

ASHP Guidelines on Emergency Medicine Pharmacist Services

Emergency medicine (EM) is an ever-changing, rapidly evolving practice specialty. The formal emergency department (ED) has its roots in the 1950s, when full-time emergency services were established in the United States.¹ Since then, the rate of mortality from accidental and traumatic injuries has significantly declined as a result of the development of regional trauma centers and improved training in the care of trauma patients.^{2,3} The first descriptions of pharmacy services provided in the ED appeared in the 1970s.⁴⁻⁶ These early reports detail services primarily related to medication distribution. Since that time, the literature has detailed the development of EM pharmacy services as they evolved to address changing needs in the ED.⁷⁻²³ In recent years, the number of EM pharmacists (EMPs) has dramatically increased,²⁴ likely as a result of several factors, including an increased focus on preventing medication errors in the ED and the EMP's role in error prevention, changing medication management standards from regulatory and accrediting agencies, and emerging literature on a variety of critical illnesses that emphasizes the need for early, goal-directed therapy. Furthermore, initial research indicates that ED health care providers highly value the services provided by EMPs.²⁵

Purpose

In 2008, ASHP published a statement on services that the pharmacy department should provide to the ED.²⁶ These guidelines extend beyond the scope of that document and are intended to define the role of the EMP, to suggest goals for providing services to meet institution-specific needs, and to establish a definition of best practices for the ED. These guidelines are based on the primary literature, therapeutic and practice guidelines, national standards, and the consensus of experts in the field of EM pharmacy practice.

Two levels of EMP services are described: essential services, which should be the basis of the practice specialty, and desirable services, which would optimize pharmacotherapy outcomes through the highest level of practice, teaching, and research and should be considered in addition to essential services. The services are further delineated by either a direct patient care or an administrative focus.

The services provided by EMPs will depend on the level of services provided by the ED. Optimal EMP coverage would provide consistent pharmacy services through a physical presence in the ED 24 hours per day, seven days per week. However, such coverage is not possible in every institution, nor may it be ideal based on institutional needs. Coverage and services provided by EMPs will therefore vary from institution to institution and should be designed to best meet the needs of the institution's emergency and pharmacy departments. In concert with ED and pharmacy administrators and providers, each EMP should use his or her professional judgment to individually weigh the factors that determine which services should be provided. These factors include the patient populations served, the number of pharmacists and time dedicated to services provided to the

ED, whether corresponding duties are required of EMPs in other areas of the hospital, and the extent of time provided for administrative duties and obligations outside the ED. Finally, it should be noted that the many services described in these guidelines could not be provided by a single EMP. When used in these guidelines, the phrase "the EMP" should not be interpreted to imply that a single EMP could or should be expected to provide every service detailed herein.

The target audience for these guidelines includes EMPs, health-system administrators, physicians, emergency nurses and other emergency clinical staff, accreditors, and regulators. In addition, pharmacists and health-system administrators may find these guidelines helpful in establishing new pharmacy services in the ED. Because some of these readers may not require as much detail as others, the services are briefly summarized in Appendix A. Those seeking more information should consult the appended list of recommended readings, references, and resources (Appendix B).

Essential Direct Patient Care Roles of EMPs

The essential direct patient care roles of EMPs include optimizing medication use through participation in direct patient care rounds, medication order review, medication therapy monitoring, participation in procedures that utilize high-risk medications, resuscitation, medication procurement and preparation, provision of medication information, and documentation of associated interventions.

Direct Patient Care Rounds. Because the large majority of medication errors occur in the prescribing and administration phases of the medication-use process, it is critical for EMPs to be involved in direct patient care activities, including medication selection and the prescribing process.^{22,27-29} For the purposes of these guidelines, rounding is broadly defined as conducting bedside patient care evaluations; working as a visible, well-integrated member of the multidisciplinary ED team; and participating in traditional rounding services when applicable (e.g., in EDs with EM residency programs for physicians). When conducting patient care rounds, EMPs should focus on providing direct patient care; they will be most effective in doing this when physically present in the ED. EMPs, in collaboration with other ED providers, should be accountable for ensuring optimized medication therapy regimens and therapeutic outcomes based on emerging literature, treatment guidelines, and quality measures established by accrediting bodies. Depending on the number of patients seen in the ED and the number of pharmacists dedicated to the ED, EMPs should create a triage system to focus their patient care efforts on patients with critical illnesses or urgent needs, on high-risk patient populations, or on specific classes of medications most associated with medication errors.

Medication Order Review. Medication order review in the ED must comply with federal, state, and local regulations and accreditation requirements. The Joint Commission's stan-

dards state that all medication orders should undergo prospective order review by a pharmacist prior to administration of the medication to the patient, with three exceptions: (1) in an emergency situation, (2) if a delay in administration would harm the patient, and (3) if a licensed independent practitioner is present to oversee the ordering, preparation, and administration of the medication.³⁰ Although many medication orders in the ED fall under the above exceptions, the level of assessment during medication order review should be consistent with that provided for patients elsewhere in the hospital. The process through which ED medication orders are reviewed should be determined by each institution based on its needs, staffing structure, and systems, as well as the interpretation of requirements by regulatory and accrediting organizations.

