

Position Paper on Critical Care Pharmacy Services: 2020 Update

Ishaq Lat, PharmD, FCCM, FCCP¹; Christopher Paciullo, PharmD, FCCM, FCCP, BCCCP²; Mitchell J. Daley, PharmD, FCCM, BCPS^{3,4}; Robert MacLaren, PharmD, MPH, FCCM, FCCP⁵; Scott Bolesta, PharmD, FCCM, FCCP, BCPS⁶; Jennifer McCann, PharmD, BCCCP⁷; Joanna L. Stollings, PharmD, FCCM, FCCP, BCCCP, BCPS^{8,9}; Kendall Gross, PharmD, BCPS, BCCCP¹⁰; Sarah A. Foos, PharmD, BCCCP¹¹; Russel J. Roberts, PharmD, FCCM, BCCCP, BCPS¹²; Nicole M. Acquisto, PharmD, FCCP, BCCCP^{13,14}; Scott Taylor, PharmD, MS, BCPS¹⁵; Michael Bentley, PharmD, FCCM, FCCP^{16,17}; Judith Jacobi, PharmD, MCCM, FCCP, BCCCP¹⁸; Tricia A. Meyer, PharmD, MS, FASHP, FTSHP^{19,20}

¹Department of Pharmacy Services, Shirley Ryan Ability Lab, Chicago, IL.

²Shields Health Solutions, Stoughton, MA.

³Dell Seton Medical Center at the University of Texas, Austin, TX.

⁴Dell Medical School at the University of Texas, Austin, TX.

⁵Department of Pharmacy Practice, Skaggs School of Pharmacy, University of Colorado, Aurora, CO.

⁶Department of Pharmacy Practice, Nesbitt School of Pharmacy, Wilkes University, Wilkes-Barre, PA.

⁷Department of Pharmacy Practice, School of Pharmacy and Health Sciences, Butler University, Indianapolis, IN.

⁸Department of Pharmaceutical Services, Vanderbilt University Medical Center, Nashville, TN.

⁹Critical Illness, Brain Dysfunction, and Survivorship (CIBS) Center, Nashville, TN.

¹⁰Department of Pharmacy, UCSF Health, San Francisco, CA.

¹¹Department of Pharmacy Services, OhioHealth Doctors Hospital, Columbus, OH.

¹²Department of Pharmacy, Massachusetts General Hospital, Boston, MA.

¹³Department of Pharmacy, University of Rochester Medical Center, Rochester, NY.

¹⁴Department of Emergency Medicine, University of Rochester Medical Center, Rochester, NY.

¹⁵Steward Health Care, Dallas, TX.

¹⁶Virginia Tech Carilion School of Medicine, Roanoke, VA.

¹⁷AstraZeneca Pharmaceuticals, Wilmington, DE.

¹⁸Visante Inc., St. Paul, MN.

¹⁹Baylor Scott and White Health-Temple Region, Temple, TX.

²⁰Department of Anesthesiology, Texas A&M College of Medicine, Temple, TX.

For information regarding this article, e-mail: ilat@sralab.org

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Objectives: To provide a multiorganizational statement to update recommendations for critical care pharmacy practice and make recommendations for future practice. A position paper outlining critical care pharmacist activities was last published in 2000. Since that time, significant changes in healthcare and critical care have occurred.

Design: The Society of Critical Care Medicine, American College of Clinical Pharmacy Critical Care Practice and Research Network, and the American Society of Health-Systems Pharmacists convened a joint task force of 15 pharmacists representing a broad cross-section of critical care pharmacy practice and pharmacy administration, inclusive of geography, critical care practice setting, and roles. The Task Force chairs reviewed and organized primary literature, outlined topic domains, and prepared the methodology for group review and consensus. A modified Delphi method was used until consensus (> 66% agreement) was reached for each practice recommendation. Previous position statement recommendations were reviewed and voted to either retain, revise, or retire. Recommendations were categorized by level of ICU service to be applicable by setting and grouped into five domains: patient care, quality improvement, research and scholarship, training and education, and professional development.

Main Results: There are 82 recommendation statements: 44 original recommendations and 38 new recommendation statements. Thirty-four recommendations represent the domain of patient care, primarily relating to critical care pharmacist duties and pharmacy services. In the quality improvement domain, 21 recommendations address the role of the critical care pharmacist in patient and medication safety, clinical quality programs, and analytics. Nine recommendations were made in the domain of research and scholarship. Ten recommendations were made in the domain of training and education and eight recommendations regarding professional development.

Conclusions: Critical care pharmacists are essential members of the multiprofessional critical care team. The statements recommended by this taskforce delineate the activities of a critical care pharmacist and the scope of pharmacy services within the ICU. Effort should be made from all stakeholders to implement the recommendations provided, with continuous effort toward improving the delivery of care for critically ill patients.

Since the formation of the first ICU in the 1930s to present day, the field of critical care medicine has evolved and increased in complexity.¹ In parallel, clinical

pharmacy practice advanced from a dispensary role to one primarily of medication management. In the 1940s, pharmacists began attending interprofessional rounds and became more involved in the clinical aspects of care.² In the intervening decades, critical care pharmacy developed into a distinct subspecialty within pharmacy practice, with specialized training and credentials. As the subspecialty evolved so too did the need for practice standards. The first position paper on critical care pharmacy services was published in 2000 and described pharmacy services that were foundational, desirable, and optimal.³ A subsequent survey of 1,034 ICUs to evaluate critical care pharmacy services found lower level services were commonly provided but desirable or optimal activities were inconsistent.⁴ Rapid progress in the field of pharmacotherapy, improvement in the application of technology, workforce trends, and evolution of healthcare delivery necessitate a continual assessment of practice standards in an effort to best serve patients. Since that first position paper, critical care medicine has continued to progress to the extent that the recommendation statements from the original position paper may no longer apply or need revision to be relevant for the current practice environment.

The purpose of this position paper is to delineate the activities of a critical care pharmacist and the scope of pharmacy services within the ICU. Critical care pharmacist activities and pharmacy services are categorized by the level of critical care services offered. We aim to provide recommendations on pharmacy practice for the current critical care environment. With an increasing emphasis placed on value in healthcare, a secondary objective of this position paper is to provide the means to demonstrate the value of a critical care pharmacist by describing activities that can be used by pharmacy administrators and hospital executives to measure and report. Finally, this position paper intends to serve as a guideline for critical care pharmacy practice for the coming decade.

The task force determined that guideline recommendations should be inclusive of pharmacy services across the continuum of critical illness. Therefore, the position paper addresses activities of the individual critical care pharmacist and those best

served by pharmacy administrators. These individuals and members of the multiprofessional team should design comprehensive pharmacy services that meet the pharmacotherapy needs of the critically ill patient. The success of the multiprofessional critical care team is contingent on the support of administrators and executives. This model relies on collaborative engagement in care delivery designed to best serve patients, while promoting the needs of patients and staff to improve institutional performance.

METHODS

A task force was created in January 2015 to review, and revise, the existing position paper on critical care pharmacy services. The Society of Critical Care Medicine (SCCM), American College of Clinical Pharmacy (ACCP) Critical Care Practice and Research Network, and the American Society of Health-System Pharmacists (ASHP) were contacted to support this work. The task force included 15 members representing a broad cross-section of critical care pharmacy practice (hospital, academia, administration, urban, rural, and clinical practice setting) and the membership of SCCM, ACCP, and ASHP. Task force members convened in-person at the SCCM Annual Congress in February 2016 and subsequently held a series of conference calls to vote on statements using a modified Delphi method, refine verbiage, and generate the article text.

There are three notable modifications in this article that differ from the previous recommendations.³ The first is a simplification from three levels of recommendations (fundamental, desirable, and optimal) to two (foundational and desirable). The task force felt this was necessary to improve interpretation and implementation of these recommendations. Consistent with the original position paper, foundational activities are those services or activities deemed essential to critical care practice. Therefore, foundational services should be interpreted not as the minimum level of service or activities, but rather, those activities that serve as the core of critical care pharmacy services and provide the underpinning of care from which to expand pharmacy services. Additionally, desirable services or activities are those deemed to be “value added”; they

are not as essential but extend the scope of practice toward a higher level. The second modification to this position paper was to use existing guidance for delivery of critical care services and assign recommendations to each level of ICU service.⁵ Level I critical care services are defined as ICUs that provide complete care for a wide range of disorders requiring intensive care, deliver comprehensive support services, and generally fulfill an academic mission. Level II critical care services provide comprehensive care but may not have the resources to care for specific populations and may not have an academic mission. Level III critical care services provide initial stabilization of critically ill patients, but do not offer comprehensive critical care. In recognition of the varying levels of critical care services, some activities are not possible, or needed, at all types of healthcare systems. Similarly, pharmacy departments for institutions with some level II and likely all level III ICUs are not staffed with the same number of personnel. In this way, the task force sought to provide recommendations that were specific to the level of resources available at each institution and are immediately relevant to practitioners, administrators, and executives. Throughout the article, the terms “critical care pharmacist,” “pharmacist,” and “designee” are used. The “critical care pharmacist” is intended to denote the pharmacist who is specialty trained and dedicated as a resource to delivering critical care pharmacy services. The “pharmacist” is intended to denote a generalist pharmacist who provides prospective order review and clinical services within their scope and expertise when a critical care pharmacist is not present. In those instances where the services of a “critical care pharmacist” may not be available, the statement would default to “pharmacist.” The “designee” is intended to denote a pharmacy resident or student pharmacist completing a practice experience under the supervision of the critical care pharmacist or pharmacist. It is not intended to suggest that such activities can or should be carried out solely by designees without a supervising pharmacist.

