

## Clinical Pharmacists in Emergency Medicine

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### Abstract

The purpose of this paper is to summarize the need for an emergency pharmacist (EPH) program, discuss the evidence showing that an EPH program is effective, and provide information and resources that can be used by hospitals considering the implementation of an EPH program. EPH programs have existed since the 1970s, but until recently, they have been rare. Their development in the emergency department (ED) is a result of the unique clinical environment that exists in the ED, which is considered high risk for adverse drug events from a systems perspective. The primary aims of the EPH program are to diminish the risks of adverse events and to reduce costs. The innovative EPH program works with the varied staff in the ED to improve medication safety and provide pharmacologic information to staff. This paper provides substantiation of the value of an EPH program and describes the details of the EPH role when optimized for patient safety.

### Introduction

Involvement of clinical pharmacists in patient care in the inpatient hospital setting results in safer and more effective medication use.<sup>1</sup> These pharmacists are typically involved in assuring appropriate prescribing and administration of drugs, monitoring patient adherence to therapy, providing drug information consultation to providers, monitoring patient responses and laboratory values, and providing patient and provider education.

Clinical pharmacy services based in the emergency department (ED) are relatively rare.<sup>2</sup> This is likely due to the unique and complex nature of the ED. The paucity of ED-based clinical pharmacy services is perplexing, given that the ED is known to be a particularly high-risk environment with frequent medication errors.<sup>3</sup> The 1999 Institute of Medicine (IOM) report *To Err is Human* reported that the ED has the highest rate of preventable adverse events among clinical environments studied.<sup>4, 5, 6</sup> EDs care for approximately 110 million patients per year in the United States;<sup>7</sup> 5 percent of these patients experience adverse drug events;<sup>8</sup> 70 percent of these, or 3.8 million events, are thought to be preventable.<sup>9</sup> Clearly, adverse drug events that occur in the ED are a significant public health problem and need to be reduced, but this must be accomplished without making the ED less efficient.

Published reports have asserted that ED-based pharmacists have the potential to reduce iatrogenic harm to patients.<sup>10, 11, 12, 13</sup> Although a pharmacist-based safe-practice intervention

appears to have face value, no study has yet attempted to demonstrate that such an intervention actually reduces preventable adverse drug events in the ED.

The University of Rochester has undertaken a project to implement and optimize a formal Emergency Pharmacist (EPh) Program designed to study the effects of this safe-practice intervention. A large prospective study is underway to quantitatively look at the effect of the EPh program on the rate of adverse drug events and medication-related quality measures.

The purpose of this paper is to provide an overview to institutions considering the implementation of a program that uses clinical pharmacists in the ED. We provide a review of the current literature supporting the use of the EPh. A qualitative study to derive an EPh role optimized for patient safety is also described. In addition to the description of the optimized role, we present practical resources, such as a job description and job qualifications. An updated listing of resources can also be found at [www.EmergencyPharmacist.org](http://www.EmergencyPharmacist.org).

## **Evidence to Support the Value of a Clinical Pharmacist**

### **Medication Errors in the ED**

Data suggest that medication errors are a significant contributor to errors in the ED, as well as in the inpatient setting,<sup>14</sup> and that the prevalence of preventable adverse events in the ED is high.<sup>9</sup> One analysis of adverse drug events reported to a national database showed more than twice as many medication errors resulted in harm in the ED, compared with the inpatient setting.<sup>15</sup> A study analyzing the Centers for Disease Control and Prevention's National Hospital Ambulatory Medical Care Survey from 1992 to 2000 showed that emergency physicians frequently prescribed inappropriate medications for older adults, and that the rate of inappropriate prescribing did not change over the years analyzed.<sup>16</sup>

Another study found that 3.6 percent of patients were prescribed an inappropriate medication in the ED, and 5.6 percent of patients were prescribed one upon discharge.<sup>8</sup> Prescription of an inappropriate medication was associated with worse functioning on components of the health-related quality-of-life score. An Austrian study found that 5.4 percent of patients who received medications had the potential for an adverse reaction.<sup>17</sup> Patients also perceive a risk in the ED. A recent study found that 38 percent of patients presenting to a variety of EDs worried that a medical error might affect them.<sup>18</sup>

### **The High-Risk Environment of the ED**

Many of the system challenges unique to the ED likely contribute to these medication safety issues. Unlike the medication procedures in most health care settings, medications in the ED are usually ordered, dispensed, and administered at the point of care. There is also a higher prevalence of verbal orders, particularly in urgent and high-stress situations.<sup>19</sup> In the ED, physicians usually are not familiar with the patient, and they often do not have access to the patient's complete medical record. As a result, they are not knowledgeable about the patient's medications, medical history, or allergies. Medications are often dispensed directly, without prospective pharmacy review of orders.