The role of an EMP in medication order review will vary, depending on the number of patient visits per day, particularly during peak patient utilization; the hours of EMP coverage; and the method of medication order entry. The role of an EMP should not focus on the medication order review process alone but rather should parallel the role of other pharmacy specialists providing direct patient care services within the institution.^{24,31–33} A process should be developed to ensure that other pharmacists are accountable to review those orders that are not reviewed by an EMP.³ Medication order review by EMPs may be performed in a manner other than traditional medication order review. When at the bedside, an EMP is able to quickly complete a review of medication orders and make medication selection and dosing recommendations based on patient-specific factors. Having a physical presence in the ED provides EMPs with the information needed to prioritize patient orders based on need and time demands. To allow EMPs to review medication orders while maintaining a physical presence in the ED, institutions should consider employing portable hand-held technology for use by the ED patient care team, including EMPs.

The majority of medication orders in the ED are one-time orders, so an EMP's intervention is most valuable if performed prior to medication administration. Ideally, all orders for high-risk medications would receive prospective review, but optimal medication use in the ED requires a balance between ensuring patient safety and preventing delays in patient care. EMPs should develop a triage system to focus the medication order review process on high-risk medications, high-risk patient populations, and emergency situations. When evaluating medication orders, EMPs should focus on key factors such as appropriateness of the medication and dose, potential medication interactions, and patient-specific factors (e.g., age, weight, medication allergies, disease states, current clinical condition).³⁰ If time and other patient care activities allow, EMPs may be involved in the review process of routine medication orders, including cost-saving initiatives, formulary compliance, and therapeutic substitutions.

In an institution with computerized provider order entry (CPOE), centrally located or designated pharmacists could work collaboratively with the EMP to assist in the medication order review process for routine ED medication orders, as well as admitting orders for boarded patients. If time permits, EMP participation in CPOE medication database maintenance should also be considered. In an institution that relies on written medication orders, a process should be developed to address the medication order review process through collaboration between the pharmacy and emergency

departments. An alert system should be developed to notify the EMP to any medication orders requiring immediate pharmacist intervention, while all other routine medication orders would be sent to the central pharmacy for review, processing, and preparation.

Medication Therapy Monitoring. The development and assessment of monitoring parameters related to medication therapy are essential steps in the medication-use process; they will determine whether the therapy selected was safe and effective, was suboptimal, or failed and whether changes to the regimen are needed. Research on pharmacist participation in monitoring medication therapy has demonstrated improved clinical outcomes in a variety of settings, including the treatment, management, and monitoring of chronic disease states such as diabetes mellitus, hypertension, and hyperlipidemia, and from therapeutic medication monitoring of antimicrobial and anticoagulant therapy in the hospital setting.^{34–37}

Several medication classes administered in the ED exert an immediate therapeutic effect and therefore can be monitored shortly after administration. EMPs should be familiar with the pharmacokinetic parameters of medications commonly administered in the ED, as well as the recommended monitoring parameters associated with each therapeutic agent. Monitoring should also be provided for medications the patient has taken prior to arrival in the ED, whether administered by emergency medical services or by the patient as part of a home medication regimen. Medication therapy monitoring should include both subjective (e.g., patient-reported pain score) and objective (e.g., blood pressure, heart rate) elements.

EMPs should provide recommendations for monitoring parameters for both the effectiveness and safety of medications administered in the ED. Much of this assessment can be completed by EMPs and used in combination with information gathered from the patient's medical record. EMPs should subsequently suggest revisions to medication regimens based on the results of monitoring parameters and the established goals for therapy. In addition, EMPs should incorporate medication therapy monitoring parameters in the development of treatment protocols used in the ED, and they may provide education to other health care providers regarding appropriate monitoring of medication therapies.

Patient Care Involving High-Risk Medications and Procedures.

A number of high-risk medications and procedures are utilized in the ED. A procedure may be considered high risk for a variety of reasons. Procedures performed on patients considered at high risk due to critical illness or instability may qualify, or the procedure may involve medications with a narrow therapeutic index or with serious potential for adverse effects (i.e., high-alert medications).³⁸ EMPs should be present at the bedside to assist in the delivery of patient care involving high-risk medications or procedures. Participation should include assisting in the appropriate selection of medications and corresponding doses, preparation of medications, and patient monitoring.

EMPs should also participate in efforts to improve the safety of procedures that utilize high-risk medications. EMPs should evaluate current processes associated with the use of high-risk medications and should assist in the development of processes and systems to improve current practices and prevent potential harm and errors. The EMP's role may

include assisting in the development of policies and protocols, with a focus on appropriate medication selection, use, monitoring, and management. Several recommendations for reducing errors associated with high-risk medications and procedures have been suggested.^{29,39–41} For example, use of medication infusion systems with smart infusion technology software and double checks on high-alert medications may be considered.^{39,40} In addition, EMPs should provide education and training related to high-risk medications to ED health care providers.

