

INSTRUCTIONAL DESIGN AND ASSESSMENT

An Advanced Pharmacy Practice Experience in Inpatient Medication Education

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Objective. To describe a unique advanced pharmacy practice experience (APPE) in which pharmacy students provided medication education to hospitalized patients.

Design. Students were trained to independently assess patients' needs for education and identify drug-related problems. Students then provided medication education and performed medication therapy management under the supervision of clinical staff pharmacists. To assess the impact of the APPE, the number of hospitalized patients assessed and educated during the 3-month time period prior to student involvement was compared to the first 3 months of the APPE.

Assessment. Student participation increased the number of patients receiving medication education and medication therapy management from the hospital pharmacy. At the end of the APPE, students reported that the experience positively affected their ability to impact patients' care and to critique their own learning and skills.

Conclusion. The inpatient medication education APPE provided students the opportunity to be responsible and accountable for the provision of direct patient care. In addition, the APPE benefitted the hospital, the school of pharmacy, and, most importantly, the patients.

Keywords: patient education, advanced pharmacy practice experience, medication therapy management, hospital

INTRODUCTION

Pharmacist involvement in hospital discharge counseling improves patients' medication knowledge and medication adherence, reduces hospital readmission rates, and minimizes polypharmacy.¹ However, data from the American Society of Health-System Pharmacists (ASHP) 2006 National Hospital Pharmacy Survey indicate pharmacists are not involved in providing medication education to most patients at many hospitals.² The 2 most commonly reported barriers to providing hospital-based medication education are the lack of pharmacist time and inadequate pharmacy staffing.³

Directors of experiential learning often struggle to provide an adequate number of educational experiences as part of their school's advanced pharmacy practice experience (APPE) program in the fourth year (P4). Preceptors are often only willing to take a limited num-

ber of students because students are a burden to their time and they do not perceive the students as adding value to their hospital pharmacy department or community pharmacy store. In a Viewpoints article published in the *Journal*, Dean Patricia Chase challenged colleges and schools of pharmacy to overcome this belief by requiring their students to provide direct patient care, thereby adding value to the services provided by the site rather than allowing students to merely observe during APPEs.⁴

Dr. Chase's editorial is supported by the Accreditation Council for Pharmacy Education (ACPE) standard for pharmacy practice experiences, which states that "pharmacy practice experiences must integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through other components of the curriculum" and include "direct interaction with...patients."⁵ Advanced practice experiences should give students the opportunity to practice the skills learned during didactic work or observed during introductory pharmacy practice experiences. Student pharmacists should have the opportunity to "make a difference in the health outcomes of their patients on a consistent basis."⁴

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A multidisciplinary medication education program called the Enhanced Patient Safety Intervention to Optimize Medication Education (EPITOME) was recently implemented at UPMC Presbyterian, a 674-bed tertiary care academic medical center with a growing decentralized, unit-based pharmacist model.⁶ The EPITOME program is based on a pilot medication education program previously described.^{7,8} This manuscript describes the development of a unique APPE where pharmacy students provided medication education to high-risk patients within the EPITOME program. This APPE can be used as a model for other schools and colleges of pharmacy that are designing APPEs that meet the requirement and intent of the ACPE standards for pharmacy education.

DESIGN

Medication Education Process Prior to Student Involvement

The EPITOME program was designed to provide all patients with information about their medications throughout their hospitalization.^{7,8} Nurses were trained to provide medication information each time they administered a medication from the day of admission through the day of discharge. For patient care units with a unit-based pharmacist, that pharmacist provided medication education to patients identified as candidates for pharmacist-delivered education. For those units without a unit-based pharmacist, a staff pharmacist was assigned each day to provide education to all patients who met the consult criteria.

Each morning, pharmacists assigned to EPITOME downloaded the list of eligible patients to tablet computers. The patients on the list included those not currently in an intensive care unit (ICU) who had not already received pharmacist education during the current admission, had been in the hospital for greater than 1 day, and for whom greater than 10 scheduled oral medications had been prescribed as identified by the hospital's clinical data repository (Medical Archival Systems [MARS], Pittsburgh, Pennsylvania). The pharmacists then triaged the patients who would be seen that day. Priority was given to patients who eventually would be discharged to home and managing their own medications. Patients who would be discharged to a long-term care facility did not receive the service. Education was delayed for patients who were acutely delirious or who would be undergoing a major procedure or surgery, and those for whom discharge plan was not yet known. Caregivers, if they were available, were the focus of the education in the cases of patients with dementia who would be going home.

