

Evaluate the Effect of an Emergency Medicine Clinical Pharmacist on Health Care and Anesthesia Staff Satisfaction

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ABSTRACT

Background: In recent years, the presence of clinical pharmacists in the emergency department (ED) has become increasingly recognized for its role in improving medication safety and efficiency. EM pharmacists are involved in direct patient care, assisting with drug information, medication dosing, pharmacokinetic monitoring, and participation in medical and trauma resuscitations. Their role has been shown to reduce medication errors, improve drug delivery, and contribute to better resource management. However, there is limited research on how their presence affects the satisfaction of other ED professionals, particularly health care and anesthesia staff, who are integral to patient care in these fast-paced environments.

Objective: This study aimed to evaluate the impact of an emergency medicine (EM) clinical pharmacist on nursing satisfaction within the emergency department (ED). Specifically, it compared nursing satisfaction with pharmacy services before and after the introduction of an EM pharmacist.

Methods: A pre-post intervention design was utilized to assess nursing satisfaction with pharmacy services, focusing on three key areas: general pharmacy services, pharmacy information technology (IT), and the perceived impact of the EM pharmacist. A 29-question survey was administered to ED health care and anesthesia staff at a 422-bed urban teaching hospital before and one year after the

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implementation of EM pharmacy services. Data were analyzed using descriptive statistics and Chi-square or Fisher's Exact tests.

Results: A total of 52 surveys were completed (22 pre-intervention, 30 post-intervention). Significant improvements in nursing satisfaction were observed in all aspects of pharmacy services. Satisfaction with general pharmacy services increased from 27% to 86% ($p < 0.0001$). Health care and anesthesia staff reported improvements in drug information accessibility, issue resolution, medication delivery time, and IT systems such as the automated medication dispensing (AMD) system. While most health care and anesthesia staff initially believed that an EM pharmacist would improve patient safety and care quality, these perceptions were reinforced post-intervention, with more health care and anesthesia staff agreeing that the EM pharmacist helped prevent medication errors (74% vs. 89%) and supported quality care during resuscitations (79% vs. 93%).

Conclusion: The introduction of an EM clinical pharmacist significantly enhanced nursing satisfaction with pharmacy services, particularly in the areas of drug information, medication delivery, and IT systems. These findings underscore the positive impact of EM pharmacists in improving interdisciplinary collaboration and patient care in the ED.

KEYWORDS: Emergency, Pharmacist, Anesthesia, and staff satisfaction.

1. Introduction

In recent years, the presence of clinical pharmacists in the emergency department (ED) has increased in the United States [1]. The American College of Emergency Physicians officially acknowledged the critical role of emergency medicine (EM) pharmacists in 2015, emphasizing their importance in ensuring safe, effective, and efficient medication use in the ED [2]. EM pharmacists provide a variety of services, including answering drug information inquiries, assisting with correct medication dosing, conducting pharmacokinetic monitoring, and participating in medical and trauma resuscitations [1, 3]. They also contribute significantly to reducing medication errors by directly engaging in patient care activities, preventing verbal order mistakes, serving as medication consultants for prescribers, reviewing medication orders prospectively, and ensuring proper medication administration techniques [4]. Published studies have documented considerable cost savings resulting from EM pharmacists' interventions, primarily due to the prevention of adverse drug events, better resource management/formulary adherence, personalized care, and direct bedside involvement [5, 6].

Despite the growing importance of EM pharmacists within the interdisciplinary team, there is limited published research on how this role impacts other ED professionals. Prior studies suggest that pharmacy services can enhance nursing job satisfaction through strategies like extending pharmacy hours, decentralizing pharmacists, pharmacist-led education, and improving medication accessibility [7, 8]. A few studies have also assessed ED staff attitudes toward EM pharmacists, with

all findings supporting the value of this role [9–11]. However, to the best of our knowledge, no studies have compared nursing satisfaction with pharmacy services before and after the introduction of an EM pharmacist.

Aim of the Study

This study aims to evaluate whether the addition of an EM clinical pharmacist enhances nursing satisfaction scores.

Ethics Approval

The study was exempt from requiring Institutional Review Board approval, as it was classified as a performance improvement project.

