.m. - 11:30 a.m.	Analysis and Therapy of Ventricular Arrhythmias-I <i>Bradley Knight, MD</i>
11:30 a.m. - 12:00 p.m.	Analysis and Therapy of Ventricular Arrhythmias-II <i>Bradley Knight, MD</i>
12:00 p.m. - 12:30 p.m.	Hemodynamic Monitoring <i>R. Phillip Dellinger, MD, FCCM</i>
12:30 P.M. - 1:45 P.M.	LUNCH ON OWN
1:45 p.m. - 2:45 p.m.	Board Review Session III <i>R. Phillip Dellinger, MD, FCCM; Henry Masur, MD, FCCM; Joseph E. Parrillo, MD, FCCM; Janice L. Zimmerman, MD, FCCM</i>
2:45 p.m. - 3:30 p.m.	Drug Overdoses <i>Janice L. Zimmerman, MD, FCCM</i>
3:30 p.m. - 4:00 p.m.	Hypothermia and Hyperthermia <i>Janice L. Zimmerman, MD, FCCM</i>
4:00 P.M. - 4:15 P.M.	BREAK
4:15 p.m. - 5:15 p.m.	Rhythm Recognition and Review <i>Bradley Knight, MD; Joseph E. Parrillo, MD, FCCM</i>
5:15 p.m. - 6:00 p.m.	Obstetrical Emergencies <i>Janice L. Zimmerman, MD, FCCM</i>

Friday, August 19, 2011

6:15 A.M. - 7:00 A.M.	CONTINENTAL BREAKFAST
7:00 a.m. - 8:00 a.m.	Congestive Heart Failure: Pathophysiology; Acute and Chronic Management <i>Joseph E. Parrillo, MD, FCCM</i>
8:00 a.m. - 8:45 a.m.	Blunt Trauma to Chest <i>Marc J. Shapiro, MD, FCCM</i>
8:45 a.m. - 9:30 a.m.	Stabilization of the Trauma Patient <i>Marc J. Shapiro, MD, FCCM</i>
9:30 a.m. - 10:15 a.m.	Ethical Dilemmas in the ICU <i>Robert D. Truog, MD, FCCM</i>
10:15 A.M. - 10:30 A.M.	BREAK

10:30 a.m. - 11:15 a.m.	Nutrition Support for the Critically Ill and Injured Patient <i>Richard G. Barton, MD</i>
11:15 a.m. - 12:00 p.m.	Endocrine Emergencies <i>James A. Kruse, MD</i>
12:00 P.M. - 1:30 P.M.	LUNCH ON OWN
1:30 p.m. - 2:30 p.m.	Board Review Session IV <i>Richard G. Barton, MD; James A. Kruse, MD; Henry Masur, MD, FCCM; Joseph E. Parrillo, MD, FCCM</i>
2:30 p.m. - 3:00 p.m.	Complications of Hematopoietic Stem Cell Transplantation <i>Richard Childs, MD</i>
3:00 p.m. - 3:15 p.m.	Case Vignettes: Management of Complicated Stem Cell Recipients <i>Richard Childs, MD</i>
3:15 P.M. - 3:30 P.M.	BREAK
3:30 p.m. - 4:15 p.m.	Antibacterial and Antiviral Therapy <i>Henry Masur, MD, FCCM</i>
4:15 p.m. - 4:45 p.m.	Thermal Injury: Burns and Smoke Inhalation <i>Jeffrey S. Guy, MD</i>
4:45 p.m. - 5:15 p.m.	Overview of Infectious Diseases You Should Know <i>Henry Masur, MD, FCCM</i>

Saturday, August 20, 2011

6:15 A.M. - 7:00 A.M.	CONTINENTAL BREAKFAST
7:00 a.m. - 7:45 a.m.	Board Review Session V <i>Cherylee W. Chang, MD; Henry Masur, MD, FCCM; Joseph E. Parrillo, MD, FCCM; Robert A. Weinstein, MD</i>
7:45 a.m. - 8:15 a.m.	Management of Severe Stroke and Subarachnoid Hemorrhage <i>Cherylee W. Chang, MD</i>
8:15 a.m. - 8:45 a.m.	Neuromuscular Respiratory Failure <i>Cherylee W. Chang, MD</i>
8:45 a.m. - 9:30 a.m.	Prevention of Nosocomial Infection in the ICU <i>Robert A. Weinstein, MD</i>
9:30 A.M. - 9:45 A.M.	BREAK
9:45 a.m. - 10:00 a.m.	Death by Neurologic Criteria <i>Cherylee W. Chang, MD</i>
10:00 a.m. - 10:30 a.m.	Intracranial Hypertension <i>Cherylee W. Chang, MD</i>
10:30 a.m. - 11:00 a.m.	Line Sepsis: Prevention and Management <i>Robert A. Weinstein, MD</i>
11:00 a.m. - 11:30 a.m.	Status Epilepticus <i>Cherylee W. Chang, MD</i>
11:30 a.m. - 12:00 p.m.	Fungal Disease in the ICU <i>Henry Masur, MD, FCCM</i>



Hotel Accommodations

Fairmont Chicago Millennium Park

200 North Columbus Drive
Chicago, Illinois 60601 USA
www.fairmont.com/chicago

Reservations: Call +1 312 565-6698 or visit
<https://resweb.passkey.com/go/2011sccm>.

