DRAFT ASHP Guidelines on Emergency Medicine Pharmacist Services

The American Society of Health-System Pharmacists (ASHP) published its first statement on pharmacy services in the emergency department (ED) in 2008.[1] Since then, ongoing literature that supports pharmacist best practices in the ED has continued, with numerous publications demonstrating that emergency medicine pharmacist (EMP) participation in patient care improved its safety and efficacy. In 2011, ASHP aimed to establish both a consistent approach and ideal practice model for emergency medicine (EM) pharmacy with its publication of the ASHP Guidelines on Emergency Medicine Pharmacist Services,[2] which was developed by the ASHP Section Advisory Group on Emergency Care.

EM pharmacy practice continues to expand, demonstrated not only by the number of EMP specialists working in hospitals, but also by the continued expansion of specialty residency training programs. The number of accredited training programs dedicated to EM has risen from a mere 4 programs in 2006 to more than 50 in 2017.

In addition, national medical organizations, including the American College of Emergency Physicians (ACEP) and the American College of Medical Toxicology (ACMT), have published position statements endorsing the value of EMPs and formally recognize the impact of EMPs on the evaluation and management of EM and toxicology patients.[3,4]

Although EM pharmacy services are now considered standard of care in many U.S. institutions, operational and clinical variabilities make a one-size-fits-all approach to EM pharmacy practice challenging. Ideally, all EDs would have access to EMPs with specialized training in direct patient care roles 24 hours per day, 7 days per week, and there would be

sufficient EMP staffing to allow time for both dedicated direct and indirect patient care activities. However, this is often not feasible, based on the staffing and funding available to pharmacy departments. Furthermore, along with these logistical differences, organizations have different clinical and operational priorities. Some of the logistical variables that EMPs encounter include:

- Whether an ED satellite pharmacy is available for medication preparation and dispensing.
- The size of the ED and number of annual visits.
- The type and setting of the institution (e.g., academic vs. community setting, urban vs. rural).
- The patient populations served and specialty services available (e.g., pediatrics, geriatrics, trauma, burn, stroke, catheterization laboratory).
- Hours of direct patient care service (EMP at bedside presence) in the ED setting.
- Number of full-time equivalents (FTEs) dedicated to EM patient care.
- Whether EMPs have additional patient care responsibilities outside the ED setting.

The scope of direct and indirect patient care services provided by EMPs also varies, including[5]:

- Whether medication order verification occurs prior to medication dispensing.
- Whether medication history or reconciliation oversight is included in pharmacist responsibilities.
- Antimicrobial stewardship responsibilities, including culture follow-up.

- Whether EMPs have primary administrative and quality improvement responsibilities, and dedicated time to complete these tasks in addition to acute patient care.
- The degree to which medication safety review and improvement are incorporated into daily responsibilities.
- The level of medication distribution optimization and technician support available in the ED.

It is important to understand that EDs may function very differently, despite the universal goal of safe, optimized medication therapy–related patient care.

This revision of the ASHP guidelines has a two-fold aim. The first goal is to combine the ASHP statement and guidelines into a single document. Merging these two foundational documents provides one overarching resource for recommendations on how to establish, maintain, and optimize EM pharmacy services in alignment with ASHP's goals. The second goal is to provide an updated roadmap for the functions that are vital to quality EM pharmacy services. One noteworthy difference in this edition is the removal of the concepts "essential" and "desirable."[2] All of the services and responsibilities identified in this document are considered essential, or vital, to EMPs' ability to provide patient-focused pharmacy services in the ED. Recognizing that there will be limitations (as listed above) that may affect an institution's ability to incorporate all of the recommendations stated, these updated guidelines are a framework for reference. Review of this document in collaboration with ED and pharmacy administrators and interdisciplinary EM clinical staff, along with professional judgment of the

EMP, should be taken into consideration when determining how to best implement the recommendations in these guidelines at an individual institution.

These revised guidelines were developed by a group of emergency medicine clinical pharmacy specialist content experts identified by ASHP. The purpose of these guidelines is to provide a framework reference to guide hospitals, health systems, and, particularly, departments of pharmacy that are planning to initiate, expand, or optimize pharmacy services in the ED. The recommendations in these guidelines represent a consensus of professional judgment, expert opinion, and documented evidence. They are written to establish reasonable goals, to be progressive and challenging, yet attainable as best practices in applicable settings. They do not represent minimum levels of practice, and readers are encouraged to exercise their professional judgment in assessing and adapting these recommendations to meet the specific needs of their healthcare organizations.

Patient Care

EM pharmacy practice is unique in both the range of patient acuity and the environment in which care is provided. Each institution and ED is different from others, and so too are the services EMPs provide. When determining how to best utilize available EMP resources to provide EM pharmacy services, hospital leadership should consider the ED's need for prospective order verification, emergency response, medication reconciliation, ED automated dispensing devices and medication delivery optimization, satellite pharmacy management, and other duties deemed necessary to the hospital's needs. Opportunities to address regulatory requirements and medication safety needs may also factor into how EMPs contribute to patient

care. The Joint Commission (TJC) medication management standard for pharmacist first review[6] and National Patient Safety Goals[7] focus on hospital quality indicators related to medication selection, timing, and delivery. The potential effects of patient flow and technology on medication safety in the ED should influence decisions regarding deployment of pharmacy services in the ED. Finally, the contributions pharmacists make to continuity of care from ED admission through hospital discharge should also be taken into consideration.

