INSTRUCTIONAL DESIGN AND ASSESSMENT

An Enhanced Community Advanced Pharmacy Practice Experience Model to Improve Patient Care

Rosemin Kassam, BSc Pharm, PharmD, and Mona Kwong, BSc Pharm, MSc

Faculty of Pharmaceutical Sciences, The University of British Columbia

Submitted March 20, 2008; accepted June 22, 2008; published April 7, 2009.

Objective. To quantify the benefits of an enhanced advanced pharmacy practice experience (APPE) community pharmacy model compared to the traditional program by comparing basic and comprehensive pharmaceutical care provided by students and assessing preceptors' perceptions of the APPE.

Methods. A pilot study consisting of 1 enhanced APPE arm and 2 traditional APPE (control) arms was conducted. The enhanced APPE consisted of a preceptor education program, a 5-day onsite student orientation, and an 8-week experience completed at 1 rather than 2 community sites.

Results. The level of interventions provided by students in the enhanced APPE arm significantly surpassed that of students in the control arms. In addition, preceptor questionnaires indicated overwhelming support for the enhanced model over the traditional APPE.

Conclusions. The study's findings demonstrated that the enhanced APPE model enabled the participating pharmacies to provide increased level of patient care (as compared to the control sites) and improved preceptor satisfaction with the APPE.

Keywords: pharmaceutical care, medication therapy management, advanced pharmacy practice experience, community pharmacy, evaluation, student impact, assessment

INTRODUCTION

For more than a decade, colleges and schools of pharmacy across North America have been striving to implement curricula that aligns with standards set by the Accreditation Council for Pharmacy Education (in the United States) and the Canadian Council for Accreditation of Pharmacy Programs (in Canada). One of the greatest challenges has been recruitment of preceptors and sites within the community pharmacy setting that are able and willing to provide students with opportunities to hone skills, knowledge, and attitudes related to patient-centered care/pharmaceutical care.¹⁻⁶ Despite the formidable work done to move practice education forward, in most situations, student activities continue to focus on the technical aspect of medication dispensing and less on designing/implementing drug therapy plans with patients and providing continuity of care through follow-up.^{1,6}

Community-based experiential sites face a number of challenges that make attaining the desired educational outcomes difficult. Some of these challenges include

time-consuming third-party billing, lack of reimbursement models to allow pharmacy staff members to engage in direct patient care activities, insufficient staffing to handle high prescription volume, inability to access patient information, lack of adequate software, lack of private areas for confidential patient consultations, and lack of education programs to support preceptors in their new role as educators.^{2,6-8} Based on these findings, the question is: How do colleges and schools of pharmacy gain buy-in from managers to commit their pharmacists' time to providing students with the much-needed comprehensive patient care experience?

The Structured Practice Education Program's (SPEP) faculty at the University of British Columbia addressed this question when the school introduced its community pharmacy APPE in 1999. Through internal consensus among all faculty members (practice-based and basic scientists) and collaboration with the student body and decision-makers from community pharmacies, the SPEP faculty revised its syllabus to incorporate pharmaceutical care-related activities and extend the duration from 4 weeks to 8 weeks. However, due to specific drivers such as community pharmacy managers' reluctance to commit to an extended APPE period and faculty members' belief that 4 weeks at 1 community pharmacy would be of sufficient length to permit students to engage in comprehensive pharmaceutical care experience, the community

Corresponding Author: Rosemin Kassam, BSc Pharm, PharmD, Associate Professor, Director - Structured Practice Education Program, Faculty of Pharmaceutical Sciences, The University of British Columbia, 2146 East Mall, Vancouver, BC V6T 1Z3. Tel: 604-822-7181. Fax: 604-822-3035. E-mail: rokassam@interchange.ubc.ca

APPE was structured to have students complete their 8 weeks at 2 different pharmacies (2 x 4-weeks). It was also presumed by faculty members that the first 4 weeks would give students the needed skills and confidence to make a smooth transition from one site to another and make positive patient care contribution at the second site. The experience was designed as a continuous experience with objectives and activities set for 8 weeks. Students were required to submit a single portfolio and received 1 grade for the entire experience. The expected competencies included collaboration with patients and care providers to assess drug-related needs, identification of existing or potential drug-related problems, design and implementation of care plans to resolve and prevent the drug-related problems, and assumption of responsibility for care through follow-up and monitoring patient progress. These syllabus changes were subsequently approved through the University Senate and became part of the core curriculum.