SCCM Rate: \$234* Run-of-House
Single/Double Occupancy
*Rate does not include applicable taxes.



Experience the luxurious accommodations of the Fairmont Chicago Millennium Park hotel, a AAA Four-Diamond landmark, recognized for exceptional service and amenities on Condé Nast Traveler's Gold List and Travel & Leisure Magazine's Top 500 Hotels List. Hotel amenities include: stunning views of the Chicago lakefront, high speed wireless Internet access in all guest-rooms, full-service spa and fitness center, business center, concierge services, and delicious on-site dining.

While in Chicago, get out and see what makes this city "My Kind of Town" to so many. Summer is the perfect time to visit Chicago because there are numerous attractions and activities to see and do.

Located in the heart of the city, the Fairmont Chicago is within walking distance to some of the city's top attractions: **Millennium Park, Michigan Avenue, Lake Michigan, Navy Pier, the Art Institute, State Street, and**

the Museum Campus. To learn more about Chicago or to customize your itinerary, visit the Chicago Convention and Tourism Bureau's website at www.choosechicago.com.

Make your hotel reservation by **Monday, July 18, 2011**, to receive SCCM's discounted rate. Visit <https://resweb.passkey.com/go/2011sccm> or call +1 312 565-6698 and identify yourself as a participant in the Adult Multiprofessional Critical Care Board Review Course. Every effort will be made to honor all room preferences; however, requests cannot be guaranteed. All rooms are based on availability. Reservations made after **Monday, July 18, 2011**, may not receive the discounted rate. Reservations must be accompanied by a deposit equal to the first night's room and tax or guaranteed with a major credit card. Cancellations must be made at least 72 hours prior to your scheduled arrival to receive a refund of the deposit. Check-in time is 3:00 p.m. Check-out time is 12:00 p.m.



Travel to Chicago

To take advantage of travel discounts to Chicago for the 2011 Multiprofessional Critical Care Board Review Course, visit www.sccm.org/boardreview.

Registration Form

Adult Multiprofessional Critical Care Board Review Course

Fairmont Chicago Millennium Park, Chicago, Illinois, USA • August 16-20, 2011

Please type or print clearly. Please keep a copy of this form for your records.

Customer ID#: _____ Male Female
First Name: _____ Middle Initial: _____ Last Name/Surname: _____
Organization: _____ Address: _____
City: _____ State/Province: _____ Zip/Postal Code: _____
Country: _____ Address Type: Home Office
Phone: _____ Fax: _____ Email: _____
Please list all of your Degrees/Credentials (ex.: ACNP, MD, PharmD, RN, RRT, etc.): _____
Please list your Primary License/Board Certification (ex.: Registered Nurse, Internal Medicine): _____
Please list your Primary License/Board Certification year (ex.: 2001): _____

STEP 1: Course Registration Fees

Please check the appropriate classification.

Early (Act By June 22, 2011)

SCCM Members

- Physician \$920
- Healthcare Professional* \$615

Nonmembers

- Physician \$1160
- Healthcare Professional* \$740

Advance (Act by July 20, 2011)

SCCM Members

- Physician \$1020
- Healthcare Professional* \$715

Nonmembers

- Physician \$1275
- Healthcare Professional* \$855

On-Site (After July 20, 2011)

SCCM Members

- Physician \$1070
- Healthcare Professional* \$765

Nonmembers

- Physician \$1335
- Healthcare Professional* \$915

* Verification letter required with registration for fellows, residents and students to receive the Healthcare Professional rate.

STEP 2: Choose Your Course Materials*

Choose a format for your course materials

- Binder (Print) \$0
- USB Flash Drive* (Electronic) \$0
- Both Formats (Print and Electronic) \$50

*If an option is not selected, materials will be provided in USB flash drive (electronic) format. Flash drives are accessed via an attendee's computer.

STEP 3: Payment

Calculate your total

Course Registration \$ _____ + Course Materials \$ _____ = Total Amount Due:

\$ _____

Choose from four easy ways to register:

Online:

www.sccm.org/boardreview

Fax:

+1 847 493-6444

Phone:

+1 847 827-6888

Mail:

Society of Critical Care Medicine
35083 Eagle Way
Chicago, IL 60678-1350 USA

Advance registration will be accepted until July 20, 2011. Thereafter, registrations will be accepted on site only.

Payment Information:

Please send payment with registration form. Inquiries can be emailed to registration@sccm.org.