2. Methods

This study assessed nursing satisfaction with pharmacy services both before and one year after the introduction of an emergency medicine (EM) clinical pharmacist. All emergency department (ED) health care and anesthesia staff employed at the institution during the study period were eligible to participate. The survey aimed to evaluate three key areas of pharmacy practice that directly influence daily nursing workflows. The first section addressed nursing satisfaction with general pharmacy services, focusing on staff accessibility, timeliness, professionalism, and responsiveness to problem resolution. The second section assessed satisfaction with pharmacy information technology (IT), primarily examining the automated medication dispensing (AMD) system and smart infusion pumps. The third section explored health care and anesthesia staff 's perceptions of having a clinical pharmacist in the ED. For the follow-up survey, the same questions from the third section were asked, but the wording was modified to evaluate the perceived impact of the EM pharmacist.

The study was conducted at a 422-bed urban teaching hospital with a high volume of ED visits annually. The ED nursing staff included both hospital employees and contract agency health care and anesthesia staff , totaling approximately 60 individuals. EM clinical pharmacy services were introduced in the ED, with the pharmacist having completed a two-year postgraduate residency in emergency medicine. The pharmacist was present in the ED during weekdays from 10 am to 6 pm. These services included involvement in medical, trauma, and stroke codes, intubation, procedural sedation, and other time-sensitive emergencies for both pediatric and adult patients. The pharmacist also served as a pharmacotherapy consultant, provided drug information, assisted with order verification, expedited medication delivery, and addressed pharmacy operational issues.

A 29-question survey was developed based on previously published questionnaires assessing satisfaction with pharmacy services [5–7]. Questions that were not relevant to the ED setting were excluded, and others were adapted to fit the local workflow. The final version of the survey received approval from the departments of pharmacy, nursing, and emergency medicine before distribution. The survey used a 5-point Likert scale, with responses ranging from "strongly disagree" to "strongly agree," except for one question where health care and anesthesia staff could select multiple

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answers. Paper surveys were distributed and collected over a two-week period before and after the implementation of the EM pharmacist services. Participation was voluntary, and no personal identifiers were included on the surveys. Completed surveys were collected either at a designated office or by a health care and anesthesia staff administrator.

Data Analysis

Descriptive statistics were used to summarize demographic data provided by the ED health care and anesthesia staff, including sex, shift (day, night, or both), work location (adult ED, pediatric ED, or both), work status (full-time, part-time, agency), and years of experience. Responses on the 5-point Likert scale were grouped into positive or negative responses, where positive included “agree” or “strongly agree” (or the reverse-worded statements where applicable), and negative included “strongly disagree,” “disagree,” or “neutral.” The question with multiple answers was categorized as “yes” or “no” based on whether the option was selected. Differences between pre- and post-implementation responses were analyzed using Chi-square or Fisher’s Exact tests for statements with low response rates. The significance level for all analyses was set at 0.05.

3. Results

A total of 52 surveys were completed during the study, with 22 responses (36.7%) from the pre-intervention group and 30 responses (50%) from the post-intervention group. Demographic data are provided in Table 1.

Comparisons of nursing satisfaction scores between the pre- and post-intervention periods are presented in Table 2. All aspects of general pharmacy services showed improvement after the introduction of EM pharmacy services. A majority of respondents agreed that the pharmacy staff provided more thorough (59% vs. 97%, $p=0.001$) and timely (55% vs. 97%, $p<0.001$) drug information. Health care and anesthesia staff also reported a faster resolution of drug-related issues, such as missing medications and low stock levels, in the post-intervention period (27% vs. 64%, $p=0.012$). Additionally, there were statistically significant improvements in medication preparation time and delivery. Overall, nursing satisfaction with pharmacy services increased dramatically from 27% to 86% ($p<0.0001$) after the EM pharmacist was implemented.