Resuscitation. EMPs should be present during all resuscitations in the ED. Initial evaluations of the role of EMPs in the resuscitation of trauma patients have revealed improved patient safety by decreasing preventable adverse medication events and expedited time to medication administration.^{7,42–44} The role of EMPs in resuscitation may vary, depending on such factors as the clinical scenario or the practice setting, but may involve preparing medications for immediate administration; ensuring appropriate medication selection and dose; ensuring appropriate administration of medications; obtaining medications that are not readily available in the ED; making recommendations for alternative routes of administration when appropriate; answering medication information questions; assisting physicians with differential diagnosis, particularly when related to a potential medication-related cause; and completing resuscitation documentation.^{45,46} In addition, EMPs should ensure that processes are in place to maintain an appropriate and readily available supply of emergency medications in the ED.

Toxicologic emergencies present resuscitation scenarios in which the knowledge of EMPs is highly valuable. Pharmacist involvement in toxicologic emergencies has been described for more than 30 years.^{47,48} EMPs should be familiar with the recognition and treatment of patients experiencing a toxicologic emergency, including recognition of characteristic physical signs and symptoms noted in the physical examination, laboratory parameters, and other diagnostic evaluations (e.g., toxidromes), that can result from a wide range of substances, including prescription and over-the-counter medications, illicit drugs, natural occurring poisons (e.g., those from plants, mushrooms, or envenomations), and various chemicals.⁴⁹ When a patient with a suspected toxicologic emergency presents to the ED, EMPs should assist in obtaining a thorough and accurate medication history and a history of present illness, as well as in identifying potential causative agents; should assist in the selection and administration of specific antidotes and other supportive therapies; may assist in the preparation of antidotes; and should provide recommendations for monitoring antidote effectiveness and safety. These services should be provided in collaboration with clinical and medical toxicologists, when available, or local and regional poison control centers. Finally, EMPs should serve as a resource to the pharmacy department in ensuring that an adequate inventory of toxicologic antidotes is available in the institution.⁵⁰

In preparing to become a member of the resuscitation team, EMPs should seek out training and certification in the conditions applicable to their practice settings. Several training opportunities and certification programs are available, including but not limited to the American Stroke Association National Institutes of Health Stroke Scale, American Heart Association (AHA) Basic Life Support

(BLS), AHA Advanced Cardiac Life Support (ACLS), AHA Pediatric Advanced Life Support (PALS), American College of Surgeons Advanced Trauma Life Support, American Academy of Clinical Toxicology Advanced HAZMAT Life Support (AHLs), and board certification as a Diplomate of the American Board of Applied Toxicology (DABAT). At a minimum, all EMPs should achieve and maintain up-to-date certification in BLS, ACLS, and PALS.

Medication Procurement and Preparation. Medication procurement in the ED presents challenges that differ significantly from those in other areas of the hospital. Because of the urgent treatment needs of patients in the ED, several critical medications must be readily available. EMPs should be an integral part of the medication procurement and preparation process for medications used in the ED, as dispensing medications is one of the five stages of the medication-use process that EMPs can impact to prevent medication errors.²⁹ EMPs may serve as consultants to the pharmacy department and ED regarding the development or revision of processes associated with medication procurement, or they may play a more active role in medication procurement and preparation.

The options available for medication procurement vary widely among EDs and depend on such factors as patient volume and acuity, the physical limitations of the ED, and processes established by the pharmacy department. Medications may be available in automated dispensing cabinets, in emergency kits, from the inpatient central pharmacy department, or from a satellite pharmacy within the ED. A satellite pharmacy with compounding ability may best serve the needs of an ED by providing prompt preparation of medications, though this is not considered a requirement. While a sterile room for preparation of intravenous medications may not be a possibility for most EDs, a laminar flow hood would aid in the preparation of most intravenous medication requests. In an ED with no satellite pharmacy, the central pharmacy should have processes in place to assist with rapid preparation and delivery of medications.²⁶ In this model, EMPs should work with the central pharmacy to ensure understanding of urgent medication needs. Finally, EMPs should be competent and responsible for preparation of medications needed for emergency use at the bedside as an exception to the *United States Pharmacopeia 797* standards.⁵¹ Competency should include methods of compounding, knowledge of potential medication interactions, intravenous medication compatibility, rates of administration, and skill in using references on these topics.

A full review of medications used in the ED, including commonly used medications, high-risk medications, and antidotes, should be performed regularly (e.g., annually or as required by institution policy). EMPs should be involved in the decision-making process regarding which medications will be made available immediately within the ED.⁵² Medications identified as appropriate and necessary for frequent use in the ED should be stored in automated dispensing cabinets or another location as designated safe by the institution, with appropriate alerts to prevent medication errors.⁵² EMPs may assist in the evaluation and management of these medications, including monitoring for appropriate usage, inventory levels, and medication storage according to both hospital and regulatory body requirements. Optimization of available medications should be based on changes in prescribing practices, guideline or protocol recommendations,

medication availability, and formulary changes. Inventory and storage replacement should be maintained by technician support and should not be the responsibility of EMPs.