The task force identified five domains to describe critical care pharmacy services: 1) patient care; 2) quality improvement; 3) research and scholarship; 4) training and education; and 5) professional development. The task force co-chairs (I.L., C.P.)

completed an initial literature review using PubMed with relevant search terms (“critical care,” “pharmacy,” and “pharmacotherapy”), collated references by section, and provided them to the task force to review. The literature review was broad and inclusive as the purpose was to ensure that all task force members were aware of current critical care pharmacy practices. The body of literature was expanded by members of the task force. Due to the lack of strong evidence, the task force sought to make recommendations using a modified Delphi method. All task force members were considered pharmacy experts and the co-chairs acted as facilitators, circulating anonymized responses and comments after each round of voting. There were no predefined stopping criteria. Voting continued until consensus was reached on a specific guideline statement, or it was retired. Experts rated statements on a 1–9 Likert scale, with a score of 1 indicating strong disagreement and 9 indicating strong agreement, with incremental levels of agreement in between. The scores were then grouped into tertiles, with the score range of 1–3 indicating disagreement, 4–6 indicating neutral, and 7–9 indicating agreement. Consensus was defined as greater than 66% of task force members agreeing on each statement and recommendation level according to the level of critical care services (I, II, or III). Task force co-chairs initiated the first phase of voting by circulating previously published guideline statements to determine if existing recommendation statements required revision or no longer applied in the current healthcare environment and, therefore, should be retired (Table 1). If a consensus was reached on the need for revision, the task force chairs revised statements and proposed additional rounds of voting until consensus was reached by the task force. If consensus was reached determining retirement of a previously published statement with greater than 66% of the Task Force voting to “retire,” the statement was excluded from new guidelines. Reasons for retiring a statement were primarily based on the consensus that the statement no longer applied to the current practice environment either due to regulatory requirements or technologic advancement. Once previous recommendation statements were either retired or revised, co-chairs moved to phase 2 by soliciting new guideline recommendations from panel experts. New recommendations were grouped

by domain. If two or more new recommendation statements submitted by task force members were similar, the phrasing of these statements was revised by the facilitators for another round of voting. Consensus was reached on all statements following the second round of voting (Table 2). In the third round, recommendation statements were approved as “foundational” or “desirable” and assigned level of critical care services (Table 3). Each domain was then organized into written statement recommendations followed by brief discussion, supported by evidence, when available, from additional literature searches. The deliberations and voting from the Task Force resulted in 82 recommendation statements and eight recommendation statements from the previous position paper.

PATIENT CARE

Recommendations

1. The critical care pharmacist regularly makes rounds as a member of the interdisciplinary critical care team to provide comprehensive medication management (CMM) for all ICU patients.

Level I: Foundational

Level II: Foundational

Level III: Desirable

2. As part of the interdisciplinary team, the critical care pharmacist assists healthcare professionals in discussions with patients and/or family members to help make informed decisions regarding pharmacotherapy options.

Level I: Foundational

Level II: Foundational

Level III: Desirable

3. The critical care pharmacist provides pertinent, comprehensive drug information to the critical care team.

Level I: Foundational

Level II: Foundational

Level III: Foundational

4. The critical care pharmacist provides drug therapy–related education to critical care team members.

Level I: Foundational

Level II: Foundational

Level III: Desirable

5. The pharmacist collaborates with the healthcare team to prevent potentially inappropriate drug therapy.

Level I: Foundational

Level II: Foundational

Level III: Foundational

6. The critical care pharmacist provides clinical consultation to the care team, both within and outside the ICU, for pharmacotherapeutic issues related to critical illness.

Level I: Foundational

Level II: Foundational

Level III: Foundational

7. Medication-related consults (i.e., pharmacotherapeutic and pharmacokinetic) are available 24 hr/d, 7 d/wk to all critically ill patients.

Level I: Foundational

Level II: Desirable

Level III: Desirable

8. The critical care pharmacist provides pharmacokinetic monitoring and therapeutic adjustments when a targeted drug is prescribed.

Level I: Foundational

Level II: Foundational

Level III: Foundational

9. The critical care pharmacist reviews the medication history to determine which maintenance medications should be continued during the acute illness.

Level I: Foundational

Level II: Foundational

Level III: Desirable

10. The pharmacist assists with medication reconciliation for ICU patients at the time of ICU admission, transfer from the ICU to the ward, or discharge to home or facility.

Level I: Foundational

Level II: Foundational

Level III: Foundational

11. When reviewing orders for verification, the critical care pharmacist prospectively evaluates all drug therapy for appropriate indication, dose, drug interactions, drug allergies, and monitors the patient's pharmacotherapeutic regimen for effectiveness and adverse drug events (ADEs), and intervenes as needed.

Level I: Foundational

Level II: Foundational

Level III: Foundational

12. The critical care pharmacist educates patients and/or patients' care givers regarding medication therapies used to treat patients during and after acute illness, as appropriate.

Level I: Foundational

Level II: Foundational.

Level III: Desirable

13. The pharmacist performs independent patient assessment (e.g., pain/agitation/delirium, nutrition).

Level I: Foundational

Level II: Desirable

Level III: Desirable

14. A pharmacist certified in advanced cardiac life support (ACLS; or pediatric advanced life support [PALS]) responds to all resuscitation events in the hospital 24 hr/d, 7 d/wk.

Level I: Foundational

Level II: Foundational

Level III: Desirable

15. The pharmacist responds, or coordinates pharmacist response to all resuscitation and time-dependent emergencies in the hospital, including, but not limited to cardiac arrest, rapid response, trauma response, hemorrhagic shock, sepsis response, and acute neurologic life support.

Level I: Foundational

Level II: Foundational

Level III: Desirable

16. The pharmacist provides routine stewardship activities targeted at anti-infectives and other medications, including those that may be high risk for adverse events, high-cost concerns, and inappropriate utilization (e.g., factor products, anticoagulants, sedatives, acid-suppressive therapies).

Level I: Foundational

Level II: Foundational

Level III: Foundational

17. The critical care pharmacist collaborates with other pharmacists (e.g., emergency medicine, infectious diseases, transplant, oncology), as needed, to address patient- and disease-specific therapeutic issues.

Level I: Foundational

Level II: Foundational

Level III: Foundational

18. In conjunction with the clinical dietitian, the critical care pharmacist reviews the nutrition therapy plan and recommends modifications as indicated to optimize the nutritional regimen.
Level I: Foundational
Level II: Desirable
Level III: Desirable
19. The critical care pharmacist uses the medical record as one means to communicate with other healthcare professionals, and/or to document specific pharmacotherapeutic recommendations or activities.
Level I: Foundational
Level II: Foundational
Level III: Foundational
20. The critical care pharmacist uses appropriate documentation tools to demonstrate their impact on patient care and economic value.
Level I: Foundational
Level II: Foundational
Level III: Foundational
21. Critical care pharmacists document pertinent collaborative medication management problems and progress notes daily.
Level I: Desirable
Level II: Desirable
Level III: Desirable
22. The critical care pharmacist documents clinical activities that include, but are not limited to, disease state management, general pharmacotherapeutic monitoring, pharmacokinetic monitoring, ADEs, education, and other patient care activities.
Level I: Foundational
Level II: Foundational
Level III: Foundational

23. The critical care pharmacist acts as a liaison between the pharmacy department and the interdisciplinary team to educate health professionals regarding current drug-related policies, procedures, guidelines, and pathways.
- Level I: Foundational*
- Level II: Foundational*
- Level III: Foundational*
24. The critical care pharmacist uses pharmacoeconomic analyses in conjunction with the interdisciplinary team to evaluate existing/new pharmacy services and the place of new drugs in critical care pharmacotherapy.
- Level I: Foundational*
- Level II: Foundational*
- Level III: Desirable*
25. The critical care pharmacist is proactive in designing, prioritizing, and promoting new clinical pharmacy programs and services.
- Level I: Foundational*
- Level II: Foundational*
- Level III: Desirable*
26. Pharmacy administrators evaluate clinical programs/services for stakeholder satisfaction, significance, and economic value.
- Level I: Foundational*
- Level II: Foundational*
- Level III: Foundational*
27. The critical care pharmacist prepares and presents drug therapy monographs and formulary reviews to the Pharmacy and Therapeutics committee for medications used in the care of critically ill patients.
- Level I: Desirable*
- Level II: Desirable*

Level III: Desirable

28. The pharmacist should participate in planning and implementation of processes for disaster, or mass casualties, scenarios as applicable to the critically ill patient.

Level I: Foundational

Level II: Foundational

Level III: Desirable

29. The majority of the critical care pharmacist's time is dedicated to critical care services, with few commitments, outside of critical care activities.

Level I: Foundational

Level II: Foundational

Level III: Desirable

30. Critical care pharmacists will have the majority of their clinical activity focused in the care of the critically ill population.

Level I: Foundational

Level II: Foundational

Level III: Desirable

31. Decentralized clinical pharmacy services in the ICU should include routine and consistent patient care coverage, inclusive of day, evening, and weekend coverage.

Level I: Foundational

Level II: Foundational

Level III: Desirable

32. Critical care pharmacy services are developed as "teams," with multiple critical care pharmacists available, to deliver consistent and quality collaborative medication management.

Level I: Foundational

Level II: Foundational

Level III: Desirable

33. In the absence of an onsite critical care pharmacist, CMM may be supplemented through telemedicine.

Level I: Desirable

Level II: Desirable

Level III: Desirable

34. The ICU pharmacist-to-patient ratio is defined based on patient acuity and complexity in addition to the scope of clinical and operational services provided.