Despite using an iterative process to develop the community APPE, subsequent evaluation of the experience demonstrated that learning opportunities fell short of desired objectives at the end of 8 weeks. Specifically, students had limited opportunities to be involved in comprehensive pharmaceutical care activities such as consulting with patients on drug-related needs, identifying and preventing drug-related problems, collaborating with patients on care plans, and providing continuity of care through follow-up.^{1,2,7} In their feedback, preceptors reported that students were hindered in their learning opportunities due to unfamiliarity with their site's workflow and technology, and by an inability to execute core dispensing and patient-care procedures efficiently. They also alleged that the provision of an APPE manual and proposed 4-week schedule while helpful was not sufficient for a successful student-preceptor experience. Accordingly, the preceptors recommended that UBC SPEP faculty members consider making several changes, including the following: adding an educational program to support community pharmacists in their role as preceptors, having students complete an on-site orientation program prior to their APPE, and holding the 8-week APPE at 1 rather than 2 sites to ensure greater continuity of care.² Feedback from students, echoing their preceptors' sentiments, proposed modifying the community APPE to one 8-week experience at a single site, offering preceptors a pharmaceutical care workshop, and equipping students with an understanding of core dispensing and pharmaceutical care-related processes and activities.

While the recommendations were conceptually easy to implement, there were practical challenges to these propositions. First, the faculty had recently finished

revising the community APPE syllabus, and would need to submit any changes to a rigorous process of approval through the University's Senate. Second, better preparing students for the APPE site might mean revising other parts of the curricula in the pharmacy practice and clinical divisions, including the possibility of adding an earlier experiential course — an undertaking faculty members were hesitant to assume without evidence that an alternate APPE model could potentially address some of the identified shortcomings and without a better appreciation of how to improve student preparation. Finally, the faculty lacked financial resources for a preceptor educational program.

To move forward, the SPEP faculty decided that revision to the APPE would need to be dynamic, with changes made incrementally over several years as they learned from their experiences. Additionally, to secure support from community pharmacy preceptors and managers, the SPEP faculty took a nontraditional methodological approach that considered all student and preceptor recommendations (preceptor education, student preparedness, and the 2 x 4-week APPE structure) at the outset, rather than incorporating the recommendations separately over 3 academic years. SPEP faculty members viewed this approach as crucial to obtaining buy-in with both students and community pharmacists. Future pilot studies and a combination of qualitative and quantitative methods would then be employed to understand the impact of each of these recommendations separately.

As a first step, the SPEP faculty developed a partnership with Shoppers Drug Mart, one of Canada's national community pharmacy chains. In collaboration with Shoppers Drug Mart, the faculty began evaluating an enhanced APPE model made up of a preceptor education program, a site-specific student orientation program, and an 8-week experience in 1 community pharmacy site. SPEP faculty agreed to develop and deliver a preceptor educational program, and Shoppers Drug Mart agreed to send select pharmacists from their stores to the preceptor education program and to underwrite the cost of delivering and evaluating the program. SPEP faculty and their Shoppers Drug Mart partners designed a pilot study to quantify the benefits of the enhanced APPE model (compared to the traditional model) to community pharmacy preceptors and managers. Specific objectives included measuring: (1) the basic pharmaceutical care that students provided at their respective APPE site (such as assessing and addressing patient needs with respect to prescriptions and over-the-counter medications); (2) the comprehensive pharmaceutical care consults that students provided (such as assessing patients needs with respect to all medications and medical history); and (3) the perceived

benefits of the enhanced APPE model from the perspective of preceptors.

DESIGN

A comparative pilot study was conducted between September 2001 and May 2002 to evaluate the added benefits of an enhanced community pharmacy APPE program. In addition to the enhanced APPE arm, the study consisted of 2 control arms to make the study results more generalizable. The study design is illustrated in Figure 1. The APPE consisted of an 8-week pharmaceutical care experience that ranged from basic pharmaceutical care to comprehensive pharmaceutical care consultations. In the enhanced APPE arm, the students completed this experience at the same pharmacy over an 8-week period, while in the control arms, students completed the same experience at 2 different pharmacies (2 x 4 weeks). Ethics approval was obtained through UBC's Office of Research Services.