Finally, EMPs should be involved with the institution's formulary review and process-improvement committees to assist with medication reviews of new formulary agents and for revisions to the current formulary regarding medications used in the ED. Further, data from medication-use evaluations, safety monitoring, and monitoring for adherence to national quality indicators should be used to assist in evaluating medication procurement and preparation processes.

Medication Information. The most common cause of medication errors is a lack of information related to medication therapy.⁵³ Provision of medication information is therefore a vital role in the practice of all pharmacists, including EMPs. Numerous studies in the ED demonstrate that medication information is an important service provided by EMPs.^{9,10,25,54} A survey of pharmacy departments revealed that only 50.4% of respondents provide medication information services to the ED.⁵⁴ In addition, ED health care providers report that they are more likely to utilize the resources of a pharmacist when that pharmacist is located in the ED rather than the central pharmacy department.²⁵ These statistics suggest a strong role in medication information for the EMP.

The medication information needs of the ED cover a broad spectrum of clinical scenarios and may include questions related to medication selection, dose, and administration; adverse medication reactions; intravenous compatibility; medication interactions; and identification of unknown medications.⁵⁵ EMPs should ensure that access to appropriate primary, secondary, and tertiary references is available as needed to respond to medication information requests. EMPs must be able to quickly and accurately retrieve the answers to medication information questions using readily available resources, programs for personal digital assistants, textbooks, or electronic resources to provide urgently needed medication information.

Documentation. Research on pharmacist interventions in the inpatient setting has demonstrated improvement in patient outcomes through optimized pharmacotherapy regimens, improved monitoring of medication therapy, and avoidance of adverse medication events.³⁶ In addition, pharmacist participation in patient care has been shown to significantly reduce the costs associated with medication therapy.^{56,57} Research has detailed EMP interventions in the ED, describing improvements to the medication-use process and patient care by EMPs recommending improvements in medication therapy, serving as a medication information resource, and improving patient safety.^{4,5,9,11,13,18,20,22,58} Several of these publications have shown dramatic cost avoidance.^{8,17,19,21,23} More detailed studies on the role of EMPs in managing specific disease states and a definitive evaluation of improvement in patient outcomes are needed.

EMPs should be diligent in documenting interventions provided during patient care and other activities (e.g., education). They should regularly review intervention documentation to identify trends, which may indicate a need to educate ED health care providers or change medication-use procedures. Finally, cost-avoidance documentation may provide the justification needed for further expansion of EMP services.

Health care institutions should support EMPs by providing the means to document interventions. Different media have been used to document interventions, including personal digital assistants, software programs on institutional intranets, and manual paper systems.^{59–64} Electronic systems offer more complete, readily retrievable documentation and shorter entry times than manual systems, without the risk of loss associated with paper records.^{65,66} In addition, electronic documentation systems offer the benefit of associating cost avoidance with the documented intervention.¹⁹ Although determining true cost avoidance can be difficult, there is research available to provide some guidance for quantifying the cost avoidance of pharmacist interventions.^{6,10,56,57,67–69} In addition to these benefits, electronic documentation of EMP interventions may improve communication with other health care providers caring for the patient after admission (e.g., “hand-off”) if the documentation system allows the documentation to follow the patient.

Desirable Direct Patient Care Roles of EMPs

Desirable direct patient care roles of EMPs include the care of boarded patients, obtaining medication histories, and medication reconciliation.

Care of Boarded Patients. ED overcrowding is a common occurrence.^{70,71} Not only are more patients seeking primary care services in the ED, but a significant number of EDs have closed over the past decade, increasing ED patient volumes.^{72,73} Because there are many obstacles and processes that hinder the timely transfer of admitted patients from the ED to an inpatient bed,⁷⁴ overcrowding in the ED often results in bottlenecks that force EDs to provide care to patients for long periods of time while they await admission or physical transfer to an inpatient bed or to another institution for a different level of care (“boarding”).⁷⁵ The needs of a boarded patient can vary from simple requests for as-needed medications to such complex needs as critical care management.

Processes should be developed, based on institutional resources, to designate the pharmacist who will be accountable for providing care to boarded patients (i.e., an EMP or the pharmacist assigned to the area to which the patient will be admitted). The EMP's primary role in ensuring the safety and effectiveness of the medication-use process of the ED should not be compromised to provide care for boarded patients if alternatives exist. When staffing levels are insufficient (e.g., when only a single EMP is present in the ED) or when the boarding area is physically separated from the ED, the responsibility of caring for boarded patients should be assigned to the inpatient pharmacist. (Ideally, to ensure continuity of care, the inpatient pharmacist would be the same pharmacist responsible for providing care to the patient after admission.) The services provided to boarded patients by EMPs will depend on the level of services offered by the institution. At a minimum, EMPs should review the medication profile of critical patients, with a focus on high-risk medications, medication dosing and procurement, and monitoring, as necessary. When it is necessary to initiate an admitting order for a boarded patient, the responsible pharmacist should review medications administered in the ED and those taken prior to arrival at the ED to prevent duplications in therapy.