Level I: Foundational

Level II: Foundational

Level III: Desirable

Discussion

The value of the critical care clinical pharmacist-to-patient care is well established.⁶⁻⁹ Medication management is the most frequent decision category on patient care rounds; therefore, pharmacists on rounds have the opportunity to facilitate CMM and prevent ADEs.¹⁰ An ADE is defined as an injury resulting from the use of a drug and can result in a wide range of consequences. A landmark trial justified the presence of a critical care pharmacist on rounds by reducing rates of preventable ADEs by 66% with a 99% acceptance rate for medication management recommendations.¹¹ An observational multicenter study in the United Kingdom identified approximately one of every six medication orders in the ICU required an intervention from a pharmacist, with two thirds rated as moderate to high impact.¹² Specifically, available evidence suggests enhanced patient safety and clinical outcomes with involvement of a pharmacist in the management of the following therapeutic domains: antimicrobial therapy, anticoagulation, pharmacokinetic dosing, pain/agitation/delirium, and emergency response.¹³⁻³¹ Application of activities generally considered foundational has been shown to reduce overall hospital mortality across 885 hospitals.³² Evolving evidence continues to support the benefit of a critical care pharmacist internationally with a broadening scope of practice in adult/PICUs and within various subspecialty critical care

practices or post-ICU care clinics.^{9, 12, 33–38} In the era of value-based care with rapidly rising medication costs, the economic impact of the critical care pharmacist has also been described.^{11, 19, 22, 39–41} It has been estimated that the return on investment of a critical care pharmacist approaches 25:1 in patients with infection.¹⁹ Decentralized critical care pharmacists may achieve cost avoidance in excess of \$200,000 per year when compared with centralized practice models.⁴⁰ A more conservative estimate of benefit up to \$5 per \$1 in labor costs would still represent a substantial benefit, considering the high cost of medications in critical care, averaging 31% of a hospital's total drug cost.^{42, 43} Evolving literature over the last several decades has demonstrated the clinical and pharmacoeconomic impact the critical care pharmacist has when providing direct patient care. As a result, the critical care pharmacist is recognized as an essential member of the interdisciplinary team by pharmacy and interprofessional organizations.^{3, 5, 44–48}

Many services that were deemed “desirable” in the recommendations published in 2000 are now considered foundational activities, reflecting the progression of the profession in general and the growing body of literature that supports the role of a critical care pharmacist to positively affect therapy. Active participation of a critical care pharmacist in patient care rounds and within an interprofessional team is foundational at level I and II institutions (statement 1). Participation in rounds facilitates provision of CMM through review of medication orders for appropriateness and safety (statements 9–11), allows collaboration and communication of recommendations regarding the therapy plan (statements 5, 6, 17–21), and provides drug information (statements 2, 3, 12) and education to the interdisciplinary critical care team (statement 4, 23). Institutions with level III critical care services may not have formal rounds, but the critical care pharmacist or pharmacist should strive to review individual patient care plans and make recommendations, provide drug information, and educate the critical care staff.

Given that critical care pharmacists have demonstrated improvements in clinical and economic outcomes, it is essential that they are optimally deployed to maximize

their benefit for the care of critically ill patients, such as the management of drugs with therapeutic monitoring to achieve pharmacologic endpoints (statements 7, 8, 13–16).^{6–9, 11, 19, 22, 39, 40, 47} The critical care pharmacist thoroughly reviews individual patient pharmacotherapy needs, inclusive of prior to critical illness and postdischarge, and communicates recommendations to the critical care team to facilitate transitions of care (statements 9 and 10). The role of the critical care pharmacist continues to evolve since its transition from a pure dispensing role to clinical or hybrid clinical-operational roles, including involvement in multidisciplinary rounds, CMM, medication safety, quality improvement, protocol development, transitions of care, emergency response/resuscitation, patient and family communication, education, management of drug shortages and recalls, research, disaster preparedness, and prescribing once a diagnosis is made (statements 22, 24, 25, 27, 28).^{3, 8, 10, 47, 49–58}

The ASHP Practice Advancement Initiative (PAI) recommends institutions to determine drug therapy management services for consistent delivery by pharmacists, devote resources to the provision of those services, and assign pharmacists to patient care units.⁴⁷ At the very least, it is deemed foundational at level I and II institutions that the majority of a critical care pharmacist's time is dedicated to the ICU and focused on clinical activities, and that the staffing model provides consistent critical care pharmacist coverage (statements 29, 30). Recent surveys report that only 43.5–62.2% of ICUs have pharmacists assigned to care for ICU patients along with significant variability in clinical activities, institutional type, and ICU bed allocation.^{4, 59} Ideally, critical care pharmacist coverage would be available 24 hr/d, 7 d/wk (statement 31). However, since economic and personnel constraints limit many institutions, it is recommended that institutions prioritize critical care pharmacy services to patients with the highest acuity and extend daily coverage to evening hours at a minimum.^{60, 61}

One approach to facilitate consistent coverage (foundational activity at level I and II institutions) is to develop teams of critical care pharmacists (statement 32).^{3, 60} As critical care pharmacy services expand to include the development of critical care pharmacist teams, it may be prudent to create critical care team leadership positions.

The team leader can ensure establishment of cohesive and best practice pharmacy services, mentor the team of pharmacists, and lead the critical care pharmacy team in creation of clinical programs and development of team goals to optimize critical care pharmacy services. Pharmacy services may be designed to align with subspecialty critical care services in hospitals (e.g., medical, surgical, neuro, cardiac, trauma, burn) necessitating pharmacists with differing daily responsibilities to provide patient-centered care. Academic critical care pharmacists especially benefit from a team of pharmacists and designees to maintain consistent services. Additionally, resource-limited ICUs may choose to supplement coverage with critical care pharmacist participation through telemedicine services (statement 33). Recent reports have highlighted critical care pharmacist involvement in telepharmacy services and demonstrated that their involvement contributes to improved scores on process measures.^{29, 62, 63} Establishing appropriate ICU pharmacist-to-patient ratios is foundational at level I and II institutions (statement 34). Bond and Raehl³² described an association between clinical pharmacist-to-occupied bed ratio and lower mortality, but limited data are available to guide optimal ratios. Critical care pharmacist-to-patient ratios have been suggested in literature, although evidence is sparse and further research is needed.^{8, 64} Determinations regarding coverage and service design should be based on patient acuity and complexity and the scope of pharmacist services to ensure that critical care pharmacists are allocated time to perform the full range of patient care and other services associated with improved outcomes.

Although a single model will not meet the needs of all critical care practice settings, key components of ideal practice models outlined in the PAI and the literature can apply across practice settings.^{10, 47, 48, 53, 54, 61, 65–70} It is recommended that each site determines how to best incorporate these recommendations such that every ICU patient receives CMM by a critical care pharmacist (statement 26).

QUALITY IMPROVEMENT

Recommendations

1. The critical care pharmacist serves as the medication safety leader for critically ill patients by identifying potential ADEs, resolving existing ADEs, and improving medication use practices.

Level I: Foundational

Level II: Foundational

Level III: Foundational

2. The critical care pharmacist assists with the management of ADEs and develops process improvements to reduce and/or prevent medication errors.

Level I: Foundational

Level II: Foundational

Level III: Foundational

3. The critical care pharmacist participates in reporting ADEs to institutional committees and national programs (e.g., the Food and Drug Administration Medwatch program).

Level I: Foundational

Level II: Foundational

Level III: Foundational

4. The critical care pharmacist is involved in continual evaluation of the availability of critical medications through optimization of automated dispensing cabinets.

Level I: Foundational

Level II: Foundational

Level III: Foundational

5. The critical care pharmacist should be involved as a team member in the design process for building a new or remodeling critical care area.

Level I: Desirable

Level II: Desirable

Level III: Desirable

6. The critical care pharmacist implements and maintains departmental policies and procedures related to safe and effective use of medications in the ICU.
Level I: Foundational
Level II: Foundational
Level III: Foundational
7. The critical care pharmacist coordinates the development and implementation of ICU-focused drug therapy protocols, guidelines, order sets, and/or care pathways to maximize benefits of pharmacotherapy.
Level I: Foundational
Level II: Foundational
Level III: Desirable
8. The pharmacist independently investigates or collaborates with other critical care healthcare team members to evaluate the impact of drug therapy protocols, guidelines, order sets, and/or care pathways used in the ICU (e.g., drug administration, disease state management algorithms).
Level I: Foundational
Level II: Desirable
Level III: Desirable
9. The critical care pharmacist leads or provides consultation to hospital committees when critical care pharmacotherapy issues are discussed.
Level I: Foundational
Level II: Foundational
Level III: Desirable
10. The critical care pharmacist serves on and provides consultation to hospital committees when critical care pharmacotherapy issues are discussed.
Level I: Foundational

Level II: Foundational

Level III: Foundational

11. The critical care pharmacist contributes to the hospital newsletter and drug monographs, on issues related to medication use in the ICU.

Level I: Foundational

Level II: Foundational

Level III: Desirable

12. The critical care pharmacist identifies and evaluates drug cost minimization opportunities and implements cost containment measures.

Level I: Foundational

Level II: Foundational

Level III: Desirable

13. The critical care pharmacist is involved in identifying local quality metrics for continuous quality improvement (e.g., risk-adjusted mortality, medication errors per medications ordered/dispensed, mechanical ventilation duration, delirium, mobilization).

Level I: Foundational

Level II: Desirable

Level III: Desirable

14. The critical care pharmacist participates in quality assurance programs to enhance collaborative medication management, minimize costs, provide ongoing evaluation of current processes, and identify the need for new programs/processes.

Level I: Foundational

Level II: Foundational

Level III: Desirable

15. The critical care pharmacist shares responsibility for hospital performance for quality and process measure compliance, such as core measures and other hospital metrics (e.g., *Clostridium difficile* infection

rates, vaccinations, patient satisfaction surveys), as it relates to critical care patients.

Level I: Foundational

Level II: Foundational

Level III: Desirable

16. The critical care pharmacist collaborates with medical staff, nursing, other members of the healthcare team, and hospital administration to prepare the ICU for accreditation and to address any deficiencies identified.

Level I: Foundational

Level II: Foundational

Level III: Desirable

17. Pharmacy space and facilities in the ICU are regularly assessed to determine whether efficiency can be improved, where applicable.

Level I: Foundational

Level II: Desirable

Level III: Desirable

18. Real-time dashboard, or analytics monitoring, of quality metrics and drug utilization are available for the pharmacist to review for patient care and research.

Level I: Desirable

Level II: Desirable

Level III: Desirable

19. Safety technology is implemented, inclusive of bedside barcode scanning, clinical decision support systems, and intelligent IV infusion devices in the routine care of critically ill patients.

Level I: Foundational

Level II: Foundational

Level III: Foundational

20. Medication use systems have the ability to:
 - i. create and maintain patient medication profiles;
 - ii. interface with patient laboratory data and other relevant test results;
 - iii. interface with patient charts (medication profiles) from other health systems and outpatient clinics;
 - iv. alert users to drug allergies;
 - v. alert users to medication maximum dose limits;
 - vi. alert users to medications prior to admission;
 - vii. alert users to diagnoses;
 - viii. alert users to drug-drug and drug-food/nutrient interactions;
 - ix. alert users to formulary and nonformulary medications as well as approved substitutions;
 - x. alert users to pertinent medication shortages; and
 - xi. provide live, real-time data that can be incorporated in pharmacotherapy decision-making.