Participants

The pilot study involved 29% of the student cohort registered to complete the community APPE that academic year. Students and APPE sites that had not been recruited for the pilot study completed the traditional APPE.

Purposeful selection was used to recruit community pharmacies from the eligible pool in the 3 study arms. A list was developed of all community pharmacies with previous histories of accepting UBC APPE students and whose store managers had expressed interest in having their students engage in pharmaceutical care activities; pharmacies were clustered by rural and urban region.

†SDM = Shoppers Drug Mart, a national Canadian community pharmacy chain

* One student opted out of the study

Figure 1. Design of a pilot study of an enhanced community advanced pharmacy practice experience model to improve patient care.

For the enhanced APPE arm, the first 7 pharmacies from the partner chain to agree to participate in the study were recruited. Seven additional pharmacies from the partner chain were recruited from the list to serve as 1 of the 2 control arms, and an assortment of 7 other pharmacies with no affiliation to the partner chain were recruited to serve as the second control arm. The control arm pharmacies were matched to the enhanced APPE arm pharmacies by geography and community demographics. The rationale for the second control arm was to make study results generalizable beyond the partner chain. Because the control arms represented the traditional model (an 8-week APPE at 2 different community pharmacies), the control arms required 2 pharmacy locations for each student; thus, for clarity, these 2 pharmacies were termed “paired-sites.” A recent evaluation of the community APPE demonstrated that pharmacies in all 3 study arms were similar in the pharmaceutical care experiences they provided to students in previous years. While students in each of these sites had ample opportunity to provide care for patients requiring new and refill prescription and non-prescription drugs, their learning opportunity related to comprehensive pharmaceutical care ranged from 0 to 1 over a 4-week period. Hence, at baseline, pharmacies across all 3 arms were comparable. All pharmacies in the APPE program agreed to take 2 students at different times during the academic year. All pharmacies received the same standard amount of remuneration for their participation: \$50 Canadian for each 4-week experience block. While most pharmacies had only 1 registered preceptor, a few had as many as 3, and these were evenly distributed among the 3 arms.

Because the enhanced APPE had not yet been evaluated and could possibly result in added work for the students compared to their peers at the traditional sites, student participation in the enhanced APPE arm was voluntary. Students were invited to participate through e-mail and class presentations, and the first 14 students to express an interest were recruited. Students were placed at the control sites as part of the normal placement process, a procedure that randomly assigns students to 1 of their 5 geographically preferred locations. Students received no remuneration for their experience since APPEs are part of the structured curriculum.

Interventions

Table 1 outlines the learning activities for this APPE, along with the student expectations for each of these activities. All students and preceptors participating in the community APPE (those participating in the 3 pilot study arms as well as all non-study locations) received the APPE manual outlining the learning activities,

Table 1. Community Pharmacy APPE Learning Activities

Learning Activities	Minimums	Required Documentation for Patient Care Activities
Assess patients with new prescriptions and resolve/prevent drug-related problems (DRPs)	10 per week	<ul style="list-style-type: none"> ● Complete the assessment log for all assessments ● Complete an “initial” pharmacy care plan to summarize interventions made for drug-related problems identified
Assess patients with refill prescriptions and resolve/prevent DRPs	10 per week	<ul style="list-style-type: none"> ● Complete the assessment log for all assessments ● Complete an “initial” pharmacy care plan to summarize interventions made for drug-related problems identified
Present and discuss 1 prescription AND 1 nonprescription drug class with preceptor	2 per week	
Provide pharmaceutical care patients requesting nonprescription products	10 per week	<ul style="list-style-type: none"> ● Complete an “initial” pharmacy care plan to summarize interventions made for drug-related problems identified
Provide follow-up to patients encountered in activities # 1, 2 ,4 and 9	10 per week	<ul style="list-style-type: none"> ● Complete a “follow-up” pharmacy care plan to assess impact of the intervention made
Provide drug information to patients, preceptors and other health care providers	2 per week	
Shadow another health care professional for ½ to 1 day	1 experience	
Discuss pharmacy practice issues related to pharmaceutical care (barriers and opportunities)	Weekly	
Provide comprehensive pharmaceutical care consultation	1 per week	<ul style="list-style-type: none"> ● Summarize interview data in the database form provided ● Summarize all drug-related problems identified in the “List of DRPs” sheet ● Complete an “initial” pharmacy care plan to summarize interventions made for drug-related problems identified ● Complete a “follow-up” pharmacy care plan to assess impact of the intervention made
Initiate and complete a patient care project	1 project	

expectations, evaluation process, policies, and patient care tools; and all students and preceptors were held to the same expectations and standards. In addition, all preceptors and students were supported through verbal telephone and written e-mail communication on an as-needed basis; all students were required to participate in a mandatory 3-hour face-to-face orientation and to complete an online quiz to reinforce the APPE expectations prior to the start of their APPE.