Check (must be U.S. funds drawn on a U.S. bank) **Credit Card:** American Express Discover MasterCard Visa

Card Number: _____ Expiration Date: _____

Cardholder Name: _____

Cardholder Signature _____ Date _____

If you have special needs related to a disability, please contact SCCM Customer Service at +1 847 827-6888 or via email at registration@sccm.org.

Cancellations must be submitted in writing. All cancellations are subject to a \$75 non-refundable processing fee and must be postmarked prior to July 20, 2011, to be eligible for a refund. Cancellations postmarked after this date will NOT be refunded. Dates for the Adult MCCBRC are subject to change and/or cancellation. In the event of cancellation, only individual registration fees will be reimbursed. Please allow four weeks to process refunds.



The Intensive Care Professionals

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10th Summer Conference in Intensive Care Medicine

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visit www.sccm.org/acutecardiaccare
or contact SCCM Customer Service
at **+1 847 827-6888**.



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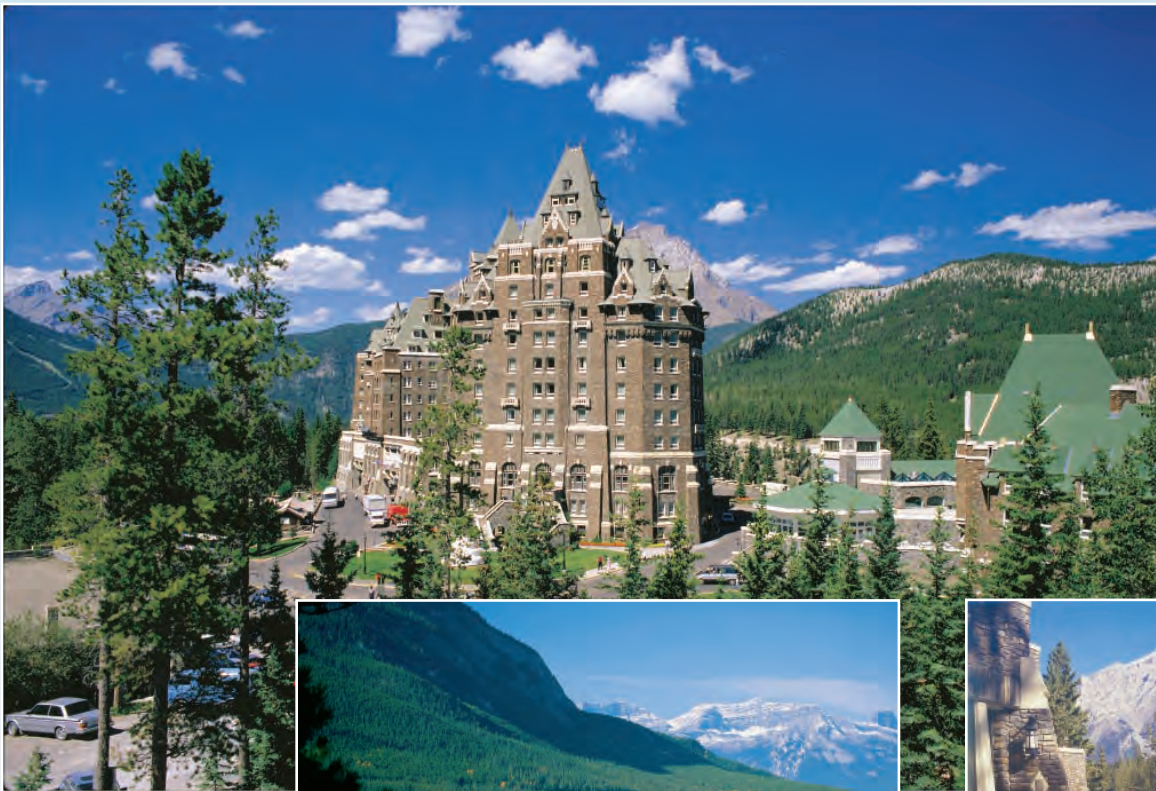
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OUR PROMISE

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Save at least \$65 off the conference registration fee! Members save up to 25% on educational programs and resources. For details on membership options and benefits, visit www.sccm.org/membership.

TIME IS MUSCLE WHEN CARDIAC COMPLICATIONS ARISE

Acute cardiac conditions are becoming increasingly prevalent in critical care units, not only as primary diagnoses, but also as comorbidities in a number of settings. Clinicians must possess the knowledge required to provide high quality care to patients with life-threatening cardiac conditions.

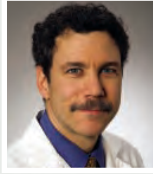
The Society of Critical Care Medicine's (SCCM) 10th Summer Conference in Intensive Care Medicine will focus on acute cardiac care and how to effectively diagnose, manage and treat cardiac complications in critically ill and injured patients. Prepare for hands-on workshops that include simulations, clinical case studies, multiple skill stations, pro-con debates, and didactic sessions. Experts from multiple disciplines will cover a variety of topics, including:

- Identification of patients most at risk for the development of acute cardiac complications
- Heart failure syndromes and appropriate therapies
- Pathophysiology and management of acute coronary syndromes and pulmonary hypertension
- Complications of ventricular assist devices and extracorporeal support
- Medications and dosing related to specific cardiac disease processes

Register today! See page 9, visit www.sccm.org/acutecardiaccare or contact SCCM Customer Service at +1 847 827-6888.