The Institute of Medicine report, Hospital-Based Emergency Care: At the Breaking Point,[8] recommends including clinical pharmacists on the EM care team to ensure patients' medication needs are appropriately met, to lead system changes to reduce or eliminate medication errors, and to evaluate the cost-effectiveness of medication therapy for the patient and hospital.[8] As part of the interdisciplinary EM care team, pharmacists provide care to patients by

- participating in resuscitation efforts;
- providing consultative services that foster appropriate evidence-based medication selection;
- providing consultation on patient-specific medication dosage and dosage adjustments;
- providing drug information consultation to emergency physicians, emergency nurses, and other clinicians;
- monitoring for patient allergies and drug interactions;
- monitoring patient therapeutic responses, including laboratory values;
- continuously assessing for and managing adverse drug reactions;
- gathering or reviewing medication histories and reconciling patients' medications;

- modifying medication regimens based on collaborative practice agreements for the management of specific patient populations that return to the ED;
- providing vaccination screening, referral, and administration;
- offering patient and caregiver education, including discharge counseling and follow-up; and
- providing information on obtaining medications through patient assistance programs, care funds, and samples.

Large-volume hospitals and major trauma centers may have different EMP needs than lower-volume or rural EDs. However, EMPs are impactful in any arena, with appropriate role delineation. These roles include direct patient care activities, medication selection, medication order review, medication therapy monitoring, patient care involving high-risk medications and procedures, resuscitation, medication procurement and preparation, medication information, documentation, care of admitted patients boarding in the ED, and medication histories and reconciliation. The amount of time spent in these various activities will be different for each EMP based on the needs of the institution, the ED, and the pharmacy department.

In recent years there has been a shift toward focusing EMPs on clinical duties. In a 2009 survey, approximately 50% of institutions had EMPs perform clinical activities.[9] In a repeat survey in 2016, this number increased to >90% of institutions. Respondents estimated the percentage of their time spent on various activities as follows (reported as medians):

- 25% on clinical activities, including pharmacotherapy consultations, drug information requests, toxicology recommendations, patient education, microbiological culture and susceptibility testing follow-up for treatment of patients, and similar activities;
- 15% on emergency response, including cardiopulmonary arrest, trauma resuscitation, myocardial infarction (MI), stroke, and similar time-dependent activities;
- 15% on order processing, including order verification, order entry, medication procurement, and similar activities;
- 10% on medication reconciliation and history-taking;
- 10% on teaching, including precepting students or residents;
- 5% on administrative activities, including accreditation activities, committee work, operations oversight, order set development, and similar activities; and
- 0% on scholarly activities.[5]

Given this information and the expanded training opportunities for this specialty practice, the activities in these guidelines are listed in order of how much time pharmacists across the nation report being involved on them. This approach may help guide new practitioners while still leaving space for individualizing practice to each EMP's unique environment.

Direct patient care activities. The majority of medication errors occur in the prescribing and administration phases of the medication-use process; therefore, it is critical for EMPs to be involved in direct patient care activities, including medication selection and the prescribing process.[10-14] EMPs are most effective in doing this when physically present in the ED. EMPs, in collaboration with other EM 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. EMPs should create a triage system to focus their patient care efforts on those with critical illnesses or urgent needs, on high-risk patient populations, or on specific classes of medications most associated with medication errors.

Medication information. The most common cause of medication errors is a lack of information related to medication therapy.[15] Provision of medication information is therefore a vital role in the practice of all pharmacists, including EMPs. ED-based studies demonstrate that medication information is an important service provided by EMPs, though only half of pharmacy departments reported performing this function.[16-19] In addition, EM healthcare clinicians 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.[18]

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 (IV) compatibility; medication interactions; and identification of unknown medications.[20] EMPs should ensure that access to appropriate primary, secondary, and tertiary references is available to respond to both emergent and non-emergent medication information requests. EMPs must be able to retrieve the answers to medication information questions quickly and accurately using readily available resources, such as computer workstations, mobile applications, textbooks, or other agile resources. A dedicated EMP computer workstation with full internet connectivity can help to ensure the EMP has fast access

to both patient information and online resources needed to answer the wide breadth of questions encountered in the ED.