Level I: Foundational

Level II: Foundational

Level III: Foundational

21. The hospital information management system is computerized, is able to comply with those requirements listed for medication use processes, and has the ability to:
 - i. allow direct provider order entry;
 - ii. interface with bedside clinical information systems in real time;
 - iii. alert users to disease state-drug and drug-drug interactions;
 - iv. provide IV admixture information (e.g., compatibility, stability, preparation);
 - v. provide medication information via references or internal guidelines/documents;

- vi. allow documentation of pharmacy patient care interventions;
- vii. provide benchmarking and quality data;
- viii. access to policies and procedures related to medications;
- ix. interface with mobile devices; and
- x. provide patient-specific treatment algorithms.

Level I: Foundational

Level II: Foundational

Level III: Foundational

Discussion

As many as 98,000 people die in hospitals each year due to preventable medical errors.⁷¹ In the ICU, medication errors represent the most common type of medical error and often lead to ADEs.^{72, 73} When compared with non-ICUs, the rate of preventable and potential ADEs occur twice as often in critical care settings.⁷⁴ More worrisome is that for every fifth dose of administered medications, one preventable error will occur, most commonly due to dose omission, incorrect dose, incorrect drug or technique, or interaction.⁷⁵ Only recently, guidelines for the safe use of medication in the ICU have been introduced.⁷⁶ Our recommendation regarding implementation of barcode medication administration provides the same intent as these guidelines while noting the weak nature of the existing evidence.

Optimizing safe medication use requires involvement of the critical care pharmacist throughout the entire medication use process (statements 2, 3, 6). Whether by rounding with the ICU team or developing ICU-focused policies and procedures, protocols, guidelines, order sets, and pathways, these functions are considered foundational for critical care pharmacists (statements 7, 8, 20). Other areas of pharmacist involvement include the implementation and maintenance of safe medication technologies (e.g., bedside barcode scanning, computerized prescriber order entry, and intelligent IV infusion devices), clinical decision support, and surveillance programs (statements 19, 21).⁷⁷⁻⁷⁹ Given that most errors in the ICU are medication related, pharmacists are uniquely positioned to lead the healthcare team in preventing,

identifying, and investigate the cause of errors and make recommendations to prevent future events from occurring (statements 1, 9–11).

Stemming from involvement in institutional committees and from the pharmacist's role on the interprofessional team, critical care pharmacists have become involved in quality improvement initiatives, assisted in determining and meeting various quality metrics and performance measures, and promoted adherence to guidelines and protocols (statements 4, 8, 13, 18). Numerous studies have demonstrated the critical care pharmacist's role in implementation and maintenance of compliance with various quality improvement initiatives.^{25, 26, 30, 80–84} Additionally, pharmacists have promoted appropriate utilization of stress ulcer prophylaxis,^{85, 86} adherence to a vasopressin protocol,⁸⁷ reduction of door to needle time for tissue plasminogen activator,⁸⁸ reduction in ADEs,¹¹ reducing the risk of QTc interval prolongation,⁸⁹ improvement in patient safety,⁹⁰ and a decrease in drug-drug interactions.⁹¹ Similarly, committee involvement and clinical practice experience enable critical care pharmacists to facilitate rapid access to critical medications for emergency scenarios (statements 5, 16, 17).^{5, 92} Pharmacist participation in accreditation surveys is necessary to fulfill certain regulatory standards (statement 15).

One of the principle responsibilities of critical care pharmacists regarding quality improvement is assurance of high-quality cost-effective care (statements 12–14). The American College of Critical Care Medicine critical care services and personnel guidelines recommend pharmacists implement and maintain policies and procedures regarding safe and effective medication use.⁵ It has been found that critical care pharmacists reduce medication cost while maintaining appropriate treatment.^{19, 22, 38, 87, 93–96} Critical care pharmacists are equipped with select knowledge and skills useful in determining the most cost-effective use of medications in the ICU, while still maintaining quality of care and patient outcomes.⁹⁷

RESEARCH/SCHOLARSHIP

Recommendations

1. The pharmacist is actively involved in critical care pharmacotherapy research, including, but not limited to, developing and reviewing study proposals, screening and/or enrollment of patients, publication of study results, and serving as a Principal Investigator, co-investigator, study coordinator, or contact person, where applicable.
Level I: Desirable
Level II: Desirable
Level III: Desirable
2. The pharmacist contributes to the pharmacy and medical literature (e.g., case reports, letters to the editor, and therapeutic, pharmacokinetic, and pharmaco-economic reports).
Level I: Desirable
Level II: Desirable
Level III: Desirable
3. The pharmacist reports research results to the pharmacy and medical community at regional, national, and international meetings.
Level I: Desirable
Level II: Desirable
Level III: Desirable
4. The pharmacist participates in research design and data analysis.
Level I: Desirable
Level II: Desirable
Level III: Desirable
5. The pharmacist secures funds for conducting research.
Level I: Desirable
Level II: Desirable
Level III: Desirable
6. The critical care pharmacist participates as a key investigator for critical care research.

Level I: Foundational

Level II: Desirable

Level III: Desirable

7. Critical care pharmacists are actively involved in collaborating in multicenter research projects.

Level I: Desirable

Level II: Desirable

Level III: Desirable

8. The profession of pharmacy is represented on the Institutional Review Board and/or Scientific Review Board, as applicable.

Level I: Foundational

Level II: Desirable

Level III: Desirable

9. The pharmacist contributes to the medical literature as a peer reviewer.

Level I: Desirable

Level II: Desirable

Level III: Desirable

Discussion

In contrast to many of the clinical pharmacy services that are rated by the taskforce as foundational, those involving research/scholarship are considered desirable across all ICU levels of services for eight of nine statements. This suggests that the scope of activities provided by the pharmacist should extend beyond clinical services, many of which are now engrained in patient care, to functions that include research/scholarship, especially at level I ICUs.⁷

The two research/scholarship functions that are rated as “foundational” are representation of the pharmacist on the Institutional/Scientific Review Board and participation of the pharmacist as a key investigator, both only at level I ICUs (statements 6 and 8). The only function related to research/scholarship that was rated as “foundational” in the position paper published in 2000 was the representation of a

pharmacist on the Institutional/Scientific Review Board.³ It should be noted that unlike the 2000 paper, the current taskforce did not address the role of the pharmacist in providing Investigational Drug Services, as these functions are carried out in accordance with the Good Clinical Practice Guidelines as mandated by the Code of Federal Regulations and should be “foundational” activities at all institutions.⁹⁸

Many pharmacists already actively engage in research/scholarship, so it is not surprising that the taskforce recognized the pharmacist as a key investigator as a foundational service, albeit only at level I ICUs. The term “key investigator” in this sense is meant to describe the investigator who conceived the project and is responsible for its completion. In many cases, project results may never be disseminated beyond the home institution, so presenting at scientific meetings or contributing to the medical literature are considered “desirable” activities. The results of a survey of ICU pharmacy functions conducted over a decade ago showed nearly half (45.5%) of pharmacists engage in research in high-level roles.⁴ However, many of the pharmacists responding to this survey practiced in level I ICUs, so it is not evident that these services are commonly provided across all ICUs. Many granting agencies and research practices promote multidisciplinary involvement in research/scholarship. Therefore, it is highly likely in the future that the level and scope of pharmacy services related to research/scholarship will continue to expand to the extent that many more activities will become foundational across all ICUs.

It is expected that demand by other healthcare disciplines for pharmacists to directly engage in functions involving research/scholarship will increase as pharmacists possess unique knowledge and skills about study design, data analyses, and pharmacotherapy application in research.⁹⁹ The results of another survey of ICU providers and pharmacists showed nonpharmacist providers consistently valued the clinical and financial impact of all pharmacy services, including those involving research/scholarship.¹⁰⁰ It will be incumbent on the profession of pharmacy to ensure that critical care pharmacists are appropriately trained to deliver the functions of research/scholarship across all ICUs.

TRAINING/EDUCATION

Recommendations

1. The critical care pharmacist provides an interprofessional experience in training and mentoring pharmacy students, residents, and fellows through experiential critical care rotations.

Level I: Foundational

Level II: Foundational

Level III: Desirable

2. The critical care pharmacist supports postgraduate residencies and/or fellowship training in critical care pharmacy practice.

Level I: Foundational

Level II: Foundational

Level III: Desirable

3. Critical care pharmacy trainees should be evaluated on educational outcomes and documented experiences to demonstrate competence for a given subject.

Level I: Foundational

Level II: Foundational

Level III: Foundational

4. The pharmacist participates in the education of pharmacy students, residents, and/or fellows by serving as a project advisor.

Level I: Desirable

Level II: Desirable

Level III: Desirable

5. The critical care pharmacist provides education to health professional students and trainees pertinent to critical care pharmacotherapy.