During education sessions, the Health Behavior Change Model⁹⁻¹¹ was used by the pharmacists to assess the patient's baseline knowledge, attitudes, and readiness

for new information before verbal medication education was provided. Although the style for each education session was left to the discretion of the pharmacist and tailored to the unique needs of each patient, pharmacists routinely educated patients on the indication, dosage, side effects, and other medication-specific information for all medications that would likely be continued following discharge. Medication education was not necessarily provided on the day of discharge since patients who are educated about medications on the day of discharge did not recall medication information better than those educated a few days prior to discharge.¹²

During the work-up and education session with the patient, the pharmacists also conducted medication reviews. Within the permanent medical record, the pharmacist wrote a note in the progress note section that described the education session, provided an assessment of the patient's medication knowledge and compliance, and if needed, included recommendations to improve the patient's medication regimen.

Inpatient Medication Education Advanced Pharmacy Practice Experience

Within months of implementing EPITOME, it became evident that time constraints made it difficult for the unit-based staff pharmacists to conduct a thorough chart review in order to successfully provide a meaningful education experience for the patients. Since the hiring of additional pharmacists was not possible, other options for maintaining the EPITOME program were contemplated, including offering an experience to pharmacy students. As a result, the hospital's pharmacy operations managers and the pharmacy faculty coordinator for the EPITOME program met with the director of experiential learning at the University of Pittsburgh School of Pharmacy to propose an Inpatient Medication Education APPE.

At the time when the Inpatient Medication Education APPE was first offered in May 2007, the APPE program at the University of Pittsburgh School of Pharmacy was administered in twelve 4-week blocks. During the last (P4) year of the PharmD curriculum, each student completed 7 of these 4-week APPE blocks. Students selected 1 each of 4 types of APPEs: community, ambulatory care, institutional, and acute care/internal medicine. Students also selected an additional ambulatory care or acute care/internal medicine APPE. Two APPEs were selected from a variety of elective options across a wide array of practice settings, services, and experiences. Following the completion of each APPE, all students completed a standard evaluation supplied by the school. The evaluation included 9, 6, and 8 survey questions for the students to answer using a Likert scale to evaluate the preceptor,

practice site, and their self-learning, respectively, during the APPE. It also included a section for written comments. These evaluations were de-identified and shared with the preceptor periodically.

As a result of the collaboration between the school and hospital, an Inpatient Medication Education APPE was created and offered to 1 student for each of the twelve 4-week rotation blocks, effectively increasing the personnel devoted to the EPITOME service by 1 for 48 weeks per year. The hospital's EPITOME-trained pharmacists trained and supervised the students.

Week 1. The goal of the first week of the Inpatient Medication Education APPE was to orient the student to the hospital and to EPITOME procedures. On the first day, the student was provided with an overview of the program and a brief course on the principles and application of the Health Behavior Change Model. The student was taught how to access the patient lists from the electronic server and become familiar with both electronic and written medical records to determine whether the patient met the criteria for pharmacist education. The student spent much of the second and third days observing and helping the preceptor perform chart reviews to prepare for and conduct patient education. By the fourth day, the majority of students were competent to independently assess patients' needs for education and identify drug-related problems. By the sixth day, the majority of students were confident enough to lead the patient education session.

Weeks 2-4. Upon arrival at the site each day, the student independently downloaded the patient list, triaged the patients to be seen that day, and began assessing patients. This process is included in Appendix 1. Throughout the day and at convenient times for the unit-based clinical pharmacist, the student presented patients to the pharmacist and highlighted specific points to be discussed. The pharmacist accompanied the student into each patient's room for the education session and allowed the student to conduct the interview and education session, only interrupting to clarify or add anything that the student may have missed. For each patient, the student prepared a handwritten progress note that documented the education, assessed the patient's understanding of his or her medication regimen, and noted any recommendations for improving the patient's medication regimen. After the pharmacist reviewed and cosigned the note, the student placed it in the patient's chart. The pharmacist provided informal verbal feedback to the student following each patient encounter in an effort to help the student improve his or her patient assessment and counseling skills.

During weeks 2 through 4, students typically triaged 6 to 10 patients per day and counseled 2 to 5 patients per day. In addition, the students were required to prepare 2 formal

presentations. Typically, 1 of the presentations was an overview and literature review of a newly approved medication or an overview of recently publicized news related to a particular side effect or new indication for a medication. The second presentation was a case presentation that included a disease-state overview as well as an overview of therapeutic alternatives for the treatment of the disease state. Students also met with 1 of the pharmacists each week to review a topic that was either assigned by the pharmacist or selected by the student in advance.

To assess the impact of the role of students within the EPITOME program, the numbers of patients assessed, educated, and provided medication therapy management during the 3-month time period prior to student involvement was compared to the first 3 months of the APPE.