Resuscitation. EMPs should be present during all critical and acute resuscitative efforts in the ED. Initial studies of the role of EMPs in the resuscitation of trauma patients found improved safety from decreased preventable adverse medication events and expedited time to medication administration.[21-24] EMPs provide value in a number of clinical emergencies, such as stroke, MI, cardiac arrest, intubation and post-intubation care, procedural sedation, and other medical emergencies. The role of EMPs in resuscitation may include 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 clinicians with differential diagnosis, particularly when related to a potential medication-related cause; and completing resuscitation documentation.[25,26] In addition, EMPs should ensure that processes are in place to maintain an appropriate and readily available supply of necessary emergency medications in the ED. Multiple studies support the positive impact of EMPs on specific outcomes in resuscitation. Examples in a variety of acute patient presentations include increased compliance with advanced cardiac life support (ACLS) guidelines,[25] reduced time to administration of antibiotics for patients presenting with sepsis,[27,28] reduced time to analgesia for trauma patients,[29] reduced time to sedation and analgesia after rapid sequence intubation,[30-33] reduced time to thrombolysis for acute ischemic stroke,[34,35] and improved door-to-balloon time for MI.[24] EMPs

have also demonstrated improvement in antibiotic selection and timeliness for patients with open fractures when responding to traumas.[36]

Pharmacist involvement in toxicologic emergencies has been described in the literature for more than 30 years.[37,38] EMPs should be familiar with the recognition and treatment of patients experiencing a toxicologic emergency. Their role should include 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, naturally occurring poisons (e.g., those from plants, mushrooms, or envenomations), and various chemicals.[39,40] 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; assist in the selection and preparation of specific antidotes and other supportive therapies; and provide recommendations for monitoring antidote effectiveness and safety. These services should be provided in collaboration with clinical and medical toxicologists, when available, and local or 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.[41,42]

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 and include but are not limited to the following: the American Stroke Association National Institutes of Health Stroke Scale, American

Heart Association (AHA) Basic Life Support (BLS), AHA ACLS, AHA Pediatric Advanced Life Support (PALS), American College of Surgeons Advanced Trauma Life Support (ATLS), American Academy of Clinical Toxicology Advanced HAZMAT Life Support (AHLS), Emergency Neurological Life Support (ENLS), 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 as appropriate, based on the patient populations they serve. Board certification in pharmacotherapy (BCPS) is strongly encouraged to ensure ongoing expertise in a wide variety of disease states and patient populations.

High-risk medications and procedures. EMPs should be present at the bedside to facilitate 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 participate in efforts to improve the safety of procedures that utilize high-risk medications. These efforts should include evaluation of current processes and the development of new or improved processes and systems that prevent or reduce potential harm and errors. The EMP's role may include aiding in the development of policies and protocols, with a focus on appropriate medication selection, use, monitoring, and management. Recommendations for reducing errors associated with high-risk medications and procedures are available.[13,43-45] For example, use of medication infusion systems with smart infusion technology software and double checks on high-alert medications may be considered.[43,44] In addition, EMPs should provide education and training related to high-risk medications to ED healthcare providers.

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 influence to prevent medication errors.[13] EMPs may serve as liaisons between 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 based on operational workflows.

The options available for medication procurement vary widely. Medications may be available in automated dispensing devices, 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, although a satellite pharmacy is not a requirement. Although a sterile compounding room that meets all the requirements of United States Pharmacopeia general chapter 797 (USP 797) for preparation of IV medications may not be a possibility for most EDs, a laminar flow hood can aid in the sterile preparation of most IV 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.[1] 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 immediate use at the bedside as an exception to the USP 797 standards.[46] Competency should include methods of

compounding, knowledge of potential medication interactions, IV medication compatibility and stability, rates of administration, and skill in using references on these topics.

EMPs should be involved in the decision-making process regarding which medications will be made available immediately within the ED.[47,48] Medications identified as appropriate and necessary for frequent use in the ED should be stored in automated dispensing devices or another location as designated safe by the institution, with appropriate alerts to prevent medication errors.[48] EMPs may assist in the evaluation and management of these medications, including monitoring for appropriate usage, inventory levels, and medication storage per both hospital and regulatory body requirements. Optimization of available medications should occur at regular intervals based on changes in prescribing practices, guideline or protocol recommendations, medication availability, and formulary changes. Inventory and storage replacement should be maintained by pharmacy technician support and should not be the direct responsibility of EMPs.

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. Furthermore, data from medication-use evaluations (MUEs), safety monitoring, and monitoring for adherence to national quality indicators should be used to assist in evaluating medication procurement and preparation processes.

The burden of extended inpatient boarding in the ED, in addition to ongoing high ED patient volumes, requires EMPs to consider the differing medication distribution needs of both outpatient and inpatient populations co-located in the ED. Similarly, the EMP should be

prepared to recognize seasonal fluctuations in medication usage, communicating with purchasers and adjusting stocks accordingly.

Medication shortages have become commonplace occurrences, and EMPs may spend significant amounts of time monitoring for medication availability and providing up-to-date alerts and recommendations to EM clinicians. EMPs should work closely with pharmacy purchasing staff to help plan for alternative therapy recommendations as soon as relevant medication shortages are identified.

Medication order review. TJC standards 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.[6] 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 ED medication order review process will vary between EDs and should be determined by each institution based on its identified needs, staffing structure, and embedded medication-use systems, as well as site-specific interpretation of requirements by regulatory and accrediting organizations.