Level I: Foundational

Level II: Foundational

Level III: Desirable

6. The critical care pharmacist provides formal accredited interprofessional educational sessions (such as medical grand rounds or intensive care rounds).
Level I: Desirable
Level II: Desirable
Level III: Desirable
7. The pharmacist has an active role in interdisciplinary simulation activities.
Level I: Desirable
Level II: Desirable
Level III: Desirable
8. The critical care pharmacist is a certified instructor and provides certification classes to other healthcare providers (ACLS, PALS, emergency neurologic life support [ENLS], as applicable)
Level I: Desirable
Level II: Desirable
Level III: Desirable
9. The pharmacist develops and implements training programs for personnel working in the ICU.
Level I: Foundational
Level II: Desirable
Level III: Desirable
10. The pharmacist identifies and educates medical and community groups about the role of pharmacists as part of the interdisciplinary healthcare team in the ICU.
Level I: Desirable
Level II: Desirable
Level III: Desirable

Discussion

An interdisciplinary, collaborative approach to patient care is necessary as the complexity of healthcare expands, especially in the critical care population. Consequently, education of healthcare professions should be interprofessional to foster interactions that enhance the practice of each individual discipline within the team (statements 1, 4). The ACCP position statement on interprofessional education and practice supports interprofessional learning and skills development, an understanding of respective disciplinary roles, mutual respect, and a sustained commitment to interprofessional learning and patient care.¹⁰¹ Therefore, the critical care pharmacist should be deeply involved in interprofessional training and these activities are considered foundational for critical care pharmacists practicing in level I ICUs and foundational or desirable for level II and III ICUs (statements 1–4, 8). Direct patient care experience for trainees provides invaluable opportunity to develop and refine problem-solving abilities, accountability, efficiency, build confidence, understand clinical disease and pharmacotherapy, and to mature professionally. Practical skills training is foundational, as opposed to didactic education (statement 4, 5, 10).¹⁰² Trainees can facilitate expansion of clinical services or support clinical programs in areas that are underserved, and critical care pharmacist participation in training programs is considered foundational for level I and II ICUs (statement 3). The fact that many of these educational services are deemed “foundational” represents advancements in practice as all educational and training activities were considered desirable or optimal services in the recommendations published in 2000.³

The critical care pharmacist should provide interprofessional experiences to trainees but also create and deliver education to all members of the team. As highlighted in the statements (statements 6–9), this may include the interdisciplinary critical care team, other community healthcare members, or through certification classes or simulation activities. These activities are considered desirable, in addition to the core foundational activities recommended above. The ACCP white paper on interprofessional education provides environment specific models, assessment

methods, and important implications and barriers to the application of interprofessional education for the clinical pharmacist.¹⁰³

Finally, to accomplish the vision of ACCP and ASHP that all entry-level hospital pharmacists will complete postgraduate residency training, or have sufficient hospital experience, prior to entering practice, the critical care pharmacist should develop opportunities and support the infrastructure of first- and second-year residency programs and fellowships (statement 3).^{104, 105}

PROFESSIONAL DEVELOPMENT

Recommendations

1. The pharmacist maintains a mastery of knowledge related to current resources and primary literature pertinent to critical care pharmacotherapy.
Level I: Foundational
Level II: Foundational
Level III: Desirable
2. The pharmacist maintains certification in available life-support courses (e.g., ACLS, PALS, ENLS, advanced trauma life support [ATLS—audit], and advanced burn life support [ABLS]), as applicable to practice.
Level I: Foundational
Level II: Foundational
Level III: Desirable
3. Pharmacists practicing extensively in critical care will seek board certification in critical care pharmacy when eligible.
Level I: Foundational
Level II: Foundational
Level III: Desirable
4. The pharmacist is involved in non-patient care activities, including interdisciplinary committees and educational lectures.
Level I: Foundational

Level II: Foundational

Level III: Desirable

5. The pharmacist provides formal accredited educational sessions at local, regional, state, and national meetings.

Level I: Foundational

Level II: Foundational

Level III: Desirable

6. The critical care pharmacist is a member of a professional critical care organization, in addition to pharmacy organizations.

Level I: Foundational

Level II: Foundational

Level III: Desirable

7. Pharmacy administrators should provide protected time for critical care pharmacists to facilitate education, administrative, research, and scholarly activities.

Level I: Foundational

Level II: Desirable

Level III: Desirable

8. Pharmacy administrators should create mechanisms for critical care pharmacists to develop their career and professional role within a health system.

Level I: Foundational

Level II: Foundational

Level III: Desirable

Discussion

To provide CMM to their patients, critical care pharmacists require appropriate preparation (statement 1). The goals and objectives of a postgraduate year 2 critical care pharmacy residency are a starting point, along with basic credentials such as the life-support certifications (e.g., ACLS, PALS, ENLS, ATLS, and ABLIS) for any practitioner

who participates in resuscitation activities (statements 2–3). Required competency of a clinical pharmacist has been defined and includes six essential domains, including board certification.¹⁰⁶ Thus, board certification in critical care pharmacotherapy is a foundational credential for critical care pharmacists in level I and II settings, and board certification in general pharmacotherapy is a desirable competency for any pharmacist practicing direct patient care in the hospital (statement 3). Board certification ensures high-quality–continuing education, provides a recognized minimum credential for direct patient care, and is becoming a required credential in hospitals.¹⁰⁷ Board certification may increase pharmacist credibility within the critical care team, as a parallel to the medical model. The Board of Pharmacy Specialties credential of Board Certified Critical Care Pharmacist is most applicable. However, alternative or additional board certifications may be appropriate for a critical care pharmacist practicing in subspecialized areas (e.g., pediatrics, nutritional support).

Employers benefit from highly competent staff and should facilitate the development process and create privileging standards and rewards.¹⁰⁷ A career recognition process with medical staff/hospital privileging creates a standardized platform for “top of the license” practice and allows for prescribing and other practice benefits in a variety of practice settings.⁵¹ Pharmacy department leaders will need to demonstrate strong leadership and advocacy to achieve a credentialing and privileging process. A standard template for evaluation of the many practice-related, educational, and scholarly activities of a clinical pharmacist should be implemented.¹⁰⁸

Professionalism and scholarly activity can be further encouraged through the provision of protected time to attend meetings and participate in scholarly activities as a component of critical care pharmacist career development and is a foundational need in level I settings (statements 4–8). Ensuring ongoing competence and professional development is essential to ensure ongoing high-quality practice and is foundational in level I and II settings. Membership in critical care organizations creates opportunities for foundational, high-level professional education (statement 6).

The completion of tasks related to professional development will increase visibility of the pharmacist and their employer and facilitates peer recognition both within and outside of pharmacy (statement 5, 7–8). Activities can include scholarly efforts such as conducting research and publishing in respected journals. The pharmacist should be actively engaged in providing pharmacy and interdisciplinary education, further establishing one's self as the medication expert at the local, regional, state, national, and international level. Active membership and involvement in critical care organizations and pharmacy-specific organizations are important and foundational for level I and II and can provide opportunities for education, appointment or election to offices, committee participation, and nominations for various awards and fellowship status. Although recognition enhances the image of the individual pharmacist, the opportunity to network and work to support the profession can enhance their effectiveness as a practitioner.

SUMMARY

Through multiorganizational collaboration among the SCCM, American Society of Health-Systems Pharmacists, and ACCP, this article provides an updated roadmap for establishing and refining critical care pharmacy services in the form of 82 statement recommendations. Informed by task force members from various critical care and administrative practice settings, these guidelines address the various domains of critical care pharmacy practice. Guideline recommendation statements were generated through a rigorous process of literature evaluation and debate.

Technology, regulation, and the services and role of pharmacists continue to evolve within the healthcare setting. Critical care pharmacists have been leaders in defining their roles and provided the framework for these statements. Although this is a potential limitation of this document, and may appear self-serving, it also creates a framework to stimulate self-reflection. This document is an important tool that critical care practitioners and administrators should use to evaluate progress toward the highest levels of activity within the realms of patient care, quality improvement, research and scholarship, training and education, and professional development.

Although limited resources may impact optimal implementation within any setting, these statements can serve as a roadmap to the highest level of care. It is hoped that practitioners will continue to document their roles and impact on patient outcome to make this an ongoing process.

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Table 1. Round 1 Task Force Panel Voting.

Activity	Ratings 1–3	Ratings 4–6	Ratings 7–9
The pharmacist's time is dedicated to critical care patients, with few commitments outside the ICU area.	0	0	15
The pharmacist prospectively evaluates all drug therapy for appropriate indication, dose, drug interactions, drug allergies, and monitors the patient's pharmacotherapeutic regimen for effectiveness and ADEs, and intervenes as needed.	0	0	15
In conjunction with the clinical dietitian, the pharmacist evaluates all orders for parenteral nutrition and recommends modifications as indicated to optimize the nutritional regimen.	0	8	7
The pharmacist identifies and assists in the management and prevention of ADE; the pharmacist develops process improvements to reduce medication errors and preventable ADEs.	0	0	15
The pharmacist uses the medical record as one means to communicate with other healthcare professionals, and to document specific pharmacotherapeutic recommendations.	1	1	13
The pharmacist provides pharmacokinetic monitoring when a targeted drug is prescribed.	0	0	15
The pharmacist provides drug information and IV compatibility information to the ICU team and uses the regional poison information center when indicated.	1	1	13
The pharmacist maintains current tertiary drug references. ^a	3	2	10
The pharmacist provides drug therapy–related education to ICU team members.	0	0	15
The pharmacist participates in reporting ADEs to institutional committees and to the Food and Drug Administration Medwatch program.	0	1	14
The pharmacist documents clinical activities that include, but are not limited to, disease state management, general pharmacotherapeutic monitoring, pharmacokinetic	0	1	14

monitoring, ADEs, education, and other patient care activities.			
The pharmacist acts as a liaison among pharmacy, nursing, and the medical staff to educate health professionals regarding current drug-related policies, procedures, guidelines, and pathways.	0	1	14
The pharmacist contributes to the hospital newsletter and drug monographs, on issues related to medication use in the ICU.	1	4	10
The pharmacist implements and maintains departmental policies and procedures related to safe and effective use of medications in the ICU.	0	3	12
The pharmacist collaborates with nursing, medical staff, and hospital administration to prepare the ICU for the Joint Commission on the Accreditation of Healthcare Organizations survey and responds to any deficiencies identified.	0	3	12
The pharmacist provides consultation to hospital committees such as Pharmacy and Therapeutics, when critical care pharmacotherapy issues are discussed.	0	1	14
The pharmacist identifies how drug costs may be minimized through appropriate use of drugs in the ICU and through implementation of cost containment measures.	0	2	13
The pharmacist participates in quality assurance programs to enhance pharmaceutical care.	0	1	14
The pharmacist regularly makes rounds as a member of the multidisciplinary critical care team (if available) to provide pharmacotherapeutic management for all ICU patients.	0	3	12
The pharmacist maintains knowledge of current primary references pertinent to critical care pharmacotherapy.	0	0	15
The pharmacist reviews the medication history to determine which maintenance medications should be continued during the acute illness. a. The pharmacist clarifies previously effective doses and dosage regimens. b. For all suspected drug-related ICU admissions, the pharmacist assesses the patient medication history for causality and documents any findings that will impact patient management in the medical record.	0	2	13
In collaboration with the clinical dietitian, the pharmacist provides formal nutrition consultation on request and responds within 24 hr.	3	7	5