Pharmacy IT-related questions also showed significant improvement, particularly in areas such as AMD system inventory, prevention and resolution of medication stock-outs, and ease of medication removal. Satisfaction with the smart infusion pump library content for medications used in the ED improved from 45% to 80% ($p=0.015$). Although health care and anesthesia staff reported a decrease in inappropriate medication removal through the AMD system (from 60% to 53%), this change was not statistically significant. Many of the equipment and space-related challenges faced by health care and anesthesia staff persisted, but there was an improvement in barcode scanning issues. Dissatisfaction with medications not available in the barcode scanning medication library decreased from 68% in the pre-

intervention group to 31% in the post-intervention group ($p=0.018$).

In the final section of the survey, which focused on the impact of the EM clinical pharmacy services, the results remained largely unchanged between the two study periods (Table 3). Prior to the implementation of EM pharmacy services, most health care and anesthesia staff believed that having an EM pharmacist would improve patient safety and quality of care, and these views remained consistent post-intervention. However, there were notable improvements in certain areas. More health care and anesthesia staff agreed that the EM pharmacist helped prevent medication errors (74% vs. 89%) and supported the delivery of safe, quality care during medical and trauma resuscitations (79% vs. 93%). Additionally, more health care and anesthesia staff felt safer when the EM pharmacist checked orders before administration (79% vs. 93%). On the other hand, fewer health care and anesthesia staff agreed that they preferred utilizing the pharmacist in the ED over contacting the main pharmacy (90% vs. 83%), or that they used the EM pharmacist as a drug information resource (95% vs. 90%), though these differences were not statistically significant.

Table 1: Demographic Characteristics of Nursing Staff

Variable	Baseline (pre-intervention)	One year (post-intervention)
Male—no. (%)	6 (33.3)	4 (13.8)
Shift		
- Days—no. (%)	11 (57.9)	18 (64.3)
- Afternoon/Evening—no. (%)	4 (21.1)	5 (17.9)
- Nights—no. (%)	2 (10.5)	4 (14.3)
- >1 shift—no. (%)	2 (10.5)	1 (3.6)
Location		
- Adult—no. (%)	12 (63.2)	15 (60.0)
- Pediatric—no. (%)	0 (0)	1 (4.0)
- Both—no. (%)	7 (36.8)	9 (36.0)
Work Status		
- Full-time—no. (%)	21 (95.5)	27 (93.1)
- Part-time—no. (%)	0 (0)	0 (0)
- Agency—no. (%)	1 (4.5)	1 (3.4)
- More than 1—no. (%)	0 (0)	1 (3.4)
Mean years as RN \pm SD	14.7 \pm 14.0	12.2 \pm 12.5
Mean years as RN at current institution \pm SD	10.7 \pm 11.3	9.6 \pm 11.2

No statistical differences in any demographic endpoint

RN = Registered Health care and anesthesia staff

Table 2: Survey Responses for General Pharmacy and Pharmacy IT

Question	Percent of Health care and anesthesia staff in Agreement (Pre-intervention)	Percent of Health care and anesthesia staff in Agreement (Post-intervention)	p value
General Pharmacy Services			
1. The pharmacy staff are easily accessible (by phone or in person)	64	86	0.095
2. When I interact with the pharmacy staff, they are courteous and professional	67	90	0.073
3. I know at least one pharmacist by name that I can call	50	72	0.145

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4. Orders are verified in a timely manner (<30 min)	29	55	0.086
5. The medications I receive for my patients are correct (in regards to drug, strength, dosage form, etc.)	86	100	0.074
6. If I have a medication related question, the pharmacist is able to answer it completely	59	97	0.001
7. I receive a timely response to drug-related questions (<30 min)	55	97	<0.001
8. There is a timely resolution of drug-related problems when brought to the pharmacy's attention (e.g., missing meds, low stock levels)	27	64	0.012
9. Routine medications being prepared in main pharmacy are delivered in a reasonable time frame (<1 h)	14	69	<0.001
10. STAT medications coming from pharmacy are delivered in a reasonable time frame (<30 min)	18	59	0.005
11. When I notify pharmacy that I am picking up medications, they are usually ready by the time I arrive	32	69	0.012
12. Unused/return drugs are dealt with in a timely manner	41	52	0.573
13. The service I receive from pharmacy fulfills my expectations	27	86	<0.0001
Pharmacy IT Services			
14. The AMD systems contain the majority of medications needed in the ED	57	87	0.024
15. Medications from the AMD system are easily retrievable	43	80	0.009
16. I currently inventory out the majority of medications I retrieve from the AMD system	60	53	0.773
17. The AMD systems are appropriately stocked to prevent stock outs	19	70	0.001
18. When a medication stock out occurs and is brought to the attention of pharmacy, it is resolved in a timely manner (<1 h)	19	69	0.001
19. When using smart pumps, all medications have a specific profile (in other words, no medications have to run as basic infusions)	45	80	0.015
20. The greatest challenge(s) to KBMA (barcoding of medications) include (circle all that apply):			
- A. Not enough computers	90	76	0.286
- B. Not enough space for C.O.W. (computer on wheels)	74	76	1.000
- C. Equipment (e.g., scanner) malfunction	79	83	1.000
- D. Medication not in KBMA drug library	68	31	0.018