ASSESSMENT

In the 3 months prior to the APPE, 133 of 734 (18%) eligible patients were assessed compared to 293 of 675 patients (43%) assessed during the 3 months after the start of student involvement. Twenty-three (17%) of the 133 patients assessed in the 3 months prior to the implementation of the APPE were provided medication education by the pharmacist, while 77 of the 293 assessed patients (26%) were provided medication education by the student accompanied by the pharmacist. In addition, student involvement increased the percentage of patients with at least 1 medication therapy management recommendation from 22% (5/23) to 35% (27/77).

Of the medication therapy management recommendations made by students, 30% were to add a medication for an untreated indication based on medication reconciliation issues, 22% were to optimize the dose of a current medication, 18.5% were to add a medication for a new untreated indication, 18.5% were to change a current medication to a more appropriate medication, 7% were to discontinue a medication without an indication, and 4% were to change the route of administration for a current medication (usually from intravenous to oral). Of the recommendations made by students, 74% were accepted by the healthcare team.

Between May and December 2007, 8 students rotated through the Inpatient Medication Education APPE. Aggregate results of the student evaluations of the APPE are presented in Table 1.

DISCUSSION

Benefits to the Hospital and Patients

Patients often leave the hospital with poor knowledge of their medication regimen. Medication education improves a patient's medication knowledge, which then has the potential for increasing medication adherence and

Table 1. Pharmacy Student Evaluations of the Inpatient Medication Education Advanced Pharmacy Practice Experience (n = 8)

	Response	
	Mean ^a	Median ^a
Student Evaluation of Preceptor		
Provide ample orientation, including site-specific learning objectives.	4.8	5.0
Spent adequate time with me and was accessible.	3.6	3.5
Served as a positive role model.	4.5	5.0
Taught at an appropriate level of difficulty.	4.3	4.0
Allowed me to assume practice responsibilities.	4.9	5.0
Encouraged my input and discussion.	4.5	5.0
Provided me with ongoing feedback.	3.9	4.0
Solicited and was receptive to suggestions to improve my experience.	4.1	4.0
Overall teaching effectiveness.	4.4	4.0
Evaluation of Practice Site		
I was a contributing member of the patient care team.	4.4	4.5
The overall workload/time requirement was reasonable to accomplish goals.	4.9	5.0
The site permitted active participation in pharmacotherapy.	5.0	5.0
I have expanded my knowledge base and practice abilities.	4.9	5.0
The educational experience was stimulating and valuable.	4.8	5.0
Overall practice site experience.	4.8	5.0
As a result of this rotation, I can more effectively:		
Develop and use an effective patient database.	4.5	5.0
Design appropriate patient-specific treatments.	4.1	4.0
Select and use appropriate endpoints/monitoring parameters to assess regimens.	4.1	4.0
Recommend appropriate regimen modifications.	4.1	4.0
Utilize drug information skills.	4.6	5.0
Communicate verbally and persuasively to positively impact a patient's care.	4.5	4.5
Communicate via writing to positively impact a patient's care.	4.4	5.0
Critique my own learning and skills to improve problem solving and self-directed learning.	4.5	4.5

^aSurvey questions were answered using a Likert scale on which 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree

decreasing the need for hospital readmission for drug-related problems.

Within standard PC.6.10, the Joint Commission requires that “the patient receive education and training specific to the patient’s needs and as appropriate to the care and services provided.”¹³ Involving pharmacy students in the EPITOME program increased the number of patients receiving medication education by over 200%. In addition, the number of patients receiving medication therapy management by a pharmacist was increased by more than 400%.

Use of students to facilitate the EPITOME program helped the hospital maintain and improve an important and necessary program at a time when hiring of additional staff members was difficult. Although the students’ impact (increasing the number of patients educated) was not assessed or verified by a controlled trial, students demonstrated that they bring value to the program and ultimately to direct patient care without placing an undue burden on preceptors’ time. The students, under the oversight of a preceptor, were able to act as workforce extenders and bridge staffing shortages without compromising patient

care. With the projected hiring of additional unit-based pharmacists and technicians in subsequent budget years, the hospital anticipates that the number of patients receiving medication education and medication therapy management from a pharmacist will continue to increase.

Benefits to the Student and the School

The Inpatient Medication Education APPE provided P4 students with the opportunity to apply communication techniques learned in the classroom and gave them the skills needed to be confident independent practitioners. Moreover, students provided a patient care service and were held responsible for independently assessing patients’ needs for education and identifying drug-related problems. By the second week of the APPE, students were expected to be the primary providers of medication education while the staff pharmacists evaluated their technique and only interjected into the patient interaction if the student clearly needed assistance. Students who completed the 4-week APPE routinely report that although they may be intimidated at the beginning, by

the end of the APPE, they have gained confidence and feel comfortable talking with patients. Students have stated that they are motivated by patients' reliance on them to provide accurate information and the need to be prepared for anything when they enter the patient's room.

