

A C C P

Position Paper on Critical Care Pharmacy Services

Prepared jointly by the Society of Critical Care Medicine and
the American College of Clinical Pharmacy

Objective. To identify and describe the scope of practice that characterizes the critical care pharmacist and critical care pharmacy services. Specifically, the goals were to define the level of clinical practice and specialized skills characterizing the critical care pharmacist as clinician, educator, researcher, and manager; and to recommend fundamental, desirable, and optimal pharmacy services and personnel requirements for the provision of pharmaceutical care to critically ill patients. Hospitals having comprehensive resources as well as those with more limited resources were considered.

Data Sources. Consensus of critical care pharmacists from institutions of various sizes providing critical care services within several types of pharmacy practice models was obtained, including community-based and academic practice settings. Existing guidelines and literature describing pharmacy practice and drug use processes were reviewed and adapted for the critical care setting.

Conclusions. By combining the strengths and expertise of critical care pharmacy specialists with existing supporting literature, these recommendations define the level of clinical practice and specialized skills that characterize the critical care pharmacist as clinician, educator, researcher, and administrator. This position paper recommends fundamental, desirable, and optimal pharmacy services as well as personnel requirements for the provision of pharmaceutical care to critically ill patients.

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The discipline of critical care pharmacy practice evolved over the past 25 years to become an essential component of the multidisciplinary team in the intensive care unit (ICU).¹⁻³ In the early 1970s, there were a few practitioners in critical care who were members of surgical or trauma services and cardiac arrest teams. During the next decade, pharmacy services expanded to various ICU settings (both adult and pediatric), the operating room, and the emergency department. In these settings, pharmacists established clinical practices consisting of therapeutic drug monitoring, nutrition support, and participation in patient care rounds. Pharmacists also developed efficient and safe

drug delivery systems with the evolution of critical care pharmacy satellites and other innovative programs.

In the 1980s, critical care pharmacists designed specialized training programs and increased participation in critical care organizations. The number of critical care residencies and fellowships doubled between the early 1980s and the late 1990s. Standards for critical care residency were developed,⁴ and directories of residencies and fellowships were published.^{5, 6} Several professional pharmacy organizations formed specialty groups consisting of critical care pharmacists. These include the American College of Clinical Pharmacy, American Society

of Health-System Pharmacists, and the Operating Room Satellite Pharmacy Association. In 1989, the Clinical Pharmacy and Pharmacology Section was formed within the Society of Critical Care Medicine, the largest international, multidisciplinary, multispecialty critical care organization. This recognition acknowledged that pharmacists are necessary and valuable members of the physician-led multidisciplinary team.

The Society of Critical Care Medicine Guidelines for Critical Care Services and Personnel deem that pharmacists are essential for the delivery of quality care to critically ill patients. These guidelines recommend that a pharmacist monitor drug regimens for dosing, adverse reactions, drug-drug interactions, and cost optimization for all hospitals providing critical care services.¹ The guidelines also advocate that a specialized, decentralized pharmacist provide expertise in nutrition support, cardiorespiratory resuscitation, and clinical research in academic medical centers providing comprehensive critical care.¹

In the last 10 years, clinical pharmacy became increasingly specialized and developed specialty board certification.⁷ The growth of critical care pharmacy practice paralleled this development. Pharmacists assumed increased responsibility for monitoring patient outcomes as well as supervising drug distribution services.³

Pharmacists have demonstrated a role in the

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Task force members were Maria I. Rudis, Pharm.D., University of Southern California, Los Angeles, CA (Chair); Henry Cohen, Pharm.D., Long Island University, New York, NY; Bradley E. Cooper, Pharm.D., Hamot Medical Center, Erie, PA; Luis S. Gonzalez, III, Pharm.D., Conemaugh Medical Center, Erie, PA; Erkan Hassan, Pharm.D., FCCM, University of Maryland, Baltimore, MD; Christian Klem, Pharm.D., Tampa General Healthcare, Tampa, FL; Vanessa L. Kluth-Land, Pharm.D., SmithKline Beecham Pharmaceuticals, Houston, TX; Katherine M. Kramer, Pharm.D., University of New Mexico, Las Cruces, NM; Angela M. Swerlein, Pharm.D., Grant/Riverside Methodist Hospitals, Columbus, OH; Julie Ann Whipple, Pharm.D., Waukesha Memorial Hospital, Waukesha WI. At the time of manuscript preparation, Dr. Kluth-Land was at Hermann Hospital, Houston, TX.