The advanced cardiac life support–certified (or pediatric advanced life support certified for pediatrics) pharmacist responds to all resuscitation events in the hospital 7 d/wk, 24 hr/d.	0	1	14
The pharmacist provides didactic lectures to health professional students in critical care pharmacology and therapeutics, where applicable.	0	5	10
The pharmacist participates in training pharmacy students, residents, and fellows through experiential critical care rotations, where applicable.	0	2	13
The pharmacist coordinates the development and implementation of drug therapy protocols and/or critical care pathways to maximize benefits of drug therapy.	0	0	15
The pharmacist uses a documentation program that attaches both a clinical significance and economic value to clinical interventions.	1	4	10
The pharmacist is actively involved in critical care pharmacotherapy research by assisting in the screening and enrollment of patients, and by serving as a study coordinator or contact person, where applicable.	2	8	5
The pharmacist participates in research design and data analysis, where applicable.	0	4	11
The pharmacist contributes to the pharmacy and medical literature (e.g., case reports, letters to the editor, and therapeutic, pharmacokinetic, and pharmaco-economic reports).	0	4	11
The pharmacist is involved in non–patient care activities, including multidisciplinary committees and educational inservices.	0	2	13
The pharmacist assists physicians in discussions with patients and/or family members to help make informed decisions regarding treatment options.	1	8	6
The pharmacist provides formal accredited educational sessions (such as medical grand rounds or intensive care rounds) for medical staff, students, and residents.	0	4	11
The pharmacist participates in teaching advanced cardiac life support.	3	9	3
The pharmacist develops residencies and/or fellowships in critical care pharmacy practice.	0	3	12
The pharmacist develops and implements pharmacist and pharmacy technician training programs for personnel working in the ICU.	1	6	8

The pharmacist identifies and educates lay groups and medical personnel in the community about the role of pharmacists as part of the multidisciplinary healthcare team in the ICU.	2	8	5
The pharmacist independently investigates or collaborates with other critical care practitioners to evaluate the impact of guidelines and/or protocols used in the ICU for drug administration and management of common disease states.	0	2	13
The pharmacist uses pharmacoeconomic analyses to prospectively evaluate existing/new pharmacy services and the place of new drugs in critical care pharmacotherapy.	0	6	9
The pharmacist is proactive in designing, prioritizing, and promoting new pharmacy programs and services.	0	1	14
The pharmacist secures funds for conducting research.	3	11	1
The pharmacist reports results of clinical research and pharmacoeconomic analyses to the pharmacy and medical community at regional and national meetings.	1	3	11
The pharmacist publishes in peer-reviewed pharmacy and medical literature as a result of any of the following activities: a clinical research or other original research that qualitatively and quantitatively evaluates drug therapy and the provision of pharmacy service; b investigator-initiated grants and contracts; and c pharmacoeconomic and outcomes research	0	2	13
Medication use systems have the ability to: a create and maintain patient medication profiles; b interface with patient laboratory data; c alert users to drug allergies; d alert users to maximum dose limits; and e alert users to drug-drug and drug-food/nutrient interactions.	0	2	13
If manual medication administration records are the only available medication administration record document, quality assurance systems are in place to verify the accuracy of this process. ^a	2	2	11
A "ready to administer" (unit-dose) drug distribution system is available in the ICU with no more than a 24-hr supply for each patient. ^a	0	3	12

Large- and small-volume parenteral products are prepared in the pharmacy and delivered at regularly scheduled time intervals to the patient care area 7 d/wk. ^a	0	2	13
Pharmacy space and facilities in the ICU are regularly assessed to determine whether efficiency can be improved, where applicable.	0	4	11
Procurement, storage, inventory, and distribution of investigational drugs, where applicable, are under the supervision of a pharmacist. ^a	0	1	14
The pharmacy department is represented on the Institutional Review Board and/or Scientific Review Board, as applicable.	0	2	13
The hospital information management system is computerized, is able to comply with those requirements listed for medication use processes, and has the ability to: <ul style="list-style-type: none"> a. alert users to disease state-drug interactions; b. provide IV admixture information (compatibility, stability, preparation, etc); c. provide online drug and poison information; and d. document clinical pharmacy patient care interventions. 	0	2	13
Computerized medication administration records are generated. Manual medication administration records are only used in emergencies. ^a	0	1	14
An ICU satellite pharmacy with unit-dose drug distribution and IV admixture capabilities is open a minimum of 40 hr/wk. ^a	4	7	4
The computerized hospital information management system serving the ICU has the following additional capabilities: <ul style="list-style-type: none"> a. direct physician medication order entry at the patient bedside; and b. interface with bedside clinical information system. 	0	2	13
An ICU satellite pharmacy with unit-dose drug distribution and IV admixture capabilities is open 24 hr/d, 7 d/wk. ^a	5	8	2

ADE = adverse drug event.

^aDenotes retired statement.

Table 2. Round 2 Voting, With New Recommendation Statements.

Activity	Ratings 1–3	Ratings 4–6	Ratings 7–9
The pharmacist's time is dedicated to critical care patients, with few commitments outside the ICU area.	0	0	15
The pharmacist prospectively evaluates all drug therapy for appropriate indication, dose, drug interactions, drug allergies, and monitors the patient's pharmacotherapeutic regimen for effectiveness and ADEs, and intervenes as needed.	0	0	15
In conjunction with the clinical dietitian, the pharmacist evaluates all orders for parenteral nutrition and recommends modifications as indicated to optimize the nutritional regimen.	0	8	7
The pharmacist identifies and assists in the management and prevention of ADE; the pharmacist develops process improvements to reduce medication errors and preventable ADEs	0	0	15
The pharmacist uses the medical record as one means to communicate with other healthcare professionals, and to document specific pharmacotherapeutic recommendations.	1	1	13
The pharmacist provides pharmacokinetic monitoring when a targeted drug is prescribed.	0	0	15
The pharmacist provides drug information and IV compatibility information to the ICU team and uses the regional poison information center when indicated.	1	1	13
The pharmacist provides drug therapy–related education to ICU team members.	0	0	15
The pharmacist participates in reporting ADEs to institutional committees and to the Food and Drug Administration Medwatch program.	0	1	14
The pharmacist acts as a liaison among pharmacy, nursing, and the medical staff to educate health professionals regarding current drug-related policies, procedures, guidelines, and pathways.	0	1	14
The pharmacist contributes to the hospital newsletter and drug monographs, on issues related to medication use in the ICU.	1	4	10
The pharmacist implements and maintains departmental policies and procedures related to safe and effective use of medications in the ICU.	0	3	12
The pharmacist collaborates with nursing, medical staff, and hospital administration to prepare the ICU for the Joint Commission on the Accreditation of Healthcare Organizations survey and responds to any deficiencies identified.	0	3	12
The pharmacist provides consultation to hospital committees, such as Pharmacy and Therapeutics, when critical care pharmacotherapy issues are discussed.	0	1	14
The pharmacist identifies how drug costs may be minimized through appropriate use of drugs in the ICU and through implementation of cost containment measures.	0	2	13

The pharmacist participates in quality assurance programs to enhance pharmaceutical care.	0	1	14
The pharmacist regularly makes rounds as a member of the multidisciplinary critical care team (if available) to provide pharmacotherapeutic management for all ICU patients.	0	3	12
The pharmacist maintains knowledge of current primary references pertinent to critical care pharmacotherapy.	0	0	15
The pharmacist reviews the medication history to determine which maintenance medications should be continued during the acute illness. a. The pharmacist clarifies previously effective doses and dosage regimens. b. For all suspected drug-related ICU admissions, the pharmacist assesses the patient medication history for causality and documents any findings that will impact patient management in the medical record.	0	2	13
In collaboration with the clinical dietitian, the pharmacist provides formal nutrition consultation on request and responds within 24 hr.	3	7	5
The ACLS-certified (or PALS certified for pediatrics) pharmacist responds to all resuscitation events in the hospital 7 d/wk, 24 hr/d.	0	1	14
The pharmacist provides didactic lectures to health professional students in critical care pharmacology and therapeutics, where applicable.	0	5	10
The pharmacist participates in training pharmacy students, residents, and fellows through experiential critical care rotations, where applicable.	0	2	13
The pharmacist coordinates the development and implementation of drug therapy protocols and/or critical care pathways to maximize benefits of drug therapy.	0	0	15
The pharmacist uses a documentation program that attaches both a clinical significance and a economic value to clinical interventions.	1	4	10
The pharmacist is actively involved in critical care pharmacotherapy research by assisting in the screening and enrollment of patients, and by serving as a study coordinator or contact person, where applicable.	2	8	5
The pharmacist participates in research design and data analysis, where applicable.	0	4	11
The pharmacist contributes to the pharmacy and medical literature (e.g., case reports, letters to the editor, and therapeutic, pharmacokinetic, and pharmacoeconomic reports).	0	4	11
The pharmacist is involved in non-patient care activities, including multidisciplinary committees and educational inservices.	0	2	13
The pharmacist assists physicians in discussions with patients and/or family members to help make informed decisions regarding treatment options.	1	8	6