The role of an EMP should not focus on the ED medication order review process alone but rather should parallel the role of other pharmacy specialists providing direct patient care services within the institution.[9,49-51] A workflow should be developed to ensure that there is

adequate pharmacist support for timely review of medication orders that are not verified by an EMP.[52]

Most 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 incorporate a triage system into the medication order review process to help prioritize evaluation of high-risk medications, high-risk patient populations, and emergent or urgent situations, followed by more routine medication orders. When evaluating medication orders, EMPs should focus on key factors such as appropriateness of the medication and doses, potential medication interactions, and patient-specific factors.[6] Prospective order review by an EMP can significantly decrease medication error rates.[10] Approximately one third of the total medication error interceptions by an EMP occur during medication order review, but the majority occur during consultative activities, often during bedside care; therefore, with limited time or resources, medication order review should not be the highest priority for EMPs.[53] Irrespective of the strategy used to identify medication errors, a high proportion intercepted by EMPs are considered significant or serious.[54] If time and other patient care activities allow, EMPs should be involved in the review process of routine medication orders, including cost-saving initiatives, formulary compliance, and therapeutic substitutions.

Medication therapy monitoring. The identification 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 changes to the regimen are needed. Pharmacist participation in monitoring medication therapy improves clinical outcomes in a variety of settings, including treatment selection, adjustment, and monitoring of chronic disease state therapies, such as diabetes mellitus, hypertension, and hyperlipidemia, and from therapeutic medication monitoring of antimicrobial and anticoagulant therapy in the hospital setting.[55-58] These clinical outcomes include reduced medication errors, lower adverse event rates, increased medication adherence, and increased medication appropriateness, and these outcomes can be translated to the ED setting with EMP services.[58]

To help address chronic therapy issues, EMPs can assess home medications of ED patients and quickly identify any laboratory tests needed to ensure the ED visit is not related to medication effects. Protocols can be implemented for pharmacists to order drug level tests as appropriate as well as any laboratory tests that may be associated with that medication's assessment; such protocols are instrumental in both the critically ill and general ED population.

EMPs should provide recommendations for monitoring parameters for both effectiveness and safety of medications administered in the ED. Given the number of patients in the ED and competing interests for an EMP's time, focusing on high-risk medications should be prioritized (e.g., vasopressors, IV antihypertensives, insulins, analgesic and sedative agents). EMPs should work closely with nursing staff and re-assess patients on these medications to ensure proper response, safety, and monitoring is completed. When appropriate, EMPs should follow up with providers to escalate and de-escalate care.

Documentation. Pharmacist interventions in the inpatient setting improve patient outcomes through optimized pharmacotherapy regimens, monitoring of medication therapy,

and avoidance of adverse medication events.[57] In addition, pharmacist participation in patient care significantly reduces the costs associated with medication therapy.[59,60] In the ED specifically, EMPs improve the medication-use process and patient care by providing recommendations about medication therapy, serving as a medication information resource, and improving patient safety.[10,16,61-66] Cost avoidance has also been documented in several studies.[67-71]

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 healthcare providers or change medication-use procedures. Finally, cost-avoidance documentation may provide the justification needed for further expansion of EMP services.

Healthcare institutions should support EMPs by providing the means to document interventions. Different media are used to document interventions, including personal digital assistants, software programs on institutional intranets, and manual paper systems.[72-77] Electronic systems offer more complete, readily retrievable documentation and shorter entry times than manual systems, without the risk of loss associated with paper records.[78,79] In addition, electronic documentation systems offer the benefit of associating cost avoidance with the documented intervention and making it readily available for data capture.[69] Although determining true cost avoidance can be difficult, there is some guidance available for quantifying this metric with pharmacist interventions.[17,59,60,80-83] In addition to these benefits, electronic documentation of EMP interventions may improve communication with other healthcare providers caring for the patient after transitioning to admitted status. The EMP can

write a note about the patient regarding medication therapy issues or monitoring needs for the next pharmacist assuming care to follow up and ensure appropriate therapy is continued. EMPs also increase the rate of medication error reporting, which, in turn, supports an institution's ability to identify issues contributing to errors and implement measures to prevent future errors.[65] Because up to 90% of adverse events in hospitals go undetected and occur in up to one third of all hospital admissions, error prevention is vital.[84]

Patient education. EMPs are uniquely qualified to provide medication education and information to patients and their caregivers and should play a key role in the delivery of medication information.[67,85] 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 whose visit to the ED was the result of a medication adverse event or error. EMPs may also rely on other EM healthcare 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 or new medication, the importance of medication adherence in disease-state management, or prevention and management of adverse medication events. Education may 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.

Care of boarded patients. ED overcrowding is common.[86,87] There are many obstacles and processes that factor into the timely transfer of admitted patients from the ED to an inpatient bed.[88] Overcrowding in the ED often results in ED staff providing care to patients for long periods of time while patients await admission or physical transfer to an

inpatient bed or to another institution for a different level of care ("boarding").[89] The needs of a boarded patient can vary from simple requests for as-needed medications to complex needs such as critical care management. In addition, EM clinicians may be tasked with the responsibility of initiating and maintaining inpatient levels of care, including routine medications and chronic disease state management. EM clinicians are not specifically trained to provide inpatient care for extended lengths of stay. EMPs are challenged in trying to support prescribers by ensuring thorough medication therapy management on complex boarded patients while continuing to focus efforts on the urgent or emergent needs of newly arrived ED patients.