In contrast to inpatient wards, where medications are ordered on a routine basis, many medication orders in the ED are unpredictable and time-sensitive, which makes remote prospective review of all orders impractical. In emergency situations, there is also an increased use of higher risk intravenous infusion medications, such as inotropes and sedatives.<sup>10</sup> Physicians and nursing staff often treat multiple patients at once, with frequent interruptions.<sup>20</sup> The ED lacks the ability for direct followup, and thus, adverse interactions between medications prescribed in the ED may go unnoticed by the providers.<sup>17</sup>

Hospital crowding and the boarding of inpatients in the ED also contribute significantly to the high-risk environment in the ED.<sup>21, 22, 23, 24</sup> Nurses and physicians care for patients in the ED using medications with which they may be relatively unfamiliar, and they do so in an overcrowded, overly chaotic environment. As a result, the ED has become a small hospital, caring for emergencies, providing primary care to patients without regular PCPs,<sup>25</sup> and caring for ill patients who wait for scarce inpatient beds. In these chaotic conditions—where inpatients, outpatients, and critically ill patients coexist—few, if any, medication safeguards exist.

## **The Clinical Pharmacist as a System-Level Solution**

Traditionally, error reduction in medicine has focused on the responsibility of the individual health professional and less on the system.<sup>11</sup> Safety experts agree that this is an outmoded and counterproductive method of improving patient safety over time.<sup>26</sup> A systems approach to the reduction of adverse events can create multiple layers of protection that greatly reduces the effect of hazards, before they reach the patient.<sup>27, 28</sup>

Leape and colleagues have described a two-fold approach to the objectives of system design for safety.<sup>29</sup> First, make it difficult for errors to occur, and second, “absorb” errors that do occur. In other words, these hazards should be detected and corrected before harm occurs.<sup>29</sup> The addition of a clinical pharmacist to the patient care team is a systems-level patient safety intervention that serves both of these functions.

The role of the hospital pharmacist has evolved into one that involves active prevention of adverse medication events, in part by screening physician orders for accuracy in dosing, drug interactions, contraindications, and allergies. Traditionally, this role has been carried out remotely from the clinical setting, usually in a centralized hospital pharmacy area.

However, many hospitals have established inpatient and ambulatory clinical pharmacist positions that enable pharmacists to develop personal relationships with nurses and physicians and to have access to more patient information and clinical data. This model increases the pharmacists’ involvement in medication choice decisions tailored to specific patients. It has been shown that pharmacists, as members of an inpatient care team, reduce the number of adverse drug events,<sup>30, 31, 32, 33</sup> and that pharmacist involvement in care is financially advantageous for health care institutions.<sup>34</sup> Several authors assert that including a pharmacist in the clinical team is a critically important patient safety solution.<sup>31, 35, 36</sup> A recent analysis of patient safety practices by the Agency for Healthcare Research and Quality (AHRQ) devotes an entire chapter to describing the clinical pharmacist’s role in preventing adverse events.<sup>37</sup>

When it comes to emergency care, however, the potential of a clinical pharmacist has gone largely unrealized. In a 2000 consensus committee report that included recommendations regarding the initial steps that should be taken to address error in the emergency care environment, there was no mention of pharmacist involvement.<sup>38</sup> Similarly, an article describing teamwork in the ED and its relationship to patient safety did not describe the pharmacist as a member of the team, although the authors did include resources, such as respiratory care, phlebotomy, and diet and nutrition services.<sup>39</sup> Although many hospitals have programs in place in which the pharmacist responds to the ED for cardiac arrests or trauma team activations,<sup>13, 40, 41, 42, 43</sup> almost none have reported programs that involve a clinical pharmacist assigned exclusively to the ED.<sup>12, 44</sup> Some have recognized this deficit, as published reports have asserted that ED-based pharmacists would have the potential to increase patient safety.<sup>10, 11</sup>

See Appendixes 1 and 2 for summaries of the educational requirements for an EPh and a typical EPh job description.

## **The Business Model for an Emergency Pharmacist Program**

No formal scientific cost-benefit studies have been conducted to assess the value of an EPh program. However, many authors have reported estimates of savings related to recorded pharmacist interventions in EDs and other settings.<sup>34, 45, 46, 47, 48, 49, 50</sup> Although there is a need for a large scientific study to assess the cost savings associated with an EPh program, the literature certainly suggests that emergency pharmacist programs have the potential to be cost effective.

Approximately 110 million patients receive care in EDs each year in the United States, more than four times the number of patients who undergo surgery each year.<sup>7</sup> Given these numbers and the evidence that EDs have the highest rate of preventable adverse events of any other clinical environment, adverse drug events that occur in the ED are clearly a significant public health problem in the United States. Thus, the presence of a clinical pharmacist in the ED would seem to be a necessary but so far grossly underutilized intervention.