The enhanced APPE arm interventions consisted of a 3-prong approach: (1) preceptor support, (2) student support, and (3) modification of the 8-week APPE structure from 2 x 4-weeks at the paired-sites to a one-time 8-week placement in a single pharmacy. Preceptor support included a half-day workshop where preceptors received an overview of the APPE learning activities, participated in discussions on how to facilitate critical thinking in students, familiarized themselves with the Hepler and

Strand pharmaceutical care philosophy and process, and received copies of all the documentation tools students were expected to use for patient care.⁹ Student support consisted of 2 components: (1) half-day preceptor-student team-building exercises built on role-playing in a common patient-pharmacist scenario, and (2) 5 nonconsecutive days of orientation at assigned APPE sites prior to the start of the APPE (scheduled by preceptors and students over 3 months to minimize disruption during the actual APPE experience). The intent of the onsite orientation was to familiarize students with the store’s prescription intake, counselling, and data entry processes; to let them participate in the delivery of 1 chronic disease clinic at their pharmacy, and engage in 1 comprehensive pharmaceutical care consultation and present this consult as a case to their peers at the University; and to establish periodic meetings with SPEP faculty members to discuss the orientation experience. The 5 non-consecutive days

were completed as a pass-fail elective course worth 3 credits. All enhanced APPE arm students completed their 8-week experience at 1 pharmacy, whereas all students in the control arms completed their 8-week APPE at a paired-site (2 pharmacies, 4 weeks at each site) similar to all the nonstudy students and sites involved in the traditional APPE.

Data Collection

At the end of their 8-week APPE, all students were required to submit a learning portfolio that included artefacts of care they had provided. Table 1 outlines the documentations submitted by students for their pharmaceutical care-related activities. As part of its quality assurance process, the SPEP faculty reviewed the student portfolios to assess patient care provided by the students. Copies of these documents were also filed in patient charts at the pharmacies. To ensure patient anonymity, students removed all patient identifiers from the portfolio prior to submission. All students were familiar with the documentation through prior use of these tools in pharmacy practice laboratories and in didactic courses. These tools are detailed in the literature.¹⁰ All enhanced APPE arm preceptors were invited to complete a questionnaire consisting of 4 open-ended questions that asked them to evaluate their current experience with the enhanced APPE vis-à-vis their previous experience with the traditional APPE. The questions were: (1) Did you prefer the traditional 2 x 4-week APPE or do you prefer the new 8-week APPE? (2) How did this APPE benefit your patients? (3) How did this APPE benefit your store? (4) How did this APPE benefit you as a preceptor. Parallel feedback from the control arm preceptors was also collected as part of the SPEP's yearly quality assurance program; however, these findings will not be discussed here as they reflect those collected during the previous year of the program and have been discussed in detail elsewhere.²

Analysis

Once the SPEP faculty reviewed the student portfolios, all relevant data were extracted from the portfolio by a student researcher and entered into Microsoft Access 2000. To preserve student and preceptor anonymity, all identifiers were removed prior to collating and analyzing the data. The data were then transferred into a Microsoft Excel 2000 spreadsheet, grouped according to the APPE sites (in the case of the enhanced APPE arm, the 1 community pharmacy; and in the case of the control arm, the paired site) in each arm and analyzed. Frequencies and standard deviations were calculated across the 3 arms from the number of patient care activities students en-

gaged in during their APPE experience (1 x 8 weeks for the enhanced APPE arm, and 2 x 4 weeks for the control arms), and reported as the number of events per arm, per APPE site/paired site and per student. The differences between the 3 arms were analyzed using ANOVA (SPSS, version 12) with the a priori level of significance set at $p \leq 0.05$. Feedback from enhanced APPE arm preceptors was grouped under common themes and the preceptor quotes that best represented the identified common themes were summarized in a table.