The diverse background of these renowned faculty members will offer a well-rounded perspective so you can make the best possible patient care decisions.

CONFERENCE CO-CHAIRS



Steven M. Hollenberg, MD, FCCM
Conference Co-Chair
Society of Critical Care Medicine
 Professor of Medicine
 Robert Wood Johnson Medical School
 UMDNJ Director/Coronary Care Unit
 Cooper University Hospital
 Camden, New Jersey, USA



Toby C. Trujillo, PharmD, BCPS (AQ Cardiology)
Conference Co-Chair
Society of Critical Care Medicine
 Associate Professor
 University of Colorado-Denver, School of Pharmacy
 Clinical Specialist - Cardiology/Anticoagulation
 University of Colorado Hospital
 Aurora, Colorado, USA

Jean-Daniel Chiche, MD
Conference Co-Chair
European Society of Intensive Care Medicine
 Service de Reanimation Medicale
 Paris, France

Alexandre Mebazaa, MD, PhD
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Jan IT Poelaert, MD, PhD
Conference Co-Chair
European Society of Intensive Care Medicine
 Chair and Director
 Department of Anesthesiology and Perioperative Medicine
 Acute and Chronic Pain Therapy
 University Hospital
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FACULTY

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 Department of Emergency Medicine
 Mount Sinai School of Medicine
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 Electrophysiologist
 The Cooper Health System
 Camden, New Jersey, USA

Yanick Beaulieu, MD, FRCPC
 Cardiologist-Echocardiographer, Intensivist
 Hôpital Sacré-Coeur de Montréal
 Director, Ultrasound Education, CAE Healthcare
 Assistant Professor, Université de Montréal
 Montréal, Québec, Canada

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Christi Burt, MA, FRCA
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 Director, Clinical Echocardiography
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 Chief of Perfusion
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 Vancouver, British Columbia, Canada

Jason Waechter, MD, FRCPC
 Foothills Hospital
 Departments of Anesthesia and Critical Care
 Calgary, Alberta, Canada

Florian Falter, MD, PhD, FRCA
 Papworth Hospital
 Cambridge, England, UK

Keith R. Walley, MD
 Professor, University of British Columbia
 St. Paul's Hospital
 Vancouver, British Columbia, Canada

John T. Granton, MD
 Toronto General Hospital
 Toronto, Ontario, Canada

Patricia Walley, RDCS
 Registered Diagnostic Cardiac Sonographer
 St. Paul's Hospital
 Vancouver, British Columbia, Canada

Target Audience

This program is intended for clinicians who are working in the intensive care unit (ICU) or who have an interest in learning more about assessing, diagnosing, treating, and monitoring the patient with cardiac problems. These clinicians include the following:

- Nurse Practitioners
- Nurse Specialists
- Pharmacists
- Physician Assistants
- Physicians
- Respiratory Therapists
- Staff ICU Nurses

Type of Activity

This activity is intended to help facilitate the cardiologic management of critically ill patients in your clinical practice and will include didactic sessions, case presentations, pro-con debates, audience participation, and question-and-answer sessions.

Learning Objectives

At the conclusion of the conference, participants should be able to:

- Identify ICU patients most at risk for acute cardiac complications in a number of settings
- Distinguish among different heart failure syndromes and tailor therapy appropriately, including both medical and surgical options
- Review the pathophysiology and management of acute coronary syndromes
- Review the pathophysiology of pulmonary hypertension and its treatment, particularly in the setting of concomitant left heart disease
- Identify indications for and complications of ventricular assist devices and extracorporeal support, with practical advice on initiating a program and troubleshooting devices
- Identify the latest information on medications and dosing for specific cardiac disease processes

Competencies

SCCM supports recommendations that will promote lifelong learning through continuing education. SCCM promotes activities that encourage the highest quality in education that will enhance knowledge, competence or performance in critical care practice. This activity will meet the following:

- Patient- and Family-Centered Care
- Practice Applications
- Communication
- Quality Improvement

Credit Hours

Physicians – Accreditation Statement: SCCM is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. Designation Statement: SCCM designates this live educational activity for a maximum of 18 *AMA PRA Category 1 credits*[™]. Physicians should only claim credit commensurate with the extent of their participation in the activity. This activity also meets the American Board of Surgery's requirements for self-assessment for MOC Part 2.

Nurses – This program has been approved by the California Board of Registered Nursing, Provider No. 8181, for up to 18 contact hours.