Processes should be developed, based on institutional resources, to address the needs of boarded patients. Pharmacists and pharmacy departments should evaluate all available resources to support the ongoing level of care needed for inpatients that remain located in the ED (e.g., an EMP or the pharmacist assigned to the area to which the patient will be admitted, or a combination of both, may assume responsibility for the medication-related needs of boarded patients). By supporting this patient influx with additional pharmacist resources, EMPs can maintain their primary role in ensuring the safety and effectiveness of the medication-use process for ED patients. 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 could be assigned to the inpatient pharmacist. Ideally, to ensure continuity of care, the inpatient pharmacist providing care to the boarded patient would be the same pharmacist responsible for providing care 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 boarded patients, with a focus on high-risk medications, medication dosing and procurement, and monitoring, as necessary. When it is necessary to initiate a standing medication 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.

Transitions of care. EMPs can provide a variety of transitions of care (TOC) services. Responsibility for follow-up may be left solely to patients, who often face barriers to receiving ongoing primary care. EMPs can help bridge this gap by ensuring patients understand any changes made to their medication regimen and helping identify and facilitate scheduled follow-up with their primary care physicians or post-discharge clinics. For example, discharge education for anticoagulation provided by an EMP for ED patients resulted in greater patient understanding and decreased return visits.[90] Pharmacist-run TOC programs for patients presenting to the ED with a chief complaint of chronic obstructive pulmonary disease, chronic heart failure, or an asthma exacerbation can provide useful interventions and referral follow-up in an ambulatory care clinic or home-based medication management program.[91]

EMPs have demonstrated to ED staff that EMP review of ED discharge prescriptions can improve patient safety, optimize medication regimens, and improve patient satisfaction.[92] If EMPs are unable to provide this resource, they can serve as liaisons for physicians and triage calls from outpatient pharmacies. EMPs can field the call and identify the options to fix the issue with the discharge prescription, discuss with a physician, and communicate the decision to the outpatient pharmacy. Such a process could more efficiently provide corrective actions to

prescription issues and lead to faster patient care by reducing the amount of physician time spent on these issues.

EMPs can also take an active role in discharge culture review. Many EDs are responsible for managing positive culture results from patients discharged without hospital admission. EMP involvement in ED culture follow-up can decrease time to positive culture review and time to patient or primary care provider notification,[93] lead to a reduction in ED revisits,[94,95] and result in improved appropriateness of changes in therapy.[96] Institutional support for pharmacist-led innovative programs targeting reduced return visits and admissions is important. Pharmacist integration into home-hospital services that facilitate continued treatment at home has demonstrated potential.[97,98] One group targeted ED discharge patients at high risk for not filling antimicrobial prescriptions, provided a full course at no charge to the patient, and demonstrated 50% reduction in return visits within the subsequent 7 days compared to standard of care.[99]

Medication histories and medication reconciliation. Medication reconciliation research has identified several barriers to obtaining an accurate medication history in the ED.[100-106] 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.

Although pharmacists are the health professionals who obtain the most accurate home medication list,[107-110] dedicating a pharmacist solely to medication history collection 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 should 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 or pharmacy technicians) can also be effective in obtaining accurate home medication histories; when possible, they should be incorporated into medication reconciliation procedures.[111-114] Quality reviews of medication histories completed by auxiliary pharmacy staff should be conducted to assess accuracy and to provide guidance for further training opportunities. EMPs may take an active role in providing oversight of such programs in the ED setting.

Opportunities for growth in EMP patient care. Despite improved integration of pharmacists into the emergency care team, there are still opportunities for growth and utilization. Thomas and colleagues reported that 69% of survey respondents provide an EMP for more than 8 hr/day, but 35% of respondents do not provide an EMP on weekends.[5] One editorial advocated for expansion of clinical pharmacists to EDs and argued the current volume of the EMP workforce is inadequate for this high-risk patient population.[115] These inadequacies continue, as there are many challenges to implementation of a dedicated EMP or expansion of current EMP services. Because EMPs do not generate a direct source of revenue, it may be difficult for administrators to realize the added value and cost savings an EMP may provide. However, the quality and efficiency benefits of EMPs, in addition to their contribution to patient safety, may more than offset the costs.[116]

Administrative Responsibilities

As a practitioner in the ED setting, an EMP should help identify and lead quality improvement initiatives relating to direct patient care, medication safety, compliance with hospital and regulatory policies, and adherence to national practice recommendations and guidelines.[117-119] EMPs, or other pharmacy representatives, should be extensively involved with quality-improvement initiatives in the ED and prehospital setting.[120] Participation in interdisciplinary committees with EM healthcare providers and hospital administrators (e.g., pharmacy and therapeutics, infection control, or disaster preparedness committees) will provide EMPs with an avenue for improving patient care processes in the ED. In addition, EMPs have a unique understanding of formulary management and operational issues that may impact therapeutic decision-making. Treatment pathways and medication-use policy should be congruent with nationally accepted practice guidelines and quality indicators. Finally, EMPs can contribute at the system level to assist in implementing safeguards at the point of prescribing and administration, reducing the risk of medication errors.[121]