Address reprint requests to the Society of Critical Care Medicine, 8101 East Kaiser Boulevard, Suite 300, Anaheim, CA 92808; or the American College of Clinical Pharmacy, 3101 Broadway, Suite 380, Kansas City, MO 64111; accp@accp.com; www.accp.com.

management of drug costs and reductions in morbidity and mortality.^{2, 3, 6-19} Clinical pharmacy services such as clinical research, provision of drug information, drug admission histories, and participation on a cardiopulmonary resuscitation (CPR) team have been associated with reduced mortality.¹¹ Prospective, controlled trials demonstrated that when pharmacists assume responsibility for pharmacotherapy as part of a multidisciplinary health care team, significant reductions in adverse drug events (ADEs) and length of stay are realized.¹²⁻¹⁶ Many of these findings have been documented in specialized critical care populations.¹⁴⁻²⁰ The American College of Clinical Pharmacy estimates that a benefit of \$16.70 is realized for every \$1.00 invested in clinical pharmacy programs.¹⁷ A landmark study involving critical care pharmacists confirmed that pharmacist rounding in the ICU with the multidisciplinary team reduces preventable ADEs and associated costs caused primarily by prescribing errors.¹⁶ Pharmacist intervention during prescribing decreased the rate of preventable ADEs by 66% from 10.4 to 3.5/1000 patient-days ($p < 0.001$). Pharmacist involvement was categorized as drug order clarification (45%), provision of drug information (25%), and recommendations for alternative therapy (12%). Based on an estimated cost of \$4685/preventable ADE, the annualized financial impact in the unit studied would be \$270,000 (1995 dollars).

Despite the growing evidence supporting the critical care pharmacist's contribution to patient care, many ICUs have not taken full advantage of this vital resource.¹⁸ A description of pharmacy services and pharmacist activities in a critical care setting will assist practitioners and administrators in establishing or advancing these specialized pharmacy services. This position paper may be used to educate other health care providers, administrators, and developers of health care policy on the role of pharmacists and pharmacy services in the care of the critically ill. Furthermore, the application of the elements in this paper will allow researchers to further document the effect of critical care pharmacy services on improving patient outcomes.

Purpose

The purpose of this position paper is to identify and describe the scope of pharmacy practice of the critical care pharmacist and critical care pharmacy services. Specifically, the

aims of the Task Force on Critical Care Pharmacy Services were:

1. To define the level of clinical practice and specialized skills characterizing the critical care pharmacist as clinician, educator, researcher, and manager.
2. To recommend levels of service and personnel requirements for the provision of pharmaceutical care to critically ill patients. The levels will be defined as fundamental, desirable, or optimal.

Methods

The Task Force on Critical Care Pharmacy Services consisted of members from the Clinical Pharmacy and Pharmacology Section of the Society of Critical Care Medicine and the Critical Care Practice and Research Network of the American College of Clinical Pharmacy. Members of the task force were from institutions of various sizes and they provide critical care services within a variety of pharmacy practice models. Practitioners from both community-based and academic practice settings were included.

The formulation of these recommendations, including discussion and development of consensus, took place between October 1997 and September 1999. Task force members were charged with developing graded parameters within six domains: clinical activities, drug distribution, education, research, documentation, and administration. This position paper was organized into pharmacist activities and pharmacy services. Drafts were reviewed and evaluated by all members of the task force, and a consensus was reached. When differences in opinion were expressed, they were resolved using a modified Delphi method.²¹ The document was reviewed externally by three established leaders in critical care pharmacy and by 18 pharmacy and hospital administrators for appropriateness of categorization of pharmacy activities and services. The paper was further reviewed by select members and the governance of both the Clinical Pharmacy and Pharmacology Section of the Society of Critical Care Medicine and the Critical Care Practice and Research Network of the American College of Clinical Pharmacy. Before organizational endorsement, the position paper underwent internal review by both the Council of the Society of Critical Care Medicine and the Board of Regents of the American College of Clinical Pharmacy.

Existing guidelines and literature for pharmacy practice and drug use processes were reviewed and adapted for the critical care setting.^{7, 22-24} The needs of hospitals with comprehensive resources as well as those with more limited resources were considered. The task force created three gradations of pharmacist responsibilities and departmental services as fundamental, desirable, and optimal. Classification of the elements into each category was the result of the consensus process. For the purposes of this document, the following definitions were used. Fundamental activities are vital to the safe provision of pharmaceutical care to the critically ill patient. Desirable activities include fundamental activities and critical care-specific pharmacotherapeutic services. Optimal activities encompass the range of fundamental to desirable services and, additionally, reflect an integrated, specialized, and dedicated model of critical care that aims to optimize pharmacotherapeutic outcomes through the highest level of teaching, research, and pharmacotherapy practice. Fundamental services should not be interpreted as an acceptable minimum level of service. Each institution and practitioner continually should strive for the highest level of service possible.