Note: Agree statements include the total of “agree” plus “strongly agree” responses expressed as percentages or, in the case of reverse-worded statements, “disagree” plus “strongly disagree” responses.

ED = Emergency Department, AMD = Automated Medication Dispensing, KBMA = Knowledge-Based Medication Administration, STAT = Immediate.

Table 3: Comparison of Perceived vs. Actual Satisfaction of EM Pharmacist

Question	Health care and anesthesia staff ' Perceived Impact of EM Pharmacist at Baseline (Pre-intervention) Agree (%)	Health care and anesthesia staff ' Satisfaction with EM Pharmacist at One-Year (Post-intervention) Agree (%)
21. Having an EM pharmacist has improved quality of patient care in the ED	100	97
22. I use the EM pharmacist as a drug information resource	95	90
23. An EM pharmacist is an integral part of the ED team	94	93
24. I make more use of the pharmacist located in the ED compared to when I have to call the main pharmacy to speak with a pharmacist	90	83
25. I feel safer with an EM pharmacist checking orders before I administer the medications	79	93
26. Having an EM pharmacist prevents medication errors	74	89
27. The presence of an EM pharmacist during trauma and medical resuscitations has enhanced my ability to deliver safe, quality care to patients	79	93
28. The EM pharmacist is a valuable resource as an educator for counseling patients regarding their discharge medication(s)	90	86
29. The EM pharmacist is a valuable teaching resource for health care and anesthesia staff regarding medication-related topics	90	90

Note: Questions 21–29 reflect the wording used in the one-year survey, therefore wording was slightly different for the baseline study.

ED = Emergency Department

4. Discussion

Decentralizing pharmacists and increasing their involvement in interdisciplinary teams has been shown to enhance satisfaction. The results from our survey indicate that the presence of an emergency medicine (EM) clinical pharmacist improves nursing satisfaction with general pharmacy and pharmacy IT services while meeting perceived expectations. These findings align with previous studies [7–11]. For instance, Chevalier et al. [7] examined three key areas where clinical pharmacists

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could influence nursing satisfaction in surgical/gastrointestinal units: central pharmacy performance, fulfillment of perceived pharmacist responsibilities, and enhancement of nursing practice. Their results demonstrated a significant improvement in the overall quality of pharmacy services, increasing from 85% before pharmacy service implementation to 95% after ($p < 0.0001$). Similarly, our survey incorporated questions related to central pharmacy performance, showing similar improvements. In both studies, the timely resolution of drug-related issues and the preparation/delivery of medications showed the greatest gains. Chevalier's team also explored how pharmacists can enhance nursing practice, a theme we included in the third section of our survey tool. Both studies found that health care and anesthesia staff felt the presence of a clinical pharmacist improved patient safety (by preventing medication errors) and boosted their confidence in the appropriateness of orders, ultimately enhancing the ability to deliver safe, quality care to patients.