Medication safety. EMPs play an important role in monitoring and ensuring patient and medication safety in the ED. By its nature, the ED environment is at high risk for patient and medication near-misses and adverse events.[122] EMPs should encourage and assist in maintaining a safe environment for medication and patient safety, and establish an ongoing continuous review cycle for potential process improvements. Such a review could include proactive and continuous monitoring of medication practices; identification of errors and high-risk medications for monitoring; addressing hazardous conditions with potential for harm; and

documentation and review of medication errors, adverse medication events, and near misses.[10,12,21,123]

Medication errors and adverse drug reactions that occur in the ED should be reviewed by EMPs, in an interdisciplinary collaboration with other healthcare 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 (RCA) could identify potential error trends or system failures and contribute to the development of safe medication practices and processes for prevention of future events. RCAs can lead to MUEs of commonly used medications in the ED, as well as those associated with errors.[124,125] Completion of RCAs and MUEs should result in education and future policy or guidelines development. EMPs should be responsible for the development and provision of education to EM healthcare providers on potential sources of errors, the risks associated with errors, and ways to prevent similar errors in the future.

Performance and quality improvement. EMPs have the opportunity and responsibility to collaborate with interdisciplinary teams throughout the health system to ensure best practices throughout the entire institution. By participating or taking on a leadership role in institutional committees and performance improvement initiatives, EMPs can have a significant impact in advancing the role of clinical pharmacists in patient care. EMPs demonstrate value in several administrative or indirect care activities, including regulatory compliance, adherence to core measures for maintenance of hospital certifications (such as stroke, MI, trauma, and sepsis), and the creation of medication-use policy and disease state management pathways. In addition, EMPs can focus a significant portion of their time on

developing and enhancing medication ordering and order set development in electronic health records.

When the ED is evaluating various technologies as part of the medication-use process, the EMP should assist in development, implementation, and assessment of the technology. EMP involvement may include, but is not limited to, automated dispensing devices location and inventory optimization, infusion pump selection, implementation of smart pump technology and medication library updates, crash cart stocking recommendations, or implementation of medication kits for management of emergencies such as anaphylaxis and rapid sequence intubation.

Emergency preparedness. With expertise in pharmacology and toxicology, EMPs are well-suited to prepare for and respond to emergency situations, such as natural disasters; disease outbreaks; biological, radiological, or chemical exposures; mass casualty incidents (MCI); and acts of terrorism. It is essential that EMPs, in conjunction with the department of pharmacy and institutional leadership, participate in emergency preparedness planning.[126-129] Planning and involvement should occur at a minimum at the institutional level, with participation ideally expanding to include community emergency preparedness efforts and beyond. Knowledge of local, state, regional, and national emergency preparedness plans, programs, and support systems, such as mass prophylaxis plans, antidote stocking policies, and the Strategic National Stockpile and CHEMPACK, is paramount in the development and successful implementation of institution-specific emergency preparedness plans.[130] EMPs can also participate in evaluating contingency planning needs for mass discharge of inpatients with "take home pack" style medications (e.g., what medications are included, how many days'

supply, dispensation plan). Planning for care of employees and their families with prophylaxis and treatment to allow them to continue caring for patients during disasters may also be part of the institution's emergency preparedness plan.

Furthermore, hospitals should maintain their own supply of antidotes congruent with national consensus guidelines for lesser exposures. ASHP advises that emergency response planners at the federal, regional, state, and local levels call on pharmacists to participate in the full range of planning issues related to pharmaceuticals, including development of a disaster formulary and inventory management; medication procurement, distribution, and use; and stockpile maintenance and/or acquisition.[42,126,128] EMPs can take a leadership role in ensuring the preparedness level of their institution(s) with respect to medication assessment and needs.

Actively participating in emergency preparedness events, such as disaster or MCI drills, strengthens the ability of EMPs to effectively identify opportunities for improvement within the disaster plan. Another valuable opportunity for EMPs is participation within institutional hospital emergency response teams. EMPs and leadership in the pharmacy department should work together in the development of pharmacy-specific plans that parallel institution-specific plans. Education of ED and pharmacy staff related to emergency preparedness should be among the responsibilities of EMPs.