A single pharmacist cannot perform all of the fundamental activities on all patients every day. Rather, these critical care pharmacy activities will require varying levels of involvement from multiple pharmacists and trained technicians acting as a team, along with support from pharmacy and hospital administrators, and other personnel. The exact allocation of labor and the pharmacist-to-patient ratio will vary by institution and depend on the level of care, the acuity of patients, and the degree of specialization of the institution.

"The pharmacist," as used herein, refers to the team of licensed pharmacy practitioners with specialized training or practice experience focusing on the unique characteristics and needs of critically ill patients. Although various practice models exist, the pharmacist practices within the framework of a multidisciplinary team. In collaboration with other members of the patient care team, pharmacists share the responsibility for patient care outcomes, not just by providing basic dispensing functions and drug information services, but by solving patient- and drug-related problems and by making decisions regarding drug prescribing, monitoring, and drug regimen adjustments.²⁵ The pharmacist's practice may integrate varying elements of patient care,

teaching, and research activities, depending on the nature of the institution and the pharmacist's training.

The task force recognizes the varied educational backgrounds of practicing critical care pharmacists. Having the qualifications and competence necessary to provide pharmaceutical care in the ICU is essential and may be achieved by a variety of means including advanced degrees, residencies, fellowships, or other specialized practice experiences.

The term "Pharmacy and Hospital Services" refers to departmental and institutional/organizational components of the infrastructure that support the pharmacist's activities. They consist of systems, operations, and personnel who facilitate and support the provision of patient care, teaching, and research to optimize safe and effective pharmaceutical care of the critically ill.

This document is not intended to be a standard of practice; however, we envision that it will serve as a guideline for hospitals of varying resources to optimize the delivery of pharmaceutical care to the critically ill. It is expected that these recommendations will continue to be reviewed at intervals of approximately 5 years as critical care pharmacy services, clinical pharmacy, and critical care medicine evolve.

Critical Care Pharmacist Activities

Fundamental Activities

1. The pharmacist's time is dedicated to critical care patients, with few commitments outside the ICU area.
2. The pharmacist prospectively evaluates all drug therapy for appropriate indications, dosage, drug interactions, and drug allergies; monitors the patient's pharmacotherapeutic regimen for effectiveness and ADEs; and intervenes as needed.
3. In conjunction with the clinical dietitian, the pharmacist evaluates all orders for parenteral nutrition and recommends modifications as indicated to optimize the nutritional regimen.
4. The pharmacist identifies ADEs and assists in their management and prevention, and develops process improvements to reduce drug errors and preventable ADEs.
5. The pharmacist uses the medical record as one means to communicate with other health care professionals and to document specific pharmacotherapeutic recommendations.

6. The pharmacist provides pharmacokinetic monitoring when a targeted drug is prescribed.
7. The pharmacist provides drug information and intravenous compatibility information to the ICU team and uses the regional poison information center when indicated.
8. The pharmacist maintains current tertiary drug references.
9. The pharmacist provides drug therapy-related education to ICU team members.
10. The pharmacist participates in reporting ADEs to institutional committees and to the Food and Drug Administration's MedWatch program.
11. The 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.
12. The pharmacist acts as a liaison between pharmacy, nursing, and the medical staff to educate health professionals regarding current drug-related procedures, policies, guidelines, and pathways.
13. The pharmacist contributes to the hospital newsletters and drug monographs on issues related to drug use in the ICU.
14. The pharmacist implements and maintains departmental policies and procedures related to safe and effective use of drugs in the ICU.
15. The pharmacist collaborates with nursing, medical staff, and hospital administration to prepare the ICU for the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) survey and responds to any deficiencies identified.
16. The pharmacist provides consultation to hospital committees, such as Pharmacy and Therapeutics, when critical care pharmacotherapy issues are discussed.
17. The pharmacist identifies how drug costs may be minimized through appropriate use of drugs in the ICU and through implementation of cost-containment measures.
18. The pharmacist participates in quality assurance programs to enhance pharmaceutical care.

