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Original Contribution

A study of time saved by emergency medicine physicians through working with clinical pharmacists in the emergency department

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ABSTRACT

Purpose: To describe quantitatively the impact on physician efficiency when an Emergency Medicine Clinical Pharmacist (EMCP) is available to Emergency Department (ED) physicians while working under a collaborative care agreement in a Michigan-based Health System.
Methods: Four EMCPs each logged and categorized their time during 14 ten hour shifts, for a total of 56 shifts or 560 total hours worked. There were nine categories observed including: culture call back, urine, blood, or other culture follow up, antibiotic changes, patient call-backs, pharmacy call backs, critically ill, and general questions.
Results: EMCPs saved ED physicians an average of 75 min per shift, with the highest yield categories being general questions (25.2 min per shift (mps), standard error (SE) = 2.67), critically ill patient service (11.5 mps, SE = 2.66), and urine culture follow-ups (11.3 mps, SE = 1.05).
Conclusions: EMCPs in the ED save physicians a significant amount of time per shift, and categorically the most time saved was in fielding general questions, time spent with critically ill patients, and following up on urine cultures. The time saved by physicians could translate into more patients seen per shift.

1. Introduction

Emergency Medicine Clinical Pharmacists (EMCP) with postgraduate residency experience and/or advanced training in the emergency department (ED) are becoming more common in hospitals nationwide [1]. EMCPs are capable of providing many different services to support patient care within an ED including: review of positive culture results, management of inquiries from community pharmacies, provision of medication information and related education, participation in medication consultation, collaboration in the care of acute patient populations and various other clinical activities that enhance the efforts of staff providing emergency care [2].

Maximizing physician efficiency is increasingly important as ED crowding, long wait times, and total patient encounters continue to rise [3]. Institutions continue to identify mechanisms by which they can improve ED physician efficiency; and the results from the literature demonstrate that the availability of a physician Emergency Medicine residency program can increase the number of patients an attending physician can see per shift [4]. Similarly, the evidence suggests the use of personnel such as scribes (whom help dictate physician's charts and input orders) can also increase the number of patients an ED provider can see per hour [5]. Additional research has noted that the use of ancillary staff scheduling (regarding appropriate shift scheduling times and number of ancillary staff) can reduce the burden of high volume times in the ED [6].

Prior studies indicate improved patient outcomes when there is EMCP involvement in patient care activities such as urine culture follow up [7], as well as all other cultures including the collection of blood, stool, wound, CSF, throat, and respiratory samples [8]. Additionally, EMCPs have been shown to improve medication safety and provide pharmacologic information to staff [8]. Current literature, however, does not attempt to quantify the amount of provider time saved by working with EMCPs. Thus, the aim of this study is to quantify the improved efficiency of physician care by evaluating physician time saved when an EMCP is available to ED physicians while working under a collaborative care agreement in a Michigan-based Health System. Therapeutic interchanges are specific and covered under the collaborative practice agreement, which is a document stating the allowed interchanges and is agreed upon by all four EMCPs and ED physicians at these two hospitals [9]. It should be specified that two of the collected data points, general questions and time with critically ill, do not fall specifically under the collaborative care agreement. These two things, however, are a function of the EMCP being present and available in the ED and do fall under the umbrella of a general work collaboration. Please see appendix A for details of the collaborative care agreement.

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Table 1
Average time saved by pharmacist for collected culture variables.

Pharmacist	Culture call-back	Urine culture f/u	Blood culture f/u	Other culture f/u
A ($N = 14$)[a]	2.86 mps	13.0 mps	1.79 mps	8.21 mps
B ($N = 14$)	2.15 mps	12.9 mps	1.86 mps	7.27 mps
C ($N = 14$)	18.4 mps	18.4 mps	4.26 mps	10.3 mps
D ($N = 14$)	6.71 mps	6.71 mps	15.1 mps	0.29 mps
Mean	7.5 (SE = 1.5)	11.3 (SE = 1.05)	2.1 (SE = 0.82)	6.5 (SE = 1.59)

mps = average minutes per shift.
SE = standard error.
[a] The number of shifts recorded per pharmacist.

