RESEARCH

Impact of Pharmacy Student Interventions in an Urban Family Medicine Clinic

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Objectives. To determine the number of interventions made by pharmacy students at an urban family medicine clinic and the acceptance rate of these recommendations by the healthcare providers. The secondary objective was to investigate the cost avoidance value of the interventions.

Methods. A prospective, unblinded study was conducted to determine the number and cost avoidance value of clinical interventions made by pharmacy students completing advanced pharmacy practice experiences (APPEs) in an urban family medicine clinic.

Results. Eighteen students completed this experience in the 8 months studied. Of the 718 interventions performed, 77% were accepted by physicians, including 58% of the 200 interventions that required immediate action. Projected avoidance was estimated at $61,855.

Conclusion. The clinical interventions by pharmacy students were generally well received by healthcare providers and resulted in significant cost savings. Pharmacy students can play an important role in a family medicine clinic.

Keywords: pharmacy students, clinical interventions, family medicine, advanced pharmacy practice experience

INTRODUCTION

Students enrolled in a doctor of pharmacy (PharmD) degree program complete various advanced pharmacy practice experiences (APPEs) prior to graduation. As per the Accreditation Council for Pharmacy Education accreditation standards for the PharmD program, students are required to be directly involved in patient care under the supervision of preceptors.[1] Unfortunately, clinical APPE sites for pharmacy students may be limited in some areas of the Northeast because medical personnel are not aware of pharmacy students' value in ambulatory care.

There are several examples in the literature documenting pharmacy student interventions in clinical settings.[2-9] However, the majority of these describe interventions performed in an inpatient setting. Another literature review documented 35 studies involving pharmacy students' interventions, but only 7 took place in ambulatory care clinics.[2] While the specific types of interventions were not noted, the acceptance rate for these recommendations varied from 32% to 98%. The range of acceptance rates was attributed to differences in how the recommendations were delivered to the physicians. The study with

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the lowest acceptance rate used facsimile as a mode of communication, whereas studies with higher acceptance rates provided the recommendations verbally. None of the studies involving ambulatory care included a cost analysis for the students' interventions. Increased documentation is needed in the ambulatory setting to show the value of pharmacy students in primary care clinics. This research examined the clinical relevance and monetary value of pharmacy students' interventions in a family medicine ambulatory care clinic.

The primary objective of this study was to determine the type and number of interventions presented by pharmacy students in an ambulatory care family medicine clinic and the acceptance rate of these recommendations by attending physicians, family medicine residents, and physician assistants. The secondary objective was to investigate the potential cost savings or cost avoidance associated with the interventions made.

METHODS

Students from St. John's University College of Pharmacy & Health Sciences had the option to choose an urban family medicine clinic located in New York City for their APPE. The clinic cares for a largely minority (Hispanic and African-American) and economically disadvantaged population. The clinic's preceptor, an associate clinical professor at St. John's University and

registered pharmacist in the state of New York, had been a practicing clinical pharmacist at the clinic for 6 years at the time the study took place. The pharmacy preceptor's clinical duties included providing medication-therapy management, diabetes education, and smoking-cessation counseling to patients. Additionally, the pharmacist also assisted in precepting family medicine residents during some of their clinic sessions. Typically, 2 students per month for 9 months out of the calendar year completed 4-week, full-time practice experiences at the site. While completing their APPE, pharmacy students were required to be at the site 8 hours per day, 5 days per week. Four hours of each day were spent in direct patient contact at the clinic.

At orientation, the preceptor reviewed with the students how to obtain a medication history from the electronic health record, fill out medication health cards for patients (Appendix 1), and detect possible medication-related issues that might be relevant to the management of the patient's disease state. The students were instructed to go through the list of scheduled patients prior to or at the beginning of their clinic session. Their initial focus was to target patients who had been prescribed 4 or more maintenance medications so that a medication health cards could be filled out with the patient. If this type of patient was not available at a given time, other patients were targeted, including those for whom fewer medications had been prescribed but who had not achieved the therapeutic goal for any of their medical condition(s), as evidenced by laboratory test results or vital markers. Each student was given time to review the health records and had the opportunity to discuss the plan of care with the preceptor prior to seeing the patient. The student would then meet with the patient in the examination room prior to the physician or nurse practitioner seeing him/her. If there was a discrepancy regarding the patient's medications, the suggested intervention(s) was given verbally to the provider. For patients who required numerous interventions, students also personally provided the suggestions in writing to the provider for reference later/as a reminder. If medication changes were made during the physician visit, the student adjusted the medication health card afterward to reflect the change. Students shadowed the preceptor on their first day of clinic to view this process prior to performing these tasks. Every intervention occurred under the supervision of the pharmacy student preceptor. Students also researched and answered any drug-information questions asked by medical personnel in relation to clinic patients, and the responses were verified by the preceptor. Pharmacy students were required to follow up in the electronic health record to determine if the intervention had been accepted within 24 hours of the patient encounter.