EMPs can play a pivotal role not only in the development of emergency operations plans, but also in the provision of clinical services during a disaster or emergency. Ensuring the efficacy and safety of the medication-use process is a natural role for pharmacists because treatment of disaster victims invariably involves the use of pharmacologic agents.[127,131]

As appropriate, EMPs should seek out training and certification in emergency preparedness, such as certification for Advanced Hazmat Life Support (AHLS), Basic Disaster Life Support, Advanced Disaster Life Support, and the Federal Emergency Management Agency (FEMA) National Incident Management System training program. In addition, local training programs funded by FEMA exist and are a great resource for hospitals to initiate hospital emergency response teams trained to respond to mass casualty incidents or disasters that may occur inside or outside the institution. Connecting with the institution's emergency preparedness coordinator as well as the local healthcare incident liaison can also create opportunities for EMP involvement in local training programs and drills. FEMA's Center for Disaster Preparedness in Anniston, Alabama, offers courses year-round, with many, such as Healthcare Leadership for Mass Casualty Incidents, which are directly applicable to EMPs. These training programs help to build and strengthen the EMP's knowledge and ability to not only respond, but also help take a leadership role in coordinating necessary response efforts from pharmacy staff.

Interdisciplinary 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. As appropriate for the specific institutional setting, EMPs should play an active role in the education of pharmacy staff, including pharmacists, students, and residents, in addition to other healthcare professionals, such as physicians, medical residents, advanced practice providers, nurses, and emergency medical services personnel. The types and levels of education will vary when balancing patient care and administrative workload. Provision of education to EM healthcare staff, at a minimum, should include information on the appropriate use of

582 medications, improvement in quality and effective medication use, and patient and medication
583 safety. Education may include formal sessions (e.g., in-service or didactic presentation at a
584 conference) or participation in courses such as BLS, ACLS, or PALS; emergency preparedness;
585 disaster management; poisoning prevention and treatment[4]; and immunizations. Participation
586 in formal education sessions may strengthen the relationship with other EM healthcare
587 providers and serves as a method of continuous learning for EMPs. Given the nature of the ED
588 environment, EMPs have a unique opportunity to provide continuous, on-the-spot education
589 via daily interdisciplinary interaction in the ED, particularly at the bedside, which is an efficient,
590 effective tool for education of staff.

591 **Training the pharmacist workforce.** Participation in the didactic and experiential
592 education of Doctor of Pharmacy students is a strongly encouraged, routine part of
593 practice that also supports the development of the profession.[132] Precepting pharmacy
594 residents in EM learning experiences supports the overall development of direct patient
595 care practitioners and provides exposure to the practice of EM pharmacy. To support the
596 growth of EM pharmacy services, the continued development and expansion of EM
597 residency programs is necessary. EMPs must be leaders in this endeavor, using their
598 unique skills and expertise in this practice setting to train the next generation. Although
599 the number of postgraduate year two (PGY2) residency programs in EM has increased
600 significantly in recent years, ASHP advocates for continued emphasis on the expansion of
601 the number of EM-based training opportunities for pharmacists, pharmacy students, and
602 residents. Colleges of pharmacy are encouraged to provide EM-based educational
603 opportunities for students. With the expansion of EM pharmacy services among health

systems, expanding coverage 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 (i.e., PGY2) residency programs after the program is established and the practice experience is significant. Expansion of PGY2 EM pharmacy residency programs will assist in filling the demand gap of highly trained EMPs providing 24-hour clinical pharmacy services. Such residency programs should meet ASHP residency quality standards.[133] These programs should prepare future EMPs for board certification in the specialty most appropriate for their practice.[134] Achievement of the goals, objectives, and expected outcomes of such training can result in a greater ability to provide around-the-clock or on-call EM clinical pharmacist services.[135]

Hospital-based EMPs with experience and interest in teaching should pursue opportunities beyond the standard ones available. Pharmacy resident and student precepting is a typical part of the job for many EMPs; however, faculty appointments at schools of pharmacy and/or medicine present unique possibilities to educate students, residents, and faculty in a more formal setting.

In addition, EMPs can identify opportunities to provide education and training for currently practicing pharmacists not specialized in EM. To train pharmacists not specialized in EM, institutions should create a checklist and minimum competency standards to prepare their staff for the ED environment and ensure they are set up for success in this challenging arena. Training should at a minimum consist of knowledge of pharmacist roles in resuscitations and direct patient care activities, appropriate certifications (e.g., ACLS,

BLS, PALS), knowledge of common EM medications and antidotes, how to triage and prioritize direct patient care in the ED, and other institution-specific practices in the ED setting. Such training may help fill clinical practice gaps and allow for additional support in ED coverage models.

Research and professional development

EMPs can also assume roles in EM-based research and scholarly activity; in professional development, service, and leadership; and in defining future roles for EMPs.

EM-based research and scholarly activity. The Institute of Medicine provides a framework for EM research that further delineates specific areas of focus.[136] Those areas have been identified as EM research (i.e., research conducted in the pre-hospital or ED setting by EM specialists); trauma/injury control research (i.e., research of the acute management of trauma injury), and research contributions that are not specific to but nevertheless impact the care of patients in the ED setting. As a specialty, EM has already helped to define a scope of research priorities over the years.[137-141] What is less clearly defined is how EMPs can support research efforts, through interdisciplinary participation in ongoing EM research or identifying opportunities to lead research in medication therapy and pharmacy specialty care outcomes in the ED setting.