2. Methods

2.1. Study design

This was a prospective, observational, exploratory descriptive study of two community based hospitals in West Michigan with a combined census of 109,600 ED visits (2016). The study was approved by the Mercy Health Regional IRB. There were, at the time of this study, 4 EMCPs who alternate between the two campuses working 10 h shifts from 1 pm to 11 pm (typically the busiest hours in the ED) 7 days a week. The EMCPs work collaboratively with ED physicians at each campus to facilitate the pharmacologic aspects of patient care. Data collection occurred over the course of 14 shifts from each of the 4 pharmacists, to achieve a total of 56 ten hour-shifts or 560 EMCP hours of data. Data was collected from February 19, 2018 to March 18, 2018.

2.2. Study procedures

The EMCPs employed at each campus contributed to daily data collection to describe and quantify their activities and the time attributed to patient care. Each EMCP utilized a stopwatch to measure the time taken to perform any task considered to be a responsibility of the attending ED physician if the EMCP was not present or available. They recorded the time to complete the following designated activities: culture call-backs, urine, blood, and other culture follow ups, antibiotic change, patient call back, pharmacy calls, time spent with the critically ill, and time fielding general questions from ED staff. After each shift the form was placed in a lock box in the ED. Data was then entered into a spreadsheet by study staff and descriptive analysis was performed.

Culture call-backs entail the need for someone to follow up on the results of urine, blood, stool, or cerebrospinal fluid cultures (which usually take around 24 h post-specimen collection) and alter treatment as needed. For the purpose of this study, the EMCPs documented all activities related to culture follow up and treatment management, as well as recorded the time attributed to each activity on a shift by shift basis using the attached data collection tool (appendix B). Another category of data collected included the time EMCPs spent fielding calls from outside pharmacies to clarify prescription dosing or provide an alternative prescription due to patient allergies or insurance conflicts. Time spent on acute patient care activities was also logged, which included when the EMCPs assist the attending ED physician with medication management, toxicology assessments and other patient care measures as delegated. Lastly, the EMCPs logged time spent answering pharmacologic questions by staff and/or patients.

3. Results

Total time saved throughout all shifts came to 69.8 h, or a mean of 75 min per shift. The most high yield categories by mean minutes per shift (mps) came in the form of general questions (25.2 mps, standard error (SE) = 2.67), time spent with critically ill (11.5 mps, SE = 2.66), urine culture follow up (11.3 mps, SE = 1.05), culture call-backs (7.5 mps, SE = 1.47), and other culture follow ups (6.5 mps, SE = 1.59). The least utilized of the measured categories included calls from pharmacies (3.1 mps, SE = 0.86), patient call backs (2.8 mps, SE = 1.04), blood culture follow ups (2.1 mps, SE = 0.82), and changes made to antibiotics (4.7 mps, SE = 1.01) (Table 1 and Table 2).

4. Conclusions

EMCPs saved ED physicians 75 min per shift on tasks that would typically be their responsibility without the EMCPs presence. Aside from the raw number of minutes saved, the EMCPs also spared the physicians from distractions and interruptions in their work flow. This is important in minimizing errors [10]. A factor that would be difficult to quantify is the increase in confidence and decrease in cognitive load an ED physician may feel when a pharmacist is present. Particularly with a critically ill patient where time is essential and cognitive errors are common, the presence of an EMCP is helpful for critical pharmacologic management [11].

The results of this study prompted several conclusions. First, it is clear that EMCPs save ED physicians a substantial amount of time when they are present. If the study finding of 75 min per shift is utilized, that would equate to the ED physician being able to see approximately 2 to 3 more patients per 10 h shift, at the national rate of ED physicians of 2 patients per hour [12]. Secondly, with the greatest effect noted with time spent in fielding general questions, critically ill, and urine culture follow ups, a hospital looking to implement an EMCP program but without the resources for a full time EMCP group could have their hospital pharmacists assist with these highest yield items (Fig. 1).

The activity, as well as the number of minutes spent on these activities, can be highly variable, but as previously noted, the activity as well as the time attributed to each activity on a shift by shift basis was documented by the involved EMCP using the study's data collection tool. Included in these time estimates was the time taken to document treatments within an electronic health record. No patient specific information was collected or recorded.

Implicit to all of the above is trust, collaboration, and communication between the ED physician and EMCP. Critical to this is the defined collaborative care agreement that specifically defines roles and responsibilities for each partner (appendix A). Overall, this study shows a significant benefit for a collaborative relationship with ED physicians and EMCPs.