Desirable Activities

1. The pharmacist regularly makes rounds as a member of the multidisciplinary critical care

- team (if available) to provide pharmacotherapeutic management for all ICU patients.
2. The pharmacist maintains knowledge of current primary references pertinent to critical care pharmacotherapy.
 3. The pharmacist reviews a patient's drug history to determine which maintenance drugs should be continued during the acute illness.
 - A. The pharmacist clarifies previously effective dosages and dosage regimens.
 - B. For all suspected drug-related ICU admissions, the pharmacist assesses the patient drug history for causality and documents in the medical record any findings that will impact patient management.
 4. In collaboration with the clinical dietitian, the pharmacist provides formal nutrition consultation on request and responds within 24 hours.
 5. The advanced cardiac life support-certified (or pediatric advanced life support-certified) pharmacist responds to all resuscitation events in the hospital 7 days/week, 24 hours/day.
 6. The pharmacist provides didactic lectures to health professional students in critical care pharmacology and therapeutics, where applicable.
 7. The pharmacist participates in training pharmacy students, residents, and fellows through experiential critical care rotations, where applicable.
 8. The pharmacist coordinates the development and implementation of drug therapy protocols and/or critical care pathways to maximize benefits of drug therapy.
 9. The pharmacist uses a documentation program that attaches both a clinical significance and an economic value to clinical interventions.
 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.
 11. The pharmacist participates in research design and data analysis, where applicable.
 12. The pharmacist contributes to the pharmacy and medical literature, e.g., case reports, letters to the editor, and therapeutic, pharmacokinetic, and pharmacoeconomic reports.

13. The pharmacist is involved in nonpatient care activities including multidisciplinary committees and educational in-services.

Optimal Activities

1. The pharmacist assists physicians in discussions with patients and/or family members to help make informed decisions regarding treatment options.
2. The pharmacist provides formal accredited educational sessions, such as medical grand rounds or intensive care rounds, for medical staff, students, and residents.
3. The pharmacist participates in teaching advanced cardiac life support.
4. The pharmacist develops residencies and/or fellowships in critical care pharmacy practice.
5. The pharmacist develops and implements pharmacist and pharmacy technician training programs for personnel working in the ICU.
6. The pharmacist identifies and educates lay groups and medical personnel in the community about the role of pharmacists as part of the multidisciplinary health care team in the ICU.
7. 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.
8. The pharmacist uses pharmacoeconomic analyses to prospectively evaluate existing or new pharmacy services and the place of new drugs in critical care pharmacotherapy.
9. The pharmacist is proactive in designing, prioritizing, and promoting new pharmacy programs and services.
10. The pharmacist secures funds for conducting research.
11. The pharmacist reports results of clinical research and pharmacoeconomic analyses to the pharmacy and medical community at regional and national meetings.
12. 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 services.
 - B. Investigator-initiated grants and contracts.

- C. Pharmacoeconomic and outcomes research.

Pharmacy and Hospital Services

Fundamental Services

1. Drug use systems can do the following:
 - A. Create and maintain patient drug profiles.
 - B. Interface with patient laboratory data.
 - C. Alert users to drug allergies.
 - D. Alert users to maximum dosage limits.
 - E. Alert users to drug-drug and drug-food/nutrient interactions.
2. If manual drug administration records are the only available drug administration document, quality assurance¹ systems are in place to verify the accuracy of this process.
3. A "ready to administer" (unit-dose) drug distribution system is available in the ICU with no more than a 24-hour supply for each patient.
4. Large- and small-volume parenteral products are prepared in the pharmacy and delivered at regularly scheduled times to the patient care area 7 days/week.
5. Pharmacy space and facilities in the ICU are assessed routinely to determine whether efficiency can be improved, where applicable.
6. Procurement, storage, inventory, and distribution of investigational drugs, where applicable, are under the supervision of a pharmacist.
7. The pharmacy department is represented on the Institutional Review Board and/or Scientific Review Board, as applicable.

Desirable Services

1. The hospital information management system is computerized, can comply with the requirements listed for drug use processes (see Fundamental Services, Item 1), and can do the following:
 - A. Alert users to disease state-drug interactions.
 - B. Provide intravenous admixture information (e.g., compatibility, stability, preparation).
 - C. Provide online drug and poison information.
 - D. Document clinical pharmacy patient care interventions.
2. Computerized drug administration records are generated. Manual records are used only in emergencies.

3. An ICU satellite pharmacy with unit-dose drug distribution and intravenous admixture capabilities is open a minimum of 40 hours/week.

Optimal Services

1. The computerized hospital information management system serving the ICU has the following additional capabilities:
 - A. Direct physician drug order entry at patient bedside.
 - B. Interface with bedside clinical information system.
2. An ICU satellite pharmacy with unit-dose drug distribution and intravenous admixture capabilities is open 24 hours/day, 7 days/week.
3. Pharmacotherapeutic, pharmacokinetic, and nutrition consultation are available 24 hours/day, 7 days/week.

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