The EM-based pharmacy research compendium continues to grow, exploring the impact of various clinical activities, including anticoagulation reversal,[142] toxicology,[143] naloxone distribution programs,[144] emergency response team participation,[145] and pain management.[29] Other studies describe progress in the medication-use process and EM-based pharmacy

activities.[5,116] Although these studies contribute new knowledge that addresses the varied scope and range of EM pharmacy services, additional information and analysis are still necessary. As a profession and specialty practitioner group, EMPs must continue to provide the necessary evidence that demonstrates the benefit EMPs provide to care in the emergent environment. In addition, EMPs must challenge themselves to incorporate the research priorities described by the Institute of Medicine into their scholarly work, which would require EMPs to think on a broader scope, not only about research topics but also about how to best carry out this work on a larger scale with limited resources. Studies that generate data on therapeutic, safety, humanistic, and economic outcomes of EM pharmacist-mediated process changes are needed. Although not an exhaustive list, specific areas of needed research expansion include the following:

- Clinical outcomes of ED-specific, medication-related interventions:
    - Patient outcomes of ED-specific medication therapy management in transitions of care.
    - Medication efficacy and safety outcomes of high-risk medications in the ED with EMP bedside monitoring.
    - Impact of antimicrobial stewardship in the ED visit.
    - Exploration of tangible cost savings or revenue generation.
- Clinical and operational outcomes of electronic medical record interventions:
    - Impact of EMP electronic medical record development and maintenance on patient safety.
    - Impact of order set or clinical pathway development on patient outcomes.

- Alternative strategies for providing 24/7 access to EMP services:
    - Leveraging non-EMP staff to assist with EMP services.
    - Pharmacy resident resources and patient outcomes.
- Disaster response:
    - Pharmacist–specific impact in disaster response.
- Public health initiatives

Development of a collaborative, interdisciplinary research network among EMPs would facilitate enhanced evaluation of clinical and professional questions of interest.[146] Research networks can help by providing larger and more diverse patient populations in which to conduct research. The ability to collaborate with other EMPs from different practice settings may also help to strengthen the depth and breadth of research being conducted, resulting in studies that have the potential to impact change in EM practice. In addition, EMPs should collaborate with EM physicians in research activities.

Professional development, service, and leadership duties. Hospitals and health systems are encouraged to support EM-based educational programs that produce experts in the field. Postgraduate training of pharmacists will provide a pipeline of clinicians, educators, leaders, and scientists who are experts in and committed to quality emergency care, as well as the expansion of this specialty 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.

Furthermore, participation in professional organizations at the local, state, and national level is essential for the continued growth of the practice of EM pharmacy. 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 healthcare professionals about EM pharmacy practice. At the national level, collaboration among EMPs increases their 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. In addition to promotion from ASHP, pharmacy professionals are encouraged to create strong interdisciplinary partnerships with medical providers, residents, and students. Such collaboration has recently yielded the recognition and endorsement of EM pharmacy services by the American College of Emergency Physicians (ACEP) and American College of Medical Toxicology (ACMT), as demonstrated by statements of support from both organizations.[1,2] By engaging at a national organization level with other disciplines in emergency care, EMPs continue to build the backbone of support needed to encourage funding and resources for expanded EMP practice at the institutional level.

Future efforts. EMPs have demonstrated their value in providing well-rounded clinical and operational medication therapy related services in the ED setting. Their unique training and expertise ensures improved patient safety and optimized patient outcomes in direct patient care. As the future of pharmacy evolves, so too must the EMP. Expanding both the scope of practice and the role within the patient care continuum is important to sustaining and maximizing the benefits of this clinical specialty. In the next decade, EMPs should engage in

activities that serve both the needs of the healthcare team and public health efforts at large. Although some of these efforts are already underway, it will be incumbent upon EMPs to help advance the goals of provider status and collaborative practice agreements, allowing practice at the highest level of licensure.

In addition, public health is an area in which EMPs can contribute. Examples include providing structure to opioid crisis services, such as naloxone distribution and counseling[148] and pharmacist-initiated medication assisted therapy; reducing antimicrobial resistance and reducing sepsis mortality with improved ED-specific antimicrobial stewardship interventions and monitoring[148]; stroke management and meeting core metrics for improved patient outcomes; ED-based pharmacist medication therapy monitoring consult services as a bridge to the outpatient clinic setting; increasing access to EMP services with alternative strategies, such as offsite resources and/or telemedicine[149]; and leadership roles in emergency preparedness and crisis response. EMPs must take the lead in setting the expectation for engagement in clinical and operational ED based services in the future.

Conclusion

The specialized role of EMPs within the scope of pharmacy services continues to be a unique and vital component of both pharmacy services and EM practice. Through a combination of the integral services described in this document, EMPs are able to help ensure the safety and optimization of medical care to patients in the ED. In addition, EMP involvement in administrative, educational, professional development and research activities, both within and outside their respective ED setting, are vital to EM practice, the

735 pharmacy profession, and, most importantly, patient care. Where possible, we encourage
736 pharmacy and hospital leadership to use these guidelines as a tool to help provide the
737 necessary support for development and expansion of EMP services.

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