Each pharmacy student entered interventions into an electronic database, MedKeeper Clinical Measures (MCM) (Gold Standard Inc, Westminster, CO).[10] This database asked the student to provide the type of intervention, whether the intervention was accepted, and a description of the intervention. The preceptor verified each intervention entered into MCM for clarity and accuracy. The program has the capability to generate reports, calculating the total number of interventions of an individual pharmacy student and/or all pharmacy students' interventions combined. Each intervention was assigned a projected cost savings, which was provided and validated by MCM based on previous research. For example, a dosage-adjustment recommendation was valued to have a cost avoidance of $125. This study received approval from the St. John's University Institutional Review Board as well as from the Institute for Family Health.

RESULTS

Eighteen pharmacy students participated in this APPE site in the 8 student-months studied, and 718 interventions were performed. Table 1 depicts the number and various types of interventions performed by the students. Essential interventions included filling out medication health card with the patient, patient counseling, and medication reconciliation. Other clinical interventions included recommending any type of change in medication regimen, requesting a necessary laboratory test, reporting an adverse drug reaction, and/or answering drug-information questions. Seventy-seven percent of the recommendations made by pharmacy students were accepted by the physicians. Figure 1 depicts interventions determined by the student preceptor as requiring immediate action from the physician during that patient visit (ie, changing the

Table 1. Type and Number of Patient Interventions Made by Pharmacy Students at a Family Medicine Clinic

| Type of Interventions	Quantity
Transcribe and provide medication card for patient	156
Patient counseling	179
Dosage adjustment of a medication	35
Recommend laboratory tests	67
Discontinue medication(s)	29
Answer drug-information question(s)	23
Therapeutic substitution/alternative therapy	32
Add therapy/recommend new medication	57
Update medication list in record/medication reconciliation	117
Reporting adverse drug reaction	5
Other	18
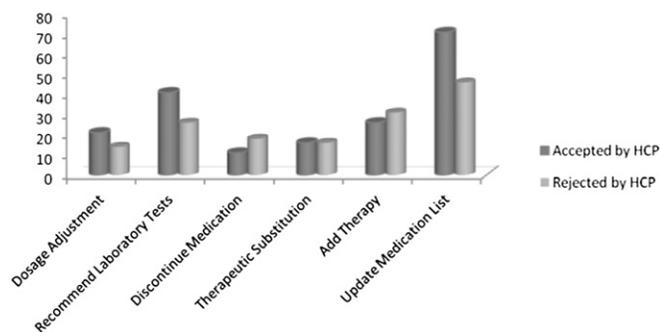
Figure 1. Pharmacy students' recommended interventions requiring immediate action (HCP=healthcare provider).

patient's medication regimen, ordering laboratory tests). Interventions not included in this computation were patient counseling, providing a medication health card, reporting an adverse drug reaction, and providing extensive answers to drug information questions. Two hundred interventions were classified as needing immediate action, 58% of which were accepted by providers. A total of $61,855 was computed by MCM as saved medical expense or avoided cost. The majority of the cost savings involved writing and reviewing medication health cards with the patients and pertinent patient counseling regarding their medications.

DISCUSSION

Pharmacy students' role in the ambulatory care setting has not been well documented. This study showed the positive impact that pharmacy students can have in a primary care family medicine clinic. Overall, the recommendations provided by the students were well received by the doctors and nurse practitioners. A majority of the pharmacy students' interventions performed by students involved providing the patients with medication health cards and patient counseling. Although these may not be technically considered interventions, having a pharmacy student provide these services to patients was beneficial and important. Many of the patients who receive medical care at this family medicine clinic see specialist physicians at other facilities. Although providers at the family medicine clinic ideally should contact these specialists, it is often difficult to do so. Prior to distributing these medication health cards to patients, there was often confusion from patients regarding what medications they were taking and their associated indications. Numerous patients had duplicate therapies (ie, simvastatin and atorvastatin taken together) that were not reflected in the patients' records. These medication health cards served as a guide for the students in assessing correct use of medications, dosing regimens, and appropriate monitoring of laboratory test results. Students also used the medication health

card as a gateway for patient counseling, ensuring adherence, inquiring whether the patient experienced any adverse effects with their regimen, and explaining to the patient the therapeutic goals for particular medical problems and recommended lifestyle modifications.

The health care provider acceptance rate for the pharmacy student recommendations requiring immediate action was 58%. Although we had anticipated a higher acceptance rate, 58% falls within the reported overall acceptance rate of between 32% and 97.9% in ambulatory/community settings.[2] There may be several explanations for why some of the recommendations were not accepted. Students had the opportunity to speak with the patient for an average of only 15 minutes. The recommendations that were made to the providers followed general treatment guidelines; however, because the students were not familiar with the patients, they may have been unaware of a patient's personal or social issues that may have deterred them from recommending a therapy regimen that otherwise would have been appropriate (ie, adding a new medication for a severely depressed individual who may not have admitted nonadherence to the student). Students also do not always recognize necessary interventions when speaking with the physician. The necessity of a given intervention(s) may not be realized until they are discussed with the preceptor and/or the information is more thoroughly reviewed. As such, recommendations may be made after the patient has left the clinic. Hence, certain recommendations may not have been followed at that visit but possibly at a subsequent visit, which was nonetheless considered not accepted at the time. Additionally, clinicians may have been overwhelmed with their patient-care session, resulting in not being attentive to some of the pharmacy students' recommendations.