The pharmacist provides formal accredited educational sessions (such as medical grand rounds or intensive care rounds) for medical staff, students, and residents.	0	4	11
The pharmacist participates in teaching ACLS.	3	9	3
The pharmacist develops residencies and/or fellowships in critical care pharmacy practice.	0	3	12
The pharmacist develops and implements pharmacist and pharmacy technician training programs for personnel working in the ICU.	1	6	8
The pharmacist identifies and educates lay groups and medical personnel in the community about the role of pharmacists as part of the multidisciplinary healthcare team in the ICU.	2	8	5
The pharmacist independently investigates or collaborates with other critical care practitioners to evaluate the impact of guidelines and/or protocols used in the ICU for drug administration and management of common disease states.	0	2	13
The pharmacist uses pharmaco-economic analyses to prospectively evaluate existing/new pharmacy services and the place of new drugs in critical care pharmacotherapy.	0	6	9
The pharmacist is proactive in designing, prioritizing, and promoting new pharmacy programs and services.	0	1	14
The pharmacist secures funds for conducting research.	3	11	1
The pharmacist reports results of clinical research and pharmaco-economic analyses to the pharmacy and medical community at regional and national meetings.	1	3	11
The pharmacist publishes in peer-reviewed pharmacy and medical literature as a result of any of the following activities: a. clinical research or other original research that qualitatively and quantitatively evaluates drug therapy and the provision of pharmacy service; b. investigator-initiated grants and contracts; and c. pharmaco-economic and outcomes research.	0	2	13
Medication use systems have the ability to: a. create and maintain patient medication profiles; b. interface with patient laboratory data; c. alert users to drug allergies; d. alert users to maximum dose limits; and e. alert users to drug-drug and drug-food/nutrient interactions.	0	2	13
Pharmacy space and facilities in the ICU are regularly assessed to determine whether efficiency can be improved, where applicable.	0	4	11
The pharmacy department is represented on the Institutional Review Board and/or Scientific Review Board, as applicable	0	2	13
The hospital information management system is computerized, is able to comply with those requirements listed for medication use processes, and has the ability to:	0	2	13

a. alert users to disease state-drug interactions; b. provide IV admixture information (compatibility, stability, preparation, etc); c. provide online drug and poison information; and d. document clinical pharmacy patient care interventions.			
The computerized hospital information management system serving the ICU has the following additional capabilities: a. direct physician medication order entry at the patient bedside; and b. interface with bedside clinical information system.	0	2	13
Pharmacotherapeutic, pharmacokinetic, and nutrition consultation are available 24 hr/d, 7 d/wk. ^a	1	4	10
Pharmacists practicing extensively in critical care will seek board certification in critical care when eligible. ^a	1	1	13
Critical care pharmacy trainees should be evaluated on educational outcomes and documented quantitative experiences to demonstrate competence for a given subject. ^a	0	1	14
The pharmacist maintains certification in ACLS, or PALS, and emergency neurologic life support, as applicable. ^a	0	0	15
Decentralized clinical pharmacy services in the ICU should include routine and consistent patient care coverage, inclusive of: day, evening, and weekend coverage. ^a	0	0	15
Critical care pharmacist will have the majority of their clinical activity focused in the care of the critically ill population. ^a	0	0	15
Critical care pharmacy services are developed as “teams”, with multiple critical care pharmacists available, to deliver consistent and quality pharmaceutical care. ^a	0	2	13
The ICU pharmacist-to-patient ratio is defined based on patient acuity and complexity in addition to the scope of clinical and operational services provided. ^a	0	2	13
The critical care pharmacist should be involved in continual evaluation of the availability of critical medications through optimization of automated dispensing cabinets. ^a	0	2	13
Pharmacy administrators should seek ways to enhance career and professional development for critical care pharmacists within health systems. ^a	0	1	14
Pharmacy administrators should seek to provide protected time for critical care pharmacists to facilitate education, administrative, research, and scholarly activities. ^a	0	1	14
In the absence of onsite critical care pharmacist, comprehensive medication management may be supplemented through telemedicine. ^a	0	3	12
The pharmacist performs medication reconciliation for ICU patients at the time of ICU admission, transfer from the ICU to the ward, or discharge to home or facility. ^a	0	1	14
Pharmacists document pertinent pharmaceutical care problems and progress notes daily. ^a	1	2	13

The critical care pharmacist educates patients and/or patient's family members regarding medication therapies used to treat patient during and after acute illness, as appropriate. ^a	0	2	13
The pharmacist responds, or coordinates, pharmacist response to all resuscitation and time-dependent emergencies in the hospital, including, but not limited to cardiac arrest, rapid response, trauma response, hemorrhagic shock, sepsis response, and acute neurologic life support. ^a	0	2	13
The pharmacist performs independent patient assessment (e.g., pain/ analgesia/delirium, nutrition). ^a	0	2	13
The pharmacist provides clinical consultation to the caregiver team, both within and outside the ICU, for pharmacotherapeutic issues related to critical illness. ^a	0	0	15
The pharmacist collaborates with other pharmacists (e.g., emergency medicine, infectious diseases, transplant, oncology), as needed, to address patient and disease-specific therapeutic issues. ^a	0	0	15
The pharmacist provides routine stewardship activities targeted at anti-infectives and other medications, including those that may be high risk and/or high cost and inappropriate utilization (factor products, anticoagulants, sedatives, acid-suppressive therapies, etc.). ^a	0	0	15
The pharmacist should collaborate with the medical staff to prevent potentially inappropriate drug therapy. ^a	2	0	13
Safety technology is implemented, inclusive of bedside barcode scanning, clinical decision support systems, and intelligent IV infusion devices in the routine care of critically ill patients. ^a	0	0	15
Critical care pharmacists should be involved in identifying local quality metrics for continuous quality improvement (e.g., risk-adjusted mortality, medication errors per medications ordered/dispensed, mechanical ventilation duration, delirium, mobilization). ^a	1	0	14
Real-time dashboard, or analytics monitoring, of quality metrics and drug utilization are available for the pharmacist to review for patient care and research. ^a	0	1	14
The critical care pharmacist serves as the medication safety leader for critically ill patients by identifying potential ADEs, resolving existing ADEs, and improving medication use practices. ^a	0	0	15
The critical care pharmacist shares responsibility in hospital performance for quality and process measure compliance, such as core measures and other hospital metrics (i.e., <i>Clostridium difficile</i> rates, vaccinations, patient satisfaction), as it relates to critical care patients. ^a	0	0	15
Pharmacy administrators evaluate clinical programs/services for stakeholder satisfaction, significance, and economic value. ^a	1	2	12
The critical care pharmacist prepares and presents drug therapy monographs and formulary reviews to the Pharmacy and	0	1	14

Therapeutics committee for medications used in the care of critically ill patients. ^a			
The critical care pharmacist leads, or provides, consultation to the hospital committees when critical care pharmacotherapy issues are discussed. ^a	0	0	15
The pharmacist should participate in planning and implementation of processes for disaster, or mass casualties, scenarios as applicable to the critically ill patient. ^a	0	0	15
The critical care pharmacist should be involved as a team member in the design process for building a new or remodeling critical care area. ^a	0	3	12
Critical care pharmacists are actively involved in collaborating in multicenter research projects. ^a	0	4	11
The critical care pharmacist participates as a key investigator for critical care research. ^a	0	4	11
The pharmacist contributes to the medical literature as a peer reviewer. ^a	0	4	11
The critical care pharmacist should be a member of professional critical care professional organizations, in addition to pharmacy organizations. ^a	1	1	13
The pharmacist participates in the education of pharmacy students, residents, and/or fellows by serving as a project advisor. ^a	0	3	12
The critical care pharmacist leads efforts to provide an interdisciplinary experience for experiential rotation exposure to students. ^a	0	4	11
The pharmacist has an active role in interdisciplinary simulation activities, where available. ^a	0	4	11
The pharmacist provides formal accredited education sessions at local, regional, state, and national meetings. ^a	0	2	13

ACLS = advanced cardiac life support, ADE = adverse drug event, PALS = pediatric advanced life support.

^aDenotes a recommendation statement.

Table 3. Recommendation statements approved as “foundational” or “desirable” and assigned a level of critical care services.

Patient Care

Statement	Level I	Level II	Level III
1. The critical care pharmacist regularly makes rounds as a member of the interdisciplinary critical care team to provide comprehensive medication management (CMM) for all ICU patients.	F	F	D
2. As part of the interdisciplinary team, the critical care pharmacist assists healthcare professionals in discussions with patients and/or family members to help make informed decisions regarding pharmacotherapy options.	F	F	D
3. The critical care pharmacist provides pertinent, comprehensive drug information to the critical care team.	F	F	F
4. The critical care pharmacist provides drug therapy related education to critical care team members.	F	F	D
5. The pharmacist should collaborate with the healthcare team to prevent potentially inappropriate drug therapy.	F	F	F
6. The critical care pharmacist provides clinical consultation to the care team, both within and outside the ICU, for pharmacotherapeutic issues related to critical illness.	F	F	F
7. Medication related consults (i.e. pharmacotherapeutic, pharmacokinetic, and nutrition patient counseling) are available 24 hours/day, 7 days/week to all critically ill patients.	F	D	D
8. The critical care pharmacist provides pharmacokinetic monitoring and therapeutic adjustments when a targeted drug is prescribed.	F	F	F
9. The critical care pharmacist reviews the medication history to determine which maintenance medications should be continued during the acute illness.	F	F	D
10. The pharmacist assists with medication reconciliation for ICU patients at the time of ICU admission, transfer from the ICU to the ward, or discharge to home or facility.	F	F	F
11. When reviewing orders for verification, the critical care pharmacist prospectively evaluates all drug therapy for appropriate indication, dose, drug interactions, drug allergies, and monitors the	F	F	F

patient's pharmacotherapeutic regimen for effectiveness and adverse drug events (ADEs), and intervenes as needed.			
12. The critical care pharmacist educates patients and/or patients' care givers regarding medication therapies used to treat patients during and after acute illness, as appropriate.	F	F	D
13. The pharmacist performs independent patient assessment (e.g. pain/agitation/delirium, nutrition).	F	D	D
14. A pharmacist certified in advanced cardiac life support (or pediatric advanced life support) responds to all resuscitation events in the hospital 24 hours/day, 7 days/week.	F	F	D
15. The pharmacist responds, or coordinates pharmacist response to all resuscitation and time-dependent emergencies in the hospital including, but not limited to cardiac arrest, rapid response, trauma response, hemorrhagic shock, sepsis response, and acute neurologic life support.	F	F	D
16. The pharmacist provides routine stewardship activities targeted at anti-infectives and other medications, including those that may be high risk for adverse events, high cost concerns, and inappropriate utilization (e.g. factor products, anticoagulants, sedatives, acid-suppressive therapies).	F	F	F
17. The critical care pharmacist collaborates with other pharmacists (e.g. emergency medicine, infectious diseases, transplant, oncology, etc.), as needed, to address patient and disease-specific therapeutic issues.	F	F	F
18. In conjunction with the clinical dietitian, the critical care pharmacist reviews the nutrition therapy plan and recommends modifications as indicated to optimize the nutritional regimen.	F	D	D
19. The critical care pharmacist utilizes the medical record as one means to communicate with other healthcare professionals, and/or to document specific pharmacotherapeutic recommendations or activities.	F	F	F
20. The critical care pharmacist uses appropriate documentation tools to demonstrate their impact on patient care and economic value.	F	F	F
21. Critical care pharmacists document pertinent pharmaceutical care problems and progress notes daily.	D	D	D