Pharmacists – SCCM is accredited by the Accreditation Council for Pharmacy Education (ACPE) as a provider of continuing pharmacy education. This course provides up to 18 contact hours of continuing education credit (0236-9999-11-220-L01-P). Pharmacists must complete the online verification form to confirm sessions attended. Upon completion of the online form, a statement of credit can be downloaded or emailed.

THURSDAY, JUNE 2, 2011

HEART FAILURE: WHAT'S NEW?

- 7:00 a.m. - 7:50 a.m. **Registration and Continental Breakfast**
- 7:50 a.m. - 8:00 a.m. **Welcome and Course Introduction**
- 8:00 a.m. - 10:00 a.m. **Heart Failure**
- Systolic Heart Failure
John R. Teerlink, MD, FACC, FAHA
 - Diastolic Heart Failure
Steven M. Hollenberg, MD, FCCM
 - Stress Cardiomyopathy
Jan IT Poelaert, MD, PhD
 - Laboratory-Directed Therapy: B-Type Natriuretic Peptide (BNP) and Friends
Alexandre Mebazaa, MD, PhD
 - Septic Cardiomyopathy
Keith R. Walley, MD
- 10:00 a.m. - 10:30 a.m. **Break and Exhibits**
- 10:30 a.m. - 11:30 a.m. **Medical Heart Failure Treatment**
- Current Concepts
John R. Teerlink, MD, FACC, FAHA
 - New Inotropes
Alexandre Mebazaa, MD, PhD
 - Organ Support: Noninvasive Ventilation (NIV), Continuous Venovenous Hemofiltration (CVVH) and Others
Keith R. Walley, MD
- 11:30 a.m. - 12:30 p.m. **Surgical Heart Failure Treatment**
- Short- and Long-Term Ventricular Assist Devices (VAD)
Florian Falter, MD, PhD, FRCA
 - ICU Care of the VAD Patient
Jean-Daniel Chiche, MD
 - Common VAD Complications
Alexandre Mebazaa, MD, PhD

AFTERNOON SESSIONS FOR FULL DAY REGISTRANTS

- 2:00 p.m. - 5:00 p.m. **Workshop: Echocardiography in the ICU**
- Transthoracic
 - Transesophageal
- Robert Arntfield, MD; Yanick Beaulieu, MD, FRCPC; Christi Burt, MA, FRCA; Steven M. Hollenberg, MD, FCCM; Jan IT Poelaert, MD, PhD; Stuart F. Reynolds, MD; John R. Teerlink, MD, FACC, FAHA; Jason Waechter, MD, FRCPC; Keith R. Walley, MD; Patricia Walley, RDCS*
- 2:00 p.m. - 5:00 p.m. **Workshop: Extracorporeal Membrane Oxygenation (ECMO) Simplified**
- How Do I Set Up an ECMO Program?
 - How Does My ECMO Circuit Work?
 - How Do I Wean My Patient from His Beloved ECMO?
- Neil Casey, CPC, ACP; Florian Falter, MD, PhD, FRCA; Alexandre Mebazaa, MD, PhD*

This program is supported by an unrestricted educational grant from



FRIDAY, JUNE 3, 2011

MYSTERIES OF THE HEART

- 7:00 a.m. - 7:50 a.m. **Registration and Continental Breakfast**
- 7:50 a.m. - 8:00 a.m. **Welcome and Introduction**
- 8:00 a.m. - 9:00 a.m. **Acute Coronary Syndromes (ACS)**
 - Initial Pharmacologic Management
Keith R. Walley, MD
 - Time Challenges in Reperfusion
John R. Teerlink, MD, FACC, FAHA
 - Platelet Function Testing
Toby C. Trujillo, BCPS, PharmD
- 9:00 a.m. - 10:00 a.m. **Fascinating Rhythms**
 - Common Rhythm Challenges
Matthew L. Ortman, MD
 - New Therapeutic Agents
Toby C. Trujillo, BCPS, PharmD
 - Interventional Strategies
Matthew L. Ortman, MD
- 10:00 a.m. - 10:30 a.m. **Break and Exhibits**
- 10:30 a.m. - 11:30 a.m. **Mysteries of the Right Heart**
 - Pulmonary Hypertension
John T. Granton, MD
 - Post-Transplant Right Ventricular Function
Stuart F. Reynolds, MD
 - Way-Out-of-Right Ventricular Failure with PH
John T. Granton, MD
- 11:30 a.m. - 12:30 p.m. **ECMO**
 - Scoop and Run in Europe
Jean-Daniel Chiche, MD
 - Scoop and Run in North America
Stuart F. Reynolds, MD
 - Where to Stick These Cannulas?
Florian Falter, MD, PhD, FRCA