Table 2
Average time saved for calls and other variables.

Pharmacist	Antibiotic change	Patient call back	Pharmacy calls	Critically ill	General questions
A ($N = 14$)[a]	8.64 mps	0.00 mps	2.43 mps	15.4 mps	38.4 mps
B ($N = 14$)	3.74 mps	8.98 mps	4.59 mps	11.8 mps	26.5 mps
C ($N = 14$)	4.92 mps	2.29 mps	2.06 mps	8.07 mps	23.5 mps
D ($N = 14$)	1.68 mps	0.00 mps	3.21 mps	10.6 mps	12.7 mps
Mean	4.7 (SE = 1.01)	2.8 (SE = 1.04)	3.1 (SE = 0.86)	11.5 (SE = 2.66)	25.2 (SE = 2.67)

mps = average minutes per shift.
SE = standard error.
[a] The number of shifts recorded per pharmacist.

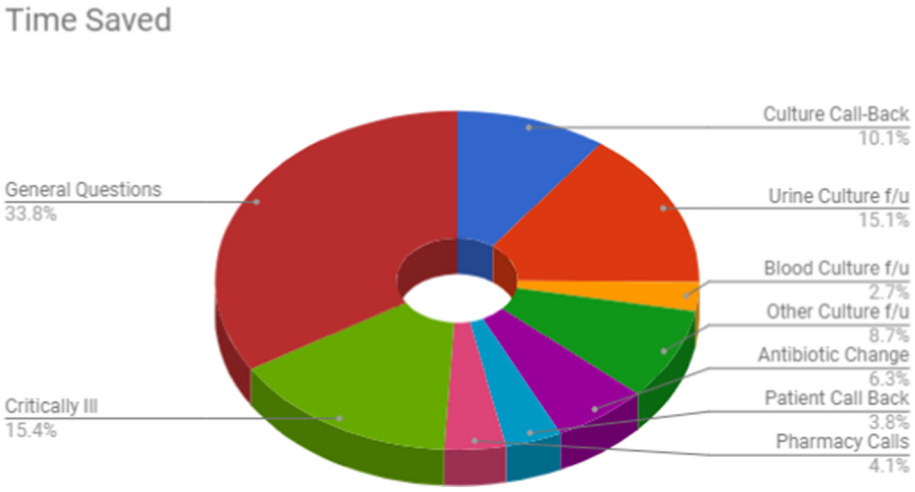

Fig. 1. Percentage of total time saved overall by category.

It should also be noted that EMCPs serve many other functions in the ED including critical medication procurement, assisting nurses with medications, and their presence provides another consistent presence to offer advice and suggestions [13]. EMCPs purposes extend well beyond simply saving ED physicians time.

4.1. Limitations

There is potential for human error when utilizing the method employed here (a stopwatch) to time events. Times could have been accidentally elongated or shortened, although we believe this risk to be minimal. There could have been a lapse in memory to record some events entirely. A future study could include a more accurate timing method such as a third party personnel that does the timing instead of the pharmacist themselves. The pharmacists were only present 1 pm–11 pm, which are on average the busiest hours in the ED, though this varies due to the inherent unpredictability of the ED environment. The time of day and number of pharmacists needed would greatly depend on the size and business of individual EDs. Additionally, this study cannot assess exactly how "general fielding of questions by pharmacists" would have impacted the ED physician had the pharmacist not been present.

There is ample opportunity for follow up studies in which greater accuracy of measurements could be achieved. The same or similar protocols in this study could be used to compare between different EMCP groups in different health systems, taking into consideration relevant similarities or differences in characteristics of their respective health systems. Varying factors that could affect data at different institutions include: volume, acuity, trauma designation, and practice patterns. Another important follow up study could look more specifically at how EMCPs impact improved patient care, which this study did not specifically assess and is the true goal of all of those who work in healthcare. A cost-analysis is another potential future study subject. This could further explore the implications involved with saving 75 min of physician time, if that truly correlates to increased patients seen, and if this cost differences validates the addition of EMCPs to the ED from a financial perspective. Though this study certainly does have limitations and the methods of recording likely contained some small errors, we believe the same conclusions apply and that the results were not dramatically affected.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajem.2018.12.028.

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