Medication Histories and Medication Reconciliation.

Research on medication reconciliation has identified several barriers to obtaining an accurate medication history in the ED.^{76–82} In many cases, ED staff are required to contact multiple sources, including primary care physician offices, pharmacies, and family members, to obtain a medication history, and even these burdensome efforts may not result in an accurate home medication list. There have been significant changes in medication reconciliation practices, with the most recent recommendations from The Joint Commission that complete medication reconciliation needs only be performed by the receiving unit for patients admitted to the hospital and that “screening” reconciliations be performed in the ED, unless otherwise requested by the treating physician.³⁰

Although research has shown that pharmacists are the providers who obtain the most accurate home medication list,^{83–85} dedicating a pharmacist solely to medication reconciliation is not the best allocation of pharmacist resources in the ED. EMPs should assist in the development and implementation of a risk-stratification protocol for identifying and determining which ED patients need a medication history. In general, medication histories may be obtained for patients with known or suspected toxicologic emergencies, with known or suspected adverse events from home medications, or with complicated medication histories that will influence ED clinical decision-making.

Auxiliary pharmacy staff (pharmacy students hired through work/study programs and pharmacy technicians) can also be effective in obtaining accurate home medication histories; when possible, they should be incorporated into medication reconciliation procedures.^{86–89} Quality reviews of medication histories completed by pharmacy technicians should be conducted to assess accuracy and to provide guidance for further training opportunities.

Essential Administrative Roles of EMPs

The administrative duties of EMPs will vary, depending on such factors as the availability of other EMPs to provide direct patient care activities in the ED or to distribute committee involvement among other EMPs. The essential administrative roles of EMPs include involvement in medication and patient safety initiatives, quality-improvement activities, professional leadership, and emergency preparedness.

For EMPs to succeed in fulfilling their administrative responsibilities without compromising patient care in the ED, pharmacy management must provide support that will allow EMPs to participate in committee meetings, pursue related projects, and develop proposals with action plans. Ideally, another pharmacist would be made available to provide coverage for direct patient care activities in the ED.

Medication and Patient Safety. EMPs play an important role in monitoring and ensuring patient and medication safety in the ED. The environment of the ED is naturally at high risk for patient and medication safety lapses. EMPs should encourage and assist in maintaining a safe environment for medication and patient safety, which should be continuously reviewed for potential process improvements. This review can include proactive and continuous monitoring of medication practices; identification of errors and high-risk medications for monitoring; addressing hazardous conditions with poten-

tial for harm; and documentation and review of medication errors, adverse medication events, and near misses.^{22,27,28,90}

Medication errors that occur in the ED should be reviewed by EMPs in collaboration with other health care providers and hospital executives to identify potential sources of error, contributing factors related to the error, and potential solutions for preventing similar errors. Performance of a root cause analysis could identify potential error trends or system failures and contribute to the development of safe medication practices and processes for prevention of future events. In addition, a review of medication errors should result in education and future policy or guideline development. Finally, EMPs should be responsible for the development and provision of education to ED health care providers on the source of the error, the risks associated with the error, and ways to prevent similar errors in the future.

Quality-Improvement Initiatives. As a practitioner in the ED setting, an EMP is able to recognize those aspects of patient care, medication safety, compliance with hospital and regulatory policies, and adherence to national practice recommendations and guidelines that could be improved. EMPs or other pharmacy representatives should be extensively involved with quality-improvement initiatives in the ED. Involvement with a multidisciplinary committee of ED health care providers and hospital administrators will provide EMPs with an avenue for improving the quality of care in the ED.

EMPs should participate in ongoing efforts to optimize pharmacotherapy regimens through medication-use evaluations and through the development and implementation of medication-use guidelines and pathways. A medication-use evaluation may be beneficial in reviewing medications commonly used in the ED, as well as those medications associated with errors.^{91,92} The results of a medication-use evaluation can be used to further guide education for other ED health care providers.

Leadership Duties and Professional Service. The leadership role of EMPs should include responsibilities to both the pharmacy department and ED. Involvement in administrative processes of both departments allows EMPs to serve as a liaison between the groups to support joint endeavors. This role would ideally include participation in departmental meetings, medication-use committees, quality-improvement and process-improvement committees, medication safety committees, and research meetings for both departments. Involvement in such meetings ensures that the needs of both departments are met and provides EMPs with an avenue for improving both patient care and medication use. In addition, involvement in ED-specific research projects increases pharmacy involvement, pharmacy publication and recognition, and grant funding potential.

Membership and active participation in local, state, and national professional pharmacy organizations are essential for the continued growth of the practice of EM pharmacy. As a relatively young area of practice, EM pharmacy is continually developing and growing. One way to support this development and strengthen the presence of EM pharmacy is through participation in professional organizations. At the local level, EMPs may collaborate to develop a local support network for training and research and can provide new practitioners with avenues for learning. At the state

level, legislative and professional advocacy may help educate government officials and other health care professionals about EM pharmacy practice. At the national level, collaboration among EMPs increases the strength as a group, serves to challenge existing programs to improve, assists new programs in their development, and allows collaboration as a group to affect the stature, practice, and further development of EM pharmacy practice. A final source of support for the development of the profession is involvement with national EM organizations. Traditionally designed for physicians, nurses, and emergency medical technicians, EM organizations provide an avenue for education, networking, and publication for EMPs.