## **Optimization of the Emergency Pharmacists' Role in Medication Safety**

Although there is mounting momentum to increase the number of EDs that utilize clinical pharmacists, no study has yet attempted to develop an optimized role for the emergency pharmacist. The role of the emergency pharmacist in the study institution has been previously described.<sup>13</sup> We conducted a cross-sectional, qualitative study to develop a formal definition of an optimized emergency pharmacist role in one ED, using qualitative methods, by identifying perceptions and experiences of key stakeholders.

### **Study Overview**

Qualitative data were collected by two researchers using a combination of two qualitative interview strategies: the general interview guide approach and the standardized open-ended approach. Questions were designed to elicit stakeholders' perceptions of how the emergency pharmacist role could be optimized, defined as one that would be most likely to improve the

quality of care and reduce adverse medication events in the ED. Participants were recruited from key stakeholder groups, including attending emergency physicians, emergency medicine residents, emergency nurses, hospital pharmacists, hospital inpatient nurses and physicians, ED patients, and emergency pharmacists. Data were collected during the interviews in the form of field notes that were transcribed within 24 hours by the interviewing investigator.

Data were compiled, coded, and thematically analyzed by a review committee using the framework approach to qualitative analysis.<sup>51</sup> This approach is characterized by a more structured data collection, which allows a focus on a pre-set objective (in this case, to optimize the pharmacist's role in patient safety). The framework approach involves five major steps. The analysis committee:

1. Reviewed the raw data (transcripts) for initial familiarization.
2. Identified themes by which the data could be further examined.
3. Indexed (coded) the data.
4. Sorted the data by these themes (charting).
5. Mapped the range and nature of the emerging themes (interpretation) to extract recurrent concepts and associations.

## Summary of Findings

A total of 43 interviews were conducted before redundancy was reached. Interviewees included 13 emergency physicians, 13 emergency nurses, 9 mid-level providers, 3 ED patients, 2 consultant physicians, 2 emergency pharmacists, and 1 inpatient pharmacist. Several areas of focus were identified, including:

- Visibility of the EPh.
- Involvement in direct patient care.
- Involvement in teaching.
- Surveillance of medication orders.
- Identification of the EPh as a resource for the ED staff.

Based on these themes, strategies were developed to optimize the EPh's role:

- **Maintain high visibility so ED staff members are aware of the EPh's presence.** Staff members felt that periodic rounding through all areas of the ED was important, and that increased visibility in the pediatric and non-acute areas of the ED would be helpful. The continued use of portable telephones and pagers for immediate accessibility was recommended. Participants suggested that signs be posted to signify the status of the EPh (on or off duty), and that the EPh become more involved with review of medication instructions related to patient discharge.
- **Focus attention on ED patients.** Staff perceived that emergency pharmacists' involvement with routine medication issues for inpatients boarding in the ED was interfering with their ability to focus on ED patients. Since boarding patients benefit from protective systems of inpatient pharmacy services, the involvement of the EPh was thought to be redundant. As a

result of this finding, responsibility for boarding patients was formally assigned to inpatient pharmacy personnel.

- **Serve as an educational resource.** Participants highlighted the importance of the EPh as an educational resource. The EPh was perceived as having a role in assisting staff with the administration of beta-blocker medication in acute myocardial infarction and other similar functions. Faculty and residents valued the EPh's distribution of current medication-related articles relevant to the practice of emergency medicine, as well as in providing followup papers to support advice given in the clinical setting.
- **Be present in the ED during peak volume hours, including evening shifts and weekends.** At the time of the study, EPh duty hours were primarily weekdays. Participants overwhelmingly expressed a desire for a shift in coverage to hours that coincided with peak patient volume.
- **Maintain surveillance of provider orders.** In addition to responding to direct queries from nurses and doctors, the EPh role in surveillance of medication orders was emphasized. However, participants did not express a need for 100 percent review of orders but rather a focus on higher risk medications.
- **Respond to all trauma and medical resuscitations in the ED.** Participants reinforced the value of having the EPh present at all resuscitations. Nurses valued their assistance in preparing medications for administration; physicians valued their clinical advice, as well as what they perceived as improved efficiency of the medication delivery system when the EPh was present.
- **Limit time out of unit.** Some participants perceived that the EPh was often called out of the ED for administrative responsibilities (such as committees).

These recommendations are based on staff perceptions at this single academic medical center. Ongoing research will serve to validate the patient safety effects of the optimized EPh role.

## Staff Perceptions of the Emergency Pharmacist Program

A survey of staff at the University of Rochester Medical Center's ED was conducted to evaluate their perception of the EPh role. The details of this study are provided elsewhere,<sup>52, 53</sup> but a summary is provided here. A survey was developed based on the results of the qualitative study. It was sent to a randomly selected subset consisting of half of the 182 eligible staff members; 82 percent of the surveys were returned (42 nurses, 33 providers), 41 percent of respondents spend at least part of their clinical time in the pediatric area.