AFTERNOON SESSIONS FOR FULL DAY REGISTRANTS

- 2:00 p.m. - 5:00 p.m. **Workshop: Echocardiography in the ICU**
 - Transthoracic
 - Transesophageal
Robert Arntfield, MD; Yanick Beaulieu, MD, FRCPC; Christi Burt, MA, FRCA; Steven M. Hollenberg, MD, FCCM; Jan IT Poelaert, MD, PhD; Stuart F. Reynolds, MD; John R. Teerlink, MD, FACC, FAHA; Jason Waechter, MD, FRCPC; Keith R. Walley, MD; Patricia Walley, RDCS
- 2:00 p.m. - 5:00 p.m. **Workshop: Extracorporeal Membrane Oxygenation (ECMO) Simplified**
 - How Do I Set Up an ECMO Program?
 - How Does My ECMO Circuit Work?
 - How Do I Wean My Patient from His Beloved ECMO?
Neil Casey, CPC, ACP; Florian Falter, MD, PhD, FRCA; Alexandre Mebazaa, MD, PhD

SATURDAY, JUNE 4, 2011

A LOOK INTO THE CRYSTAL BALL

7:00 a.m. - 7:50 a.m. **Registration and Continental Breakfast**

7:50 a.m. - 8:00 a.m. **Welcome and Introduction**

8:00 a.m. - 10:00 a.m. **What Does the Crystal Ball Say?**

- Stem Cell Therapy
Keith R. Walley, MD
- Your Genes on Your iPhone
Jean-Daniel Chiche, MD
- Chaos in Practice: Non-Linear Hemodynamics
Steven M. Hollenberg, MD, FCCM
- Remote Monitoring of Implantable Devices
Matthew L. Ortman, MD

10:00 a.m. - 10:30 a.m. **Break and Exhibits**

10:30 a.m. - 12:30 p.m. **Pro/Con: Pulmonary Artery Catheterization (PAC) for Hemodynamic Monitoring in Congestive Heart Failure**

- We NEED the PAC!
Steven M. Hollenberg, MD, FCCM
- No, We Don't
Jan IT Poelaert, MD, PhD

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Self-Parking: \$25 CAD overnight with in/out privileges

Reservations

Visit www.sccm.org/SummerConference to reserve your hotel room online. Or, contact the hotel via telephone at +1 403 762-6866 and identify yourself as a participant in SCCM's Summer Conference to receive SCCM's discounted rate. All rooms are based on availability. Every effort will be made to honor room preferences; however, requests cannot be guaranteed. Reservations made after April 29, 2011, may not receive the discounted rate. Reservations must be accompanied by a prepayment of the first night's room and tax or guaranteed with a major credit card. No-shows and cancellations received within less than 72 hours of arrival will be billed for one night's room and tax.



11/15/2012



DISCOUNTED AIRFARE TO BANFF (CALGARY INTERNATIONAL AIRPORT)



SCCM has arranged for discounted airfare with United Airlines for travel to the Summer Conference in Banff, Alberta, Canada. Take advantage of the following savings:

- Earn a 2% to 10% discount off applicable fares, including first-class fares.
- Purchase your ticket at least 30 days in advance of your scheduled travel and receive an additional 5% discount. This special offer applies to travel on domestic segments of all United Airlines, United Express, TED, and United code share flights (UA*) operated by US Airways, US Airways Express, Air Canada, and international segments on United and Lufthansa flights. Some restrictions apply.

Make your reservation now while the lowest fares are still available. Call United Airlines toll-free at +1 800 521-4041 for domestic travel or +1 800 538-2929 for international travel. Mention meeting ID 500ZD to receive SCCM travel discounts. If booking your flight online at www.united.com, enter 500ZD in the promotion field. Alternatively, you may contact Tzell Travel, SCCM's official travel agency, at +1 800 865-9037 between 9:00 a.m. and 5:30 p.m. Eastern Time for assistance with your travel needs. If calling after hours, dial +1 877 591-5822 and use code W-U7A.

TRANSPORTATION BETWEEN CALGARY INTERNATIONAL AIRPORT AND THE FAIRMONT BANFF SPRINGS

Let Banff Airporter take care of your transportation needs between Calgary International Airport and your accommodations at The Fairmont Banff Springs. Relax and enjoy the scenic and awe-inspiring beauty of the Canadian Rockies during the two-hour trip between the airport and the hotel. With 12 daily departures in each direction, wait times at the airport are minimal for door-to-door service.

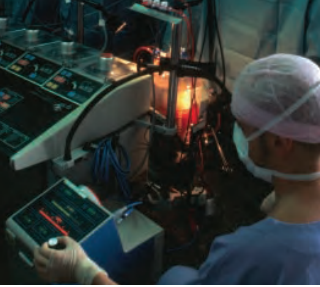
Visit www.banffairporter.com/conferences-cardiology to reserve your shuttle service online or call +1 888 449-2901 ext. 1 and identify yourself as a participant in the Society of Critical Care Medicine's Summer Conference to receive a 15% discount. Reservation agents are available 7 days a week, 8:00 a.m. - 6:00 p.m. (Mountain Time).

SCCM Discounted Rates*:

\$47.30 CAD per person, one way

\$94.61 CAD per person, round trip

*Prices include goods and services tax.