Since the hospital saw the impact of the pharmacy students on its medication education program, the School of Pharmacy gained a new APPE site. The APPE facilitated student achievement of the competencies outlined in Standard 12 of the ACPE Standards and Guidelines.⁵ Activities integral to the APPE contributed to the student's development and refinement of his or her ability to "provide patient care in cooperation with patients, prescribers, and other members of an interprofessional health care team based upon sound therapeutic principles and evidence-based data" and "manage and use resources of the health care system, in cooperation with patients, prescribers, other health care providers, and administrative and supportive personnel, to promote health; to provide, assess, and coordinate safe, accurate, and time-sensitive medication distribution; and to improve therapeutic outcomes of medication use." Because each student assumed significant personal responsibility for the content and quality of the patient education provided, the APPE provided an opportunity for the participants to refine clinical judgment through the patient triage process and prioritization of education points; demonstrate professional behavior, attitudes, and values in interactions with patients, caregivers, and other health care providers; and enhance professional confidence.

SUMMARY

An inpatient medication education APPE which trained pharmacy students to provide medication education to high-risk patients in the hospital setting benefitted students by giving them the opportunity to provide and improve patient care. The hospital pharmacy benefitted from the students because it had additional manpower to provide medication education, an important and valuable service. Finally, the School of Pharmacy benefitted because it established an APPE site that sees the value of its students, is available to students across all blocks, and provides a quality, direct patient care experience.

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Appendix 1. Inpatient Medication Education Advanced Pharmacy Practice Experience Description

Patient Evaluation

For each patient, prior to entering the room:

1. Determine if the patient should be excluded from patient education.
 - Review the Discharge Plan and/or Nursing Assessment (or talk directly to the nurse) to determine if the patient is a resident at a long-term care facility or will be going to a long-term care facility following discharge.
 - Review care notes to determine if the patient has dementia or is otherwise incapable of self-care. Talk with the nurse to see if the caregiver visits and attempt to educate the caregiver in these situations.
2. For each active medication, review the patient chart (paper and/or electronic) to identify:
 - Indication.
 - Whether the medication was taken prior to admission or just newly started.
3. If there are any home medications not on the active medication list, then review the progress notes to determine the reason that the medication is not being continued.
4. Review the chief complaint and PMH to determine if there is an indication for a medication that is currently untreated.
5. Review the most recent SCr obtained. Calculate a CrCl and assess each medication requiring renal dosing.
6. Make note of any unnecessary medication duplication, opportunities for dose optimization, untreated indications, medications without an indication, and any other issues related to drug selection or use.

Patient Counseling

1. After verifying that you have the correct patient by having him/her state his/her name and birth date, introduce yourself to the patient as the pharmacist student and also introduce the pharmacist. Explain that your job is to see all patients who are prescribed a high number of medications.
2. Ask if the patient has any questions about their medications.
3. Using the Health Behavior Change Model, elicit patient readiness to be compliant and their current degree of knowledge about each of their medications.
4. The patient should understand the following information about each of their medications. In order of priority, patients should be told the reason for each medication, the name and dosage, the appropriate time of day (with or without meals) to take the medication, any special dietary or laboratory monitoring considerations, and any important side effects to look out for. Additional information should be provided to those patients who already understand the basics and/or request it.
5. Elicit the patients understanding of all new information that you provided and provide reinforcement as needed.
6. For any newly started medications (or any old medications for which the patient lacks understanding), ensure that a patient information sheet for the medication has been given to the patient. If it has not, then print it out and give to the patient.
7. During the interaction, be alert to any information that the patient reveals that you did not see noted within the chart. Such things might include:
 - An untreated condition.
 - A medication or herbal taken at home but not included in the home medication list.
 - An adverse drug reaction (be sure to report it as per hospital policy).
 - The patient's inability to afford medications (alert the primary nurse who will assess further and consult a social worker, if needed).

Documentation

1. Leave a note in the Progress Note section for each patient. Ideally, the note should be written on the Rounding Report so the current medications are already prelisted for you. Be sure to include the following information:
 - State you are seeing the patient as part of the EPITOME program.
 - Briefly state that you provided medication education.
 - Assess the patient understanding of the information provided.
 - Include your recommendations for any medication-related issues that you identified during your patient evaluation and counseling session.
2. For urgent issues, after discussing the issue fully with the pharmacist, page the prescriber. For issues related to dose scheduling, speak with the nurse.