Respondents felt that the EPh improved the quality of care in the ED, and that an EPh was an integral part of the ED team. In addition, most had consulted the EPh at least a few times during their last five shifts. The results of this survey reveal that the EPh role is highly valued and often utilized by staff when located on site. The staff also perceived that the EPh improved patient safety and quality of care.

Respondents to the survey felt it was important that high-risk and rarely used medications be checked by a pharmacist whenever possible. In addition, respondents who cared for children felt that a mandatory review of certain medication orders for children under 1 year of age would

improve medication safety. The majority of respondents felt that the EPh was helpful with medical and trauma resuscitations, reviews of high-risk medications, and consultations and as a patient educator. Respondents also reported that they tended to consult with the EPh more often than they would if the pharmacist were remotely located. Furthermore, certain valued duties—such as patient education, checking orders, and attendance at resuscitations—are not possible from a remote location.

Our findings support the premise that once this program is established, staff will value it. This survey supports the principle of physically locating the EPh in the ED. We found that physicians and nurses in this academic ED overwhelmingly supported the presence of an EPh and regularly sought the EPh's advice. The physicians and nurses felt that the presence of an EPh improved patient safety and quality of care. These results reinforce the value of the many specific duties carried out by this EPh program, and the results also demonstrate that staff acceptance should not be a barrier to implementation of an EPh program.

These results have important implications for ED and hospital leadership teams that are considering the implementation of an EPh program. Although some may worry that resistance from physicians and nurses could be a barrier to implementation, this study clearly demonstrates that the EPh is seen as a highly valued resource and is sought out by ED providers and nurses in an on-site established program.

## **Conclusion**

The use of clinical pharmacists in the emergency department setting is growing, and we anticipate an increasing demand for this role.<sup>2, 54</sup> We hope this paper will serve as a resource to institutions considering an emergency pharmacist program. Updated resources can also be found at [www.EmergencyPharmacist.org](http://www.EmergencyPharmacist.org).

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## **Appendix 1: Sample Education and Training Requirements for an Emergency Pharmacist position**

- Required: Successful completion of PGY-1 (pharmacy practice residency or equivalent experience).
- Highly desired: Successful completion of PGY-2 in critical care or emergency medicine (General Pharmacotherapy PGY-2 acceptable).
- Highly desired: BCPS certified.
- Required: ACLS and PALS course completion
- Highly desired: ATLS Course Completion (audit).
- Well-versed in medication management and pharmacology in the following areas:
  - Airway management, RSI/Post-RSI sedation.
  - Ambulatory care.
  - Cardiology.
  - Critical care.
  - General medicine.
  - Infectious diseases.
  - Pediatrics.
  - Procedural sedation.
  - Psychiatry.
  - Toxicology/drugs of abuse/overdose.
- Some background in disaster management is preferred.
- An understanding of medication-related quality measures applied in the emergency medicine setting.

Note: this is not intended to be an exhaustive or a prescriptive list, but rather a starting point for institutions that wish to develop a listing of qualifications for a clinical pharmacist whose primary practice responsibility will be in the ED.

## **Appendix 2: Sample Emergency Pharmacist Job Description**

The Emergency Pharmacist is responsible for providing comprehensive clinical pharmacy services for the ED and all associated areas (e.g., pediatrics, trauma, urgent care), including pharmacokinetic and therapeutic consultation. Specific responsibilities include, but are not limited to:

- Provide pharmacy review of high-risk medication orders prior to administration.
- Provide patient-specific medication use teaching for discharge medications when appropriate.
- Focus on cost avoidance and cost savings due to medication use in the ED.
- Facilitate proper information transfer with regard to medication use for patients converted to inpatient registry from ED.
- Work collaboratively with other clinicians and health care providers to implement and maintain innovative disease management programs and clinical pharmacy services.
- Participate in the development of medication management programs within the institution, including clinical guidelines, critical pathways, disease management, and drug use programs.
- Participate in providing didactic and experiential training in clinical pharmacy for PharmD students and clinical pharmacy residents.
- Actively participate in clinical research projects.
- Participate in the professional development and competency of clinical staff. Function as an educational resource for pharmacy staff.
- Assist in the development, implementation, and evaluation of critical care and emergency medicine pharmacy residency programs.
- Keep informed of all local, State, and Federal laws covering the storage, handling, and dispensing of drugs; and interpret each prescription order to determine that it meets all legal requirements.
- Keep informed of the actions, side effects, and proper use of all new drugs as they are made commercially available, as well as of all investigational drugs being studied at this institution.
- Maintain awareness of contemporary trends in the profession through the professional literature and regular attendance at professional meetings, institutes, and seminars.
- Participate collegially in the development of new programs, services, and practices in the education activities of the department and the management and administration of the department.
- Perform other related duties as required.