22. The critical care pharmacist documents clinical activities that include, but are not limited to, disease state management, general pharmacotherapeutic monitoring, pharmacokinetic monitoring, ADEs, education and other patient care activities.	F	F	F
23. The critical care pharmacist acts as a liaison between the pharmacy department and the interdisciplinary team to educate health professionals regarding current drug-related policies, procedures, guidelines, and pathways.	F	F	F
24. The critical care pharmacist uses pharmacoeconomic analyses in conjunction with the interdisciplinary team to evaluate existing/new pharmacy services and the place of new drugs in critical care pharmacotherapy.	F	F	D
25. The critical care pharmacist is proactive in designing, prioritizing, and promoting new clinical pharmacy programs and services.	F	F	D
26. Pharmacy administrators evaluate clinical programs/services for stakeholder satisfaction, significance, and economic value.	F	F	F
27. The critical care pharmacist prepares and presents drug therapy monographs and formulary reviews to the Pharmacy and Therapeutics committee for medications used in the care of critically ill patients.	D	D	D
28. The pharmacist should participate in planning and implementation of processes for disaster, or mass casualties, scenarios as applicable to the critically ill patient.	F	F	D
29. The majority of the critical care pharmacist's time is dedicated to critical care services, with few commitments, outside of critical care activities.	F	F	D
30. Critical care pharmacists will have the majority of their clinical activity focused in the care of the critically ill population.	F	F	D
31. Decentralized clinical pharmacy services in the ICU should include routine and consistent patient care coverage, inclusive of day, evening, and weekend coverage.	F	F	D
32. Critical care pharmacy services are developed as "teams", with multiple critical care pharmacists available, to deliver consistent and quality pharmaceutical care.	F	F	D
33. In the absence of an onsite critical care pharmacist, CMM may be supplemented through telemedicine.	D	D	D

34. The ICU pharmacist-to-patient ratio is defined based on patient acuity and complexity in addition to the scope of clinical and operational services provided.	F	F	D
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Quality Improvement

Statement	Level I	Level II	Level III
1. The critical care pharmacist serves as the medication safety leader for critically ill patients by identifying potential ADEs, resolving existing ADEs, and improving medication use practices.	F	F	F
2. The critical care pharmacist assists with the management of ADEs and develops process improvements to reduce and/or prevent medication errors.	F	F	F
3. The critical care pharmacist participates in reporting ADEs to institutional committees and national programs (e.g. the Food and Drug Administration (FDA) Medwatch program).	F	F	F
4. The critical care pharmacist is involved in continual evaluation of the availability of critical medications through optimization of automated dispensing cabinets.	F	F	F
5. The critical care pharmacist should be involved as a team member in the design process for building a new or remodeling critical care area.	D	D	D
6. The critical care pharmacist implements and maintains departmental policies and procedures related to safe and effective use of medications in the ICU.	F	F	F
7. The critical care pharmacist coordinates the development and implementation of ICU-focused drug therapy protocols, guidelines, order sets, and/or care pathways to maximize benefits of pharmacotherapy.	F	F	D
8. The pharmacist independently investigates or collaborates with other critical care healthcare team members to evaluate the impact of drug therapy protocols, guidelines, order sets, and/or care pathways used in the ICU (e.g. drug administration, disease state management algorithms).	F	D	D
9. The critical care pharmacist leads or provides consultation to hospital committees when critical care pharmacotherapy issues are discussed.	F	F	D
10. The critical care pharmacist serves on and provides consultation to hospital committees when critical care pharmacotherapy issues are discussed.	F	F	F

11. The critical care pharmacist contributes to the hospital newsletter and drug monographs, on issues related to medication use in the ICU.	F	F	D
12. The critical care pharmacist identifies and evaluates drug cost minimization opportunities and implements cost containment measures.	F	F	D
13. Critical care pharmacist is involved in identifying local quality metrics for continuous quality improvement (e.g. risk-adjusted mortality, medication errors per medications ordered/dispensed, mechanical ventilation duration, delirium, mobilization).	F	D	D
14. The critical care pharmacist participates in quality assurance programs to enhance CMM, minimize costs, provide ongoing evaluation of current processes and identify the need for new programs/processes.	F	F	D
15. The critical care pharmacist shares responsibility for hospital performance for quality and process measure compliance, such as core measures and other hospital metrics (e.g. <i>C. difficile</i> infection rates, vaccinations, patient satisfaction surveys), as it relates to critical care patients.	F	F	D
16. The critical care pharmacist collaborates with medical staff, nursing, other members of the healthcare team, and hospital administration to prepare the ICU for healthcare accreditation and to address any deficiencies identified.	F	F	D
17. Pharmacy space and facilities in the ICU are regularly assessed to determine whether efficiency can be improved, where applicable.	F	D	D
18. Real time dashboard, or analytics monitoring, of quality metrics and drug utilization are available for the pharmacist to review for patient care and research.	D	D	D
19. Safety technology is implemented, inclusive of bedside barcode scanning, clinical decision support systems and intelligent intravenous infusion devices in the routine care of critically ill patients.	F	F	F
20. Medication use systems have the ability to: <ul style="list-style-type: none"> i. Create and maintain patient medication profiles. ii. Interface with patient laboratory data and other relevant test results. iii. Interface with patient charts (medication profiles) from other health-systems and outpatient clinics iv. Alert users to drug allergies. 	F	F	F

<ul style="list-style-type: none"> v. Alert users to medication maximum dose limits. vi. Alert users to medications prior to admission vii. Alert users to diagnoses viii. Alert users to drug-drug and drug-food/nutrient interactions ix. Alert users to formulary and non-formulary medications as well as approved substitutions. x. Alert users to pertinent medication shortages xi. Provide live, real time data that can be incorporated in pharmacotherapy decision making 			
<p>21. The hospital information management system is computerized, is able to comply with those requirements listed for medication use processes, and has the ability to:</p> <ul style="list-style-type: none"> i. Allow direct provider order entry ii. Interface with bedside clinical information systems in real-time iii. Alert users to disease state-drug and drug-drug interactions iv. Provide intravenous admixture information (e.g. compatibility, stability, preparation) v. Provide medication information via references or internal guidelines/documents vi. Allow documentation of pharmacy patient care interventions vii. Provide benchmarking and quality data viii. Access to policies and procedures related to medications ix. Interface with mobile devices x. Provide patient-specific treatment algorithms 	F	F	F

Research/ Scholarship

Statement	Level I	Level II	Level III
<p>1. The pharmacist is actively involved in critical care pharmacotherapy research including, but not limited to, developing and reviewing study proposals, screening and/or enrollment of patients, publication of study results, and serving as a Principal Investigator, co-investigator, study coordinator or contact person, where applicable.</p>	D	D	D
<p>2. The pharmacist contributes to the pharmacy and medical literature (e.g., case reports, letters to the</p>	D	D	D

editor, and therapeutic, pharmacokinetic, and pharmacoeconomic reports).			
3. The pharmacist reports research results to the pharmacy and medical community at regional, national, and international meetings.	D	D	D
4. The pharmacist participates in research design and data analysis.	D	D	D
5. The pharmacist secures funds for conducting research.	D	D	D
6. The critical care pharmacist participates as a key investigator for critical care research.	F	D	D
7. Critical care pharmacists are actively involved in collaborating in multicenter research projects.	D	D	D
8. The profession of pharmacy is represented on the Institutional Review Board and/or Scientific Review Board, as applicable.	F	D	D
9. The pharmacist contributes to the medical literature as a peer reviewer.	D	D	D

Training/ Education

Statement	Level I	Level II	Level III
1. The critical care pharmacist provides an interprofessional experience in training and mentoring pharmacy students, residents, and fellows through experiential critical care rotations.	F	F	D
2. The critical care pharmacist supports postgraduate residencies and/or fellowship training in critical care pharmacy practice.	F	F	D
3. Critical care pharmacy trainees should be evaluated on educational outcomes and documented experiences in order to demonstrate competence for a given subject.	F	F	F
4. The pharmacist participates in the education of pharmacy students, residents and/or fellows by serving as a project advisor.	D	D	D
5. The critical care pharmacist provides education to health professional students and trainees pertinent to critical care pharmacotherapy.	F	F	D
6. The critical care pharmacist provides formal accredited interprofessional educational sessions (such as medical grand rounds or intensive care rounds).	D	D	D
7. The pharmacist has an active role in interdisciplinary simulation activities.	D	D	D

8. The critical care pharmacist is a certified instructor and provides certification classes to other healthcare providers (ACLS, PALS, ENLS, as applicable).	D	D	D
9. The pharmacist develops and implements training programs for personnel working in the ICU.	F	D	D
10. The pharmacist identifies and educates medical and community groups about the role of pharmacists as part of the interdisciplinary healthcare team in the ICU.	D	D	D

Professional Development

Statement	Level I	Level II	Level III
1. The pharmacist maintains a mastery of knowledge related to current resources and primary literature pertinent to critical care pharmacotherapy.	F	F	D
2. The pharmacist maintains certification in available life-support courses (e.g. advanced cardiac life support [ACLS], pediatric advanced life support [PALS], emergency neurological life support [ENLS], advanced trauma life support [ATLS - audit], advanced burn life support [ABLS]), as applicable to practice.	F	F	D
3. Pharmacists practicing extensively in critical care will seek board certification in critical care pharmacy when eligible.	F	F	D
4. The pharmacist is involved in non-patient care activities including interdisciplinary committees and educational lectures.	F	F	D
5. The pharmacist provides formal accredited educational sessions at local, regional, state, and national meetings.	F	F	D
6. The critical care pharmacist is a member of a professional critical care organization, in addition to pharmacy organizations.	F	F	D
7. Pharmacy administrators should provide protected time for critical care pharmacists to facilitate education, administrative, research and scholarly activities.	F	D	D
8. Pharmacy administrators should create mechanisms for critical care pharmacists to develop their career and professional role within a health-system.	F	F	D

F=Foundational, D=Desirable