This study had several limitations. Given that the interventions were self-reported by the pharmacy students, there is a possibility of reporting bias. However, each intervention that was entered into MCM was reviewed daily by the preceptor to ensure accuracy. This study also did not have the capability of determining patient-care outcomes, such as preventing hospitalization or improving patient quality of life. Evaluating patient and provider satisfaction was also outside the scope of this study. Additionally, not all intervention categories had a projected cost value assigned by MCM, (eg, providing a medication health card). When no cost-value estimate was available, the lowest value of $50 was used. Hence, reported cost savings may have been underestimated or overestimated.

The length of time for a physician visit varied among the medical residents, attending physicians, physician assistants, and nurse practitioners. Attending physicians and nurse practitioners were allotted a 30-minute visit for new

patients or physical examinations and 15 minutes for follow-up visits. Residents' time with a patient ranged from 15-60 minutes, depending on their postgraduate year. For providers who had shorter time allotments or were running behind schedule, the time to consult with a student may have been compromised. However, as this is a teaching facility for both medical and pharmacy students, each provider is expected to discuss patient cases with students. Given that students had completed practice experiences at this family medicine clinic and offered suggestions to providers for 6 years prior to this study taking place, the possibility of a bias in the acceptance rate cannot be excluded.

CONCLUSION

Pharmacy students undergoing their ambulatory-care APPE played an important role in a family medicine clinic, easily becoming part of the multidisciplinary team and executing significant interventions that resulted in considerable cost avoidance.

REFERENCES

1. Accreditation Council for Pharmacy Education. Accreditation standards and guidelines for the professional program in pharmacy leading to the doctor of pharmacy degree. https://www.acpe-accredit.org/pdf/FinalS2007Guidelines2.0.pdf. Accessed August 8, 2013.

2. Mersfelder TL, Bouthillier MJ. Value of the student pharmacist to experiential practice sites: a review of the literature. *Ann Pharmacother*. 2012;46(4):541-548.

3. Abdelhalim D, Mohundro BL, Evans JD. Role of student pharmacists in the identification and prevention of medication-related problems. *J Am Pharm Assoc*. 2011;51(5):627-630.

4. Al-Hajje AH, Atoui F, Awada S, Rachidi S, Zein S, Salameh P. Drug-related problems identified by clinical pharmacist's students and pharmacist's interventions. *Ann Pharm Fr*. 2012;70(3):169-176.

5. Lubowski TJ, Cronin LM, Pavelka RW, Briscoe-Dwyer LA, Briceland LL, Hamilton RA. Effectiveness of a medication reconciliation project conducted by PharmD students. *Am J Pharm Educ*. 2007;71(5):Article 94.

6. Pound MW, Miller SM. Written versus oral recommendations made by pharmacy students during internal medicine rotations. *Ann Pharmacother*. 2007;45(5):772-776.

7. McCollum M, Nuffer W, Ellis SL, Turner CJ. Physician acceptance of pharmacotherapy recommendations made by pharmacy students in a rural pharmacy-based diabetes care and education clinic. *Am J Pharm Educ*. 2009;73(2):Article 24.

8. Lundquist LM, Moye PM. Resident physicians' acceptance of pharmacy students' pharmacotherapy recommendations during an ambulatory care advanced pharmacy practice experience. *Am J Pharm Educ*. 2009;73(8):Article 145.

9. Fit KE. Documentation of student pharmacists' interventions from medication histories in a primary care setting. *J Pharm Technol*. 2008;24(6):330-335.

10. MedKeeper. RxInterventions. www.medkeeper.com. Accessed August 10, 2013.

Appendix 1. Medication Health Card (photocopied back-to-back and folded in thirds).

Front

Name: _____

Height: _____   **Weight:** _____

MEDICAL PROBLEM LIST
1. _____
2. _____
3. _____
4. _____
5. _____

SCREENING

Flu Shot _____ date

Colon CA Screening _____ date

Mammogram _____ date

Pap Smear _____ date

MEDICATION LIST (Rx, OTC & Herbals)

Allergies: _____

Medication/dose/direction	Reason for use
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____
13. _____	_____

LABORATORY/TEST RESULTS

	Date	Result
Blood Pressure	_____	_____
	_____	_____
	_____	_____
	_____	_____

Lipid Panel: _____
Total Chol. _____
LDL (bad) _____
HDL (good) _____
Trig. (bad) _____

Blood Glucose:	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

HbA₁C:

Back

OTHER LABORATORY/TEST RESULTS

Lab	Date	Result
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Primary Doctor: _____

Pharmacy: _____

Prepared by: _____

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MEDICATION AND HEALTH CARD
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