Emergency Preparedness. As experts in pharmacology and toxicology, EMPs have the skills and knowledge to serve as active participants in emergency situations, such as natural disasters; disease outbreaks; biological, radiological, or chemical exposures; and acts of terrorism. It is essential that EMPs, in conjunction with the department of pharmacy, participate in emergency preparedness planning.^{93,94} Planning and involvement should occur at a minimum at the institutional level, with participation potentially expanding to include local, state, and national emergency preparedness efforts. Knowledge of local, state, and national emergency preparedness plans, programs, and support systems is paramount in the development of institution-specific emergency preparedness plans. These plans and programs should be used to develop recommendations and policies regarding decontamination, medication acquisition, stockpiles, storage, distribution, and use.⁹³

Actively participating in emergency preparedness events will strengthen the knowledge and skills EMPs need to effectively lead in emergency situations. EMPs and executives in the pharmacy department should work together in the development of pharmacy-specific plans to coincide with institution-specific plans. Education of ED and pharmacy staff related to emergency preparedness should be among the responsibilities of EMPs.

To further develop strengths in emergency preparedness, EMPs should seek out training and certification in emergency preparedness, such as certification for AHLA, Basic Disaster Life Support, Advanced Disaster Life Support, and the National Incident Management System.

Desirable Administrative Roles of EMPs

Education of pharmacists and other health care providers, pharmacy students and residents, and ED patients and their caregivers and participation in research are desirable administrative roles for EMPs.

Education. The role of EMPs in education can be variable and broad, and it has been mentioned in conjunction with other responsibilities throughout these guidelines. It is desirable for EMPs to participate in the education of other health care providers, including pharmacists and pharmacy staff, pharmacy students, pharmacy residents, physicians, medical residents, midlevel practitioners, nurses, and emergency medical support personnel. The types and levels of education will vary with patient care and administrative workload.

Provision of education to ED health care staff should, at a minimum, include information on the appropriate use of

medications, improvement in quality and effective medication use, and patient and medication safety. Education may include formal sessions (e.g., in-service or didactic presentation at a conference) or participation in courses such as BLS, ACLS, or PALS. Participation in formal education sessions may strengthen the relationship with other ED health care providers and serves as a method of continuous learning for EMPs. Informal education may also be provided through interaction in the ED, particularly at the bedside, which is a time-efficient, effective tool for education of staff.

Participation in the didactic and experiential education of doctor of pharmacy students is also a desirable activity that supports the development of the profession. Precepting pharmacy residents in EM learning experiences supports the overall development of direct patient care practitioners and provides exposure to the practice of EM pharmacy. To support the continued development of EM pharmacy services, the development of EM residency training programs is highly desirable. With the expansion of EM pharmacy service locations and hours and the increasing role of EMPs in administrative activities, the need for additional qualified pharmacists increases. New EMPs should focus on developing current services with plans to develop advanced (e.g., postgraduate year two) residency training programs after the program is established and the practice experience is significant. Additionally, education and development of currently practicing pharmacists are desirable, as education and development of existing pharmacists will provide additional EMP coverage.

Having medication therapy expertise, EMPs are uniquely qualified to provide medication education and information to patients and their caregivers in the ED and should play a key role in the delivery of medication information. In some cases, the education of ED patients and their families and caregivers may be independently considered among the essential roles of the EMP. EMPs may develop a system of triage for patient education so that counseling is focused on patients who will be discharged from the ED with a new or high-risk medication or on patients whose visit to the ED was the result of a medication adverse event or error. In addition to developing a triage system for identifying the patients with the greatest need for education, EMPs may also rely on other ED health care providers to identify patients in need of medication education. The medication education provided to patients and caregivers in the ED is diverse and may include information related to the use of a new device, the importance of medication adherence, or a potential adverse medication event. Education can include oral or written materials and should be documented in the patient's medical record. EMPs should confirm patient and caregiver understanding of the medication education provided.

Research and Scholarly Activity. The Institute of Medicine has described three aspects of emergency care research.⁹⁵ These aspects include EM research, defined as research conducted in either the prehospital or ED setting by EM specialists; trauma and injury control research, defined as the research of the acute management of traumatic injury; and research contributions that affect the ED but are attributed to other practice specialties. EM research can be further subdivided into basic science, clinical, and health services research. A number of research priorities in the prehospital and ED settings have been described.^{96–100}

There is also an urgent need for research in EM pharmacy, both for pharmacotherapy and pharmacy practice. Such research would be facilitated by the development of a practice-based research network, which is a group of practitioners located locally, regionally, or nationally that collaborates on pursuits of scholarly activity.¹⁰¹ Practice research networks can be effective, as a larger group of researchers represents a larger patient population that is more diverse than a single medical center. Practice-based research networks have been successful in other areas of practice and among a wide variety of health care practitioners, including interdisciplinary health care teams.