ACUTE CARDIAC CARE June 2-4, 2011

10th Summer Conference in Intensive Care Medicine

**THE FAIRMONT BANFF SPRINGS
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Conference Registration Fees (Please check the appropriate classification.)

			Early Rate (Act By 4/6/11)	Advance Rate (Act By 5/4/11)	On-Site Rate
Morning Sessions Only	MEMBER	<input type="checkbox"/> Physician	\$525	\$575	\$625
		<input type="checkbox"/> Healthcare Professional*	\$390	\$440	\$490
	NONMEMBER	<input type="checkbox"/> Physician	\$590	\$640	\$690
		<input type="checkbox"/> Healthcare Professional*	\$470	\$520	\$570
Morning Sessions with Afternoon Workshops	MEMBER	<input type="checkbox"/> Physician	\$1,215	\$1,295	\$1,375
		<input type="checkbox"/> Healthcare Professional*	\$1,015	\$1,095	\$1,175
	NONMEMBER	<input type="checkbox"/> Physician	\$1,415	\$1,495	\$1,575
		<input type="checkbox"/> Healthcare Professional*	\$1,215	\$1,295	\$1,375

Pre-registration will be accepted until May 4, 2011. Thereafter, registrations will be accepted on site only.

*Fellows and residents register at the Healthcare Professional rate. Training verification letter must accompany registration form for fellows, residents and students.

Choose from four easy ways to register:

For orders placed online or by phone, please have your credit card and customer ID ready.

ONLINE: www.sccm.org | **FAX:** +1 847 493-6444 | **PHONE:** +1 847 827-6888 | **MAIL:** Society of Critical Care Medicine
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Payment Information: Please send payment with registration form.

- Check payable to SCCM (must be U.S. funds drawn on a U.S. bank) or international money order
- Wire transfer (Please contact SCCM Customer Service for wire transfer information.)
- Credit Card: American Express Discover MasterCard Visa

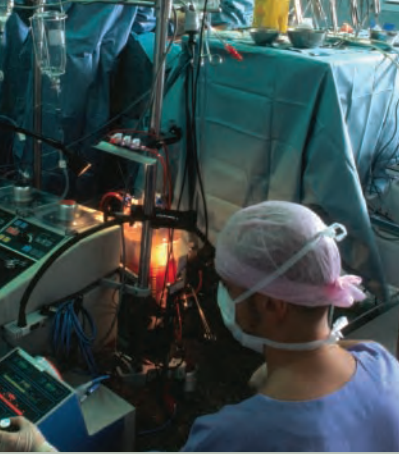
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Cardholder Signature: _____ Date: _____

CANCELLATION/REFUND POLICY – Cancellations must be submitted in writing. All cancellations are subject to a \$75 non-refundable processing fee, and must be postmarked prior to May 4, 2011, to be eligible for a refund. Cancellations postmarked after this date will **NOT** be refunded. The dates for 10th Summer Conference in Intensive Care Medicine are subject to 15/2011 and/or cancellation. In the event of cancellation, only individual registration fees will be reimbursed. Please allow four weeks to process refunds.

If you have special needs related to a disability please contact SCCM Customer Service at +1 847 827-6888 or via email at registration@sccm.org. Page 414 of 441



ACUTE CARDIAC CARE

10th Summer Conference in Intensive Care Medicine

THE FAIRMONT BANFF SPRINGS
BANFF, ALBERTA, CANADA
June 2-4, 2011

Society of
Critical Care Medicine



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at **+1 847 827-6888**.





P.L.A.N.® search detail

Course Title Joint Session SCCM/ESICM
UAN 0236-0000-12-85-L01-P
Contact Hours (CEUs): 1 (0.1)
Initial Release Date: 2/7/2012
Expiration Date: 2/7/2015
Provider: Society of Critical Care Medicine
Primary Contact: N/A
Email: dalberson@sccm.org
Phone: (847) 827-6869
Fax: (847) 827-6886
Website: www.sccm.org
Address: 500 Midway Drive
 Mount Prospect, IL 60056

Learning Objectives (Pharmacy): At the completion of this activity, the participant will be able to:
 1. Determine the roles of the neuroendocrine system in sepsis
 2. Compare and contrast methods for hemodynamic monitoring in sepsis
 3. Identify immunosuppression in septic patients
 4. Utilize appropriate methods to protect the gut in critical illness

Live Program Information

Date	Format	Location	Cancelled
2/7/2012	Seminar	Houston	No

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 The information that is listed for this activity is current. If the information should change you will be notified by the provider.