Matthias and colleagues developed a survey to assess nursing satisfaction with hospital pharmacy services, focusing on pharmacist accessibility, medication delivery accuracy, quality of drug information services, and health care and anesthesia staff ' perceptions of pharmacists' value [8]. Originally conducted in 2000 and repeated in 2004 after expanding several pharmacy programs, this survey included many questions incorporated into the second section of our survey (Pharmacy IT). Matthias' study found health care and anesthesia staff were most satisfied with drug information accuracy and the benefits of decentralized pharmacists, while they expressed dissatisfaction with medication accessibility and pharmacy telephone services. While their study showed a slight decrease in satisfaction with automated medication dispensing (AMD) systems (3.6 vs. 3.3, $p < 0.001$), our results showed significant improvements in satisfaction with medication inventory. This improvement is likely due to the presence of a dedicated pharmacist working directly in the ED, who was able to identify gaps in medication procurement processes. For instance, changes in the electronic medical record (EMR) configuration of frequently used medications made dispensing more efficient, and the development of adult and pediatric order sets provided clinical decision support to ensure the availability of the most appropriate medication therapy. Moreover, the EM clinical pharmacist proactively assessed and adjusted the AMD system inventory to prevent stockouts. With the pharmacist's recommendation, the pharmacy department also began batching commonly used medications for faster turnaround times, leading to more timely medication administration. The EM pharmacist served as a key liaison between nursing and pharmacy for medication-related issues.

Although our study focused on health care and anesthesia staff , other studies have also assessed provider attitudes and satisfaction with inpatient clinical pharmacy services [9–14]. In countries outside the United States, where clinical pharmacy services have only recently been introduced, providers have generally welcomed the role of clinical pharmacists, though their expected scope of practice varies [12–14]. Many providers acknowledged the significant contribution of pharmacists to patient care through education, participation in rounds, and involvement in therapeutic

planning with the healthcare team. However, some expressed reservations about pharmacists engaging in advanced clinical activities like modifying treatment regimens, prescribing medications, and treating minor illnesses [13, 14]. In the U.S., three studies specifically focused on EM clinical pharmacy services [9–11]. Elenbaas et al. [9] found that all providers and health care and anesthesia staff believed the EM pharmacist was a vital member of the ED team and contributed to patient care and educational programs. Most providers also felt that the pharmacist could provide primary care for select patients once the diagnosis had been made by a physician. Similarly, Fairbanks et al. [10] conducted a survey that showed the majority of participants (both providers and health care and anesthesia staff) felt that EM pharmacists improved patient care, were integral to the team, and were highly utilized throughout their shifts. Coralic et al. [11] surveyed providers and health care and anesthesia staff to assess perceptions of a newly implemented EM clinical pharmacy service, with respondents indicating that the pharmacist's availability for consultation and participation in codes/resuscitations maximized their contribution to medication safety. Additionally, they preferred consulting with an EM pharmacist over one located elsewhere. The key distinction between our study and the previously published surveys is that we measured the change in nursing satisfaction before and after the implementation of EM clinical pharmacist services, whereas the other studies evaluated perceived impact at a single point in time post-implementation.

In our study, the EM pharmacist was able to deliver services that met health care and anesthesia staff's expectations before the service was implemented. Although we observed slight decreases in agreement on a few questions, none were statistically significant. Upon further analysis, we found that these minor decreases were primarily driven by overnight nursing staff, who do not work directly with the EM pharmacist. This group was included in the survey since many system changes initiated by the EM pharmacist affected nursing practices even outside of their working hours. However, questions specifically related to direct utilization of the EM pharmacist at the bedside may have been influenced by this factor.

There are limitations to our study. The nursing participation rate was low, and nursing turnover occurred during the study period, meaning not all the same health care and anesthesia staff completed both surveys. Response bias may also have impacted our results, as health care and anesthesia staff may have felt compelled to participate or provide socially desirable responses due to professional relationships with the EM pharmacist. To minimize this potential bias, survey responses were kept anonymous. Another limitation was the lack of validation for our survey before distribution. While the tool was initially created for a performance improvement project, it expanded in scope after the baseline survey was conducted. Despite not validating the survey, many of its questions were drawn from previously validated studies.

5. Conclusion

The implementation of emergency medicine clinical pharmacist services led to improved nursing satisfaction regarding general pharmacy and pharmacy IT services

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when comparing baseline and one-year satisfaction scores following the service's introduction. The EM clinical pharmacist effectively fulfilled the health care and anesthesia staff ' perceived expectations for their role.

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