The role of the pharmacist in research has been described and can be applied to the ED setting.^{102,103} EMPs may participate in ongoing clinical and practice-based research being conducted in the institution, including identifying a research question, providing assistance with patient recruitment and randomization, assisting with research medications, and completing data collection and analysis. EMPs could also assist in securing funding for conducting research in the ED, and, after the completion of research projects, EMPs could participate in the scholarly activities related to research efforts.

Conclusion

EMPs provide many vital services within the ED. The central role of the EMP is to improve patient outcomes by improving patient safety, preventing medication errors, and providing optimized pharmacotherapy regimens and therapeutic outcomes through participation in direct patient care activities and quality-improvement initiatives in the ED. In addition, EMPs can provide education to members of the pharmacy department and other health care providers, as well as patients and their caregivers, and EMPs may participate in research and scholarly activities in the ED.

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Appendix A—Summary of Recommendations

Essential Direct Patient Care Roles of EMPs

Direct patient care rounds: It is critical for EMPs to be accountable for and involved in direct patient care activities, including medication selection and the prescribing process. EMPs should focus on providing direct patient care and will be most effective in doing this when physically present in the ED, working as visible and well-integrated members of the multidisciplinary ED team.

Medication order review: Review of medication orders in the ED should provide the same level of assessment provided to patients elsewhere in the hospital. The role of an EMP in medication order review will vary, depending on site-specific factors. The EMP should develop a triage system to focus the medication order review process on high-risk medications, high-risk patient populations, and emergent situations. The EMP must not be the sole party responsible for ensuring that medication order review occurs in the ED; the pharmacy department should ensure that adequate processes are in place to ensure that all medication orders are reviewed in compliance with federal, state, and local regulations and accreditation requirements. Each institution should strive to identify the optimal balance between accountability for prospective medication order review and direct patient care activities in the ED.

Medication therapy monitoring: EMPs should ensure that medication therapy administered in the ED is safe and ef-

fective by designing monitoring plans for medications administered both in the ED and prior to arrival. EMPs should subsequently provide recommendations for modifications to medication regimens based on the results of monitoring parameters and established goals for therapy.

Patient care involving high-risk medications and procedures: Whenever possible, EMPs should be present at the patient's bedside to assist in the delivery of patient care that utilizes high-risk medications or procedures. EMPs should review the use of high-risk medications in the ED and should assist in the development of processes and procedures to improve patient safety and avoid errors. In addition, EMPs should provide education to ED health care providers related to the use of high-risk medications.

Resuscitation: EMPs should be present during all resuscitations in the ED, including trauma, cardiopulmonary arrest, and toxicologic emergencies. In the resuscitation setting, EMPs should prepare medications for immediate administration, ensure the appropriate administration and dose of medications, obtain medications that are not readily available in the ED, make recommendations for alternative routes of medication administration, answer medication information questions, assist with differential diagnosis, and complete resuscitation documentation. EMPs should be familiar with the recognition and treatment of toxicologic emergencies and should assist in identifying causative agents, with the selection and administration of antidotes and other supportive therapies, and with recommendations for monitoring antidote therapy in conjunction with toxicologists and poison control centers. EMPs should seek training programs relevant to the conditions treated in their EDs.

Medication procurement and preparation: Although the role of EMPs will vary, depending on the needs and resources of the institution, EMPs should be an integral part of the medication procurement and preparation process in the ED. EMPs should be involved in selecting medications stocked in the ED, should ensure safe storage and usage of these medications, should ensure timely turnaround for medications obtained from the central pharmacy, and may assist in the preparation of urgently needed medications. EMPs should be involved with the institution's formulary review and process-improvement committees to assist with formulation of policies regarding medications used in the ED.

Medication information: Medication information is a vital role of EMPs. The medication information needs of the ED cover a broad spectrum of clinical scenarios and patient cases. EMPs should ensure access to appropriate primary, secondary, and tertiary references as needed to respond to medication information requests and must be able to quickly and accurately retrieve the answers to medication information questions using those resources.

Documentation: EMPs should document interventions provided in the ED to allow measurement of improvement in patient outcomes and potential cost avoidance. EMPs should regularly review intervention documentation to identify trends, which may indicate a need to educate ED health care providers or change medication-use procedures. Health care

institutions should support EMPs by providing means to document those interventions.

Desirable Direct Patient Care Roles of EMPs

Care of boarded patients: Based on institutional resources, processes should be developed to identify the pharmacist accountable for providing care to boarded patients. These processes should not compromise the EMP's primary role in ensuring safe and effective use of medications for new patients presenting to the ED. When possible, responsibility for the care of boarded patients should be assigned to the pharmacist who will be responsible for providing care to the patient after admission to ensure continuity of care. At a minimum, the responsible pharmacist should review the medication profile of critical patients, review any high-risk medications, assist with medication dosing, assist with medication procurement, and provide monitoring as necessary.