P.L.A.N.® search detail

Course Title Critical Care PRN Focus Session?Adverse Drug Events in the ICU: Learn Using High Fidelity Patient Simulation Cases

UAN 0217-0000-11-091-L05-P

Contact Hours (CEUs): 1.5 (0.15)

Initial Release Date: 10/18/2011

Expiration Date: 10/18/2014

Provider: American College of Clinical Pharmacy

Primary Contact: Ms. Nancy K Perrin

Email: nperrin@accp.com

Phone: (913) 492-3311

Fax: (913) 492-0088

Website: www.accp.com

Address: 13000 W. 87th St. Parkway
Lenexa, KS 66215

Learning Objectives (Pharmacy): At the completion of this activity, the participant will be able to:

1. Discuss ADEs that are unrecognized in the ICU.
2. Describe the management of ADEs discussed in simulated cases.
3. Identify drug-induced ADEs in complex cases.

Live Program Information

Date	Format	Location	Cancelled
10/18/2011	Seminar	Pittsburgh -- www.accp.com/am	No

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P.L.A.N.® search detail

Course Title Curricular Track I?Manipulation of the Immune System in Transplantation and Oncology

UAN 0217-0000-11-086-L01-P

Contact Hours (CEUs): 1.5 (0.15)

Initial Release Date: 10/18/2011

Expiration Date: 10/18/2014

Provider: American College of Clinical Pharmacy

Primary Contact: Ms. Nancy K Perrin

Email: nperrin@accp.com

Phone: (913) 492-3311

Fax: (913) 492-0088

Website: www.accp.com

Address: 13000 W. 87th St. Parkway
Lenexa, KS 66215

Learning Objectives (Pharmacy): At the completion of this activity, the participant will be able to:

1. Review current trends in transplant immunosuppression.
2. Discuss strategies for managing T and B cell activation.
3. Differentiate immunosuppressive regimens based on the recipient?s disease state and organ transplanted
4. Review the evolving therapies in oncology targeting the immune system.
5. Describe how immunomodulatory agents are incorporated either as single agent or in combination with chemotherapy in the treatment of cancer.

Live Program Information

Date	Format	Location	Cancelled
10/18/2011	Seminar	Pittsburgh -- www.accp.com/am	No

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P.L.A.N.® search detail

Course Title (ACHS #2075) 8th Annual Critical Care Conference
UAN 0797-0000-12-001-L04-P
Contact Hours (CEUs): 7.25 (0.725)
Initial Release Date: 1/19/2012
Expiration Date: 1/19/2015
Provider: Annenberg Center for Health Sciences at Eisenhower
Primary Contact: N/A
Email: cwatlet@annenberg.net
Phone: (760) 773-4500
Fax: (760) 773-4513
Website: www.annenberg.net
Address: 39000 Bob Hope Drive
 Rancho Mirage, CA 92270-3298

Learning Objectives (Pharmacy):
 At the completion of this activity, the participant will be able to:
 1- Provide examples from films illustrating ethics issues pertaining to professional behaviors
 2- Articulate concepts for the treatment of patients with ARDS
 3- Understand the applications for use of Ultrasound in Critical Care
 4- Identify concepts for the use of Therapeutic Hypothermia after Cardiac Arrest
 5- Recognize patients who suffer from poisoning and identify treatment used in the care of these patients
 6- Interpret acid base imbalances with information provided at conference

Live Program Information

Date	Format	Location	Cancelled
4/21/2012	Seminar	Rancho Mirage	No

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P.L.A.N.® search detail

Course Title Inhaled Drug Therapy in the ICU: Just Blowing Smoke or the Real Deal?
UAN 0204-0000-11-264-L01-P
Contact Hours (CEUs): 2 (0.2)
Initial Release Date: 12/7/2011
Expiration Date: 12/7/2014
Provider: American Society of Health-System Pharmacists
Primary Contact: Ms. JoAnn Stacy A Harris, B.S.
Email: jharris@ashp.org
Phone: (301) 664-8755
Fax: (301) 634-5855
Website: www.ashp.org
Address: 7272 Wisconsin Avenue
 Bethesda, MD 20814

Learning Objectives (Pharmacy):

1. Evaluate the general principles of aerosol therapy and delivery technology.
2. Apply the evidence to support aerosolized antimicrobial agents as a viable therapeutic option for the treatment of pulmonary infections.
3. Recommend appropriate inhaled drug therapy regimen and therapeutic plan in the ICU patient with pulmonary arterial hypertension.

Live Program Information

Date	Format	Location	Cancelled
12/7/2011	Seminar	New Orleans	No

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 The information that is listed for this activity is current. If the information should change you will be notified by the provider.

Critical Care Pharmacist Signatures

Electronic Signatures from Critical Care Pharmacists in support of
the Petition to BPS to Recognize Critical Care Pharmacy Practice as a Specialty

Dorota Szarlej, BCPS
Neurosurgery Critical Care Clinical
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900 Walnut St.
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High Point Regional Health System

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Electronic Signatures from Critical Care Pharmacists in support of
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Electronic Signatures from Critical Care Pharmacists in support of
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Electronic Signatures from Critical Care Pharmacists in support of
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Jamey Dodge, RPh
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Electronic Signatures from Critical Care Pharmacists in support of
the Petition to BPS to Recognize Critical Care Pharmacy Practice as a Specialty

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