Medication histories and medication reconciliation: EMPs may assist in the development of a risk-stratification protocol for determining which medication histories will be obtained in the ED. In general, a focus on patients with known or suspected toxicologic emergencies, with known or suspected adverse events from home medication regimens, or with complicated medication histories that will influence ED clinical decision-making should be considered.

Essential Administrative Roles of EMPs

Medication and patient safety: In collaboration with physicians, nurses, and hospital executives, EMPs should assist in reporting medication errors, reviewing reported medication errors, and identifying error trends. EMPs should further assist in developing safe medication practices and processes for prevention of errors, assist in implementing system improvements, and provide staff education when needed.

Quality-improvement initiatives: EMPs or other pharmacy representatives should be extensively involved with quality-improvement initiatives in the ED. EMPs should participate in ongoing efforts to optimize pharmacotherapy regimens through medication-use evaluation and development of medication-use guidelines and pathways.

Leadership duties and professional service: The leadership duties and professional service of EMPs may include involvement at the hospital level, which provides EMPs with an avenue for improving both patient care and medication use. Involvement with local, state, and national professional pharmacy organizations, as well as with other professional health care organizations, will allow for collaboration, leading to further development of EM pharmacy practice and the role of the EMP as an integral member of the ED health care team.

Emergency preparedness: The role of EMPs in emergency preparedness should include education, training, and certification; knowledge of federal, state, and local emergency preparedness and response policies; involvement with institutional emergency preparedness policy development; planning of and participation in planned disaster drills; and education of pharmacy and ED staff.

Desirable Administrative Roles of EMPs

Education: It is desirable that EMPs provide education to fellow pharmacists; other health care providers; pharmacy students and residents; and ED patients, their families, and caregivers.

Research and scholarly activity: There is an urgent need for research in EM pharmacy, both for pharmacotherapy and pharmacy practice. EMPs can be valuable researchers in the ED and should be encouraged to participate in the completion of research projects and scholarly activities. The establishment of pharmacy practice research networks to facilitate the completion of pharmacy-based research projects in the ED setting should also be encouraged.

Appendix B—Recommended Readings, References, and Resources

The following list represents suggested readings that would be useful to readers and should be considered in addition to those references and resources provided in the guidelines. The suggested readings are categorized into applicable categories and are then listed in alphabetical order by the primary author. For additional resources related to specific areas of emergency medicine pharmacist (EMP) service development, implementation, and best practices, please refer to the ASHP Section of Clinical Specialists and Scientists Section Advisory Group on Emergency Care Internet Resource Center (www.ashp.org/EmergencyCare.aspx). In addition to these resources and references, interested parties should seek out relevant resources and references related to local, regional, state, and national regulatory and accrediting agencies.

Internet Resources

1. American Society of Health-System Emergency Medicine Pharmacist Practice Internet Resource Center. www.ashp.org/EmergencyCare.aspx
2. American Society of Health-System Pharmacy Medication Reconciliation Toolkit. www.ashp.org/Import/PRACTICEANDPOLICY/PracticeResourceCenters/PatientSafety/ASHPMedicationReconciliationToolkit_1.asp
3. Institute for Healthcare Improvement: Prevent Adverse Drug Events (Medication Reconciliation). www.ihp.org/IHI/Programs/Campaign/ADEsMedReconciliation.htm

Primary Literature

Initial descriptions of EMP services

1. Berry NS, Folstad JE, Bauman JL, et al. Follow-up observations on 24-hour pharmacotherapy services in the emergency department. *Ann Pharmacother*. 1992; 26:476–80.
2. Culbertson V, Anderson RJ. Pharmacist involvement in emergency room services. *Contemp Pharm Pract*. 1981; 4:164–76.
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12. Whalen FJ. Cost containment of emergency room prescriptions. *Am J Hosp Pharm.* 1982; 39:312–3.

Recent descriptions of EMP services

13. Aldridge VE, Park HK, Bounthavong M, et al. Implementing a comprehensive, 24-hour emergency department pharmacy program. *Am J Health-Syst Pharm.* 2009; 66:1943–7.
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Resuscitation

26. Acquisto NM, Hays DP, Fairbanks RJ, et al. The outcomes of emergency pharmacist participation during acute myocardial infarction. *J Emerg Med.* 2010 [epub ahead of print 2010 Aug 31].
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Toxicology

30. Czajka PA, Skoutakis VA, Wood GC, et al. Clinical toxicology consultation by pharmacists. *Am J Hosp Pharm.* 1979; 36:1087–9.
31. Dart RC, Borron SW, Caravati EM, et al. Expert consensus guidelines for stocking antidotes in hospitals that provide emergency care. *Ann Emerg Med.* 2009; 54:386–94.
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Automated medication dispensing systems

33. American Society of Health-System Pharmacists. ASHP guidelines on the safe use of automated dispensing devices. *Am J Health-Syst Pharm.* 2010; 67:483–90.
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Documentation and cost avoidance

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