ASSESSMENT

Forty-one student portfolios were reviewed (13 in the enhanced APPE arm and 14 in both control arms). One enhanced APPE arm student opted out of the pilot study, leaving 13 students. Study results were summarized in terms of: (1) basic pharmaceutical care provided by the students, (2) comprehensive pharmaceutical care consultations provided by the students, and (3) enhanced arm preceptors' experiences with the enhanced program.

Basic Pharmaceutical Care Provided by Students

Figure 2 illustrates the average number of interventions for basic pharmaceutical care provided by students at their APPE sites and across all 3 study arms. While students in all 3 study arms assessed the requisite numbers of patients receiving new and refill prescriptions and non-prescription products as specified by the APPE program, the level of interventions provided by students in the enhanced APPE arm to optimize patients' drug therapies clearly surpassed that observed at the paired sites in the control arms (enhanced APPE arm (Shoppers Drug Mart =SDM): 103.3 ± 39.0 ; SDM control arm: 64.9 ± 17.2 ; non-SDM control arm: 64.0 ± 22.6 ; F ratio = 4.5, $p < 0.05$). This difference was primarily attributed to an increase in interventions related to new and refill prescriptions at the enhanced APPE sites (enhanced APPE arm: 47.4 ± 17.2 ; SDM control arm: 17.9 ± 17.2 ; non-SDM control arm: 24.1 ± 10.9 ; F ratio = 9.0, $p < 0.05$), intervention counts for nonprescription consultations were comparable across all 3 arms.

Comprehensive Pharmaceutical Care Provided by Students

Similarly, as demonstrated in Table 2, the number of comprehensive pharmaceutical care consults provided by students in the enhanced APPE arm was significantly greater compared to the number of consults provided by students in the 2 control arms (enhanced APPE arm: 24.7 ± 4.9 ; SDM control arm: 1.3 ± 0.8 ; non-SDM control arm: 1.6 ± 1.1 ; F ratio = 147.4, $p < 0.05$). Unlike the enhanced APPE arm where all students were given

Figure 2. Number of basic pharmaceutical interventions completed by students at their APPE placements across the 3 study arms (mean SD). *The difference between the enhanced arm and both control arms was significant, $p < 0.05$.

ample opportunity to provide comprehensive pharmaceutical care to patients at their sites, 1 paired-site from each of the 2 control arms failed to create any such opportunity for their students and patients.

Table 2 shows the number of drug-related problems identified during the comprehensive pharmaceutical care audits provided by the students in the 3 study arms. The number of drug-related problems identified by the 7 enhanced APPE arm sites with 13 students was significantly greater than that identified by the 7 paired-sites with 14 students in each of the 2 control arms (enhanced APPE arm: 93.3 ± 27.6 ; SDM control: 3.0 ± 2.6 ; non-SDM control: 3.0 ± 2.3 ; F ratio = 73.5, $p < 0.05$); this difference was true for both prescription and non-prescription-related problems. The students in the enhanced APPE sites documented a total of 653 drug-related problems for 173 study patients (average of 3.7 ± 2.5 per patient); whereas the students at the Shoppers Drug Mart control arm paired-sites documented 21 drug-related problems for 9 study patients (average of 2.3 ± 2.1 per patient) and the students at the non-SDM control arm paired-sites documented 21 drug-related problems for 11 study patients (average of 1.9 ± 2.1 per patient).

Care provided by students to patients in the enhanced APPE arm significantly surpassed the care provided by students in the 2 control arms (Table 2). There were more interventions made in the enhanced APPE arm than in the 2 control arms (enhanced APPE arm: 64.4 ± 33.6 ; SDM control: 1.9 ± 1.9 ; non-SDM control: 2.3 ± 1.5 ; F ratio = 23.9; $p < 0.05$); there was more follow-up care provided in the enhanced APPE arm compare to the 2 control arms (enhanced APPE arm: 47.6 ± 26.9 ; SDM control: 0.6 ± 1.1 ; non-SDM control: 1.7 ± 1.6 ; F ratio = 20.7; $p <$

0.05); and there was more evidence of drug-related problems resolved or prevented at the end of the students' APPE experience in the enhanced APPE arm compared to the 2 control arms (Enhanced APPE arm: 31.1 ± 18.9 ; SDM control: 0.1 ± 0.4 ; non-SDM control: 1.3 ± 1.3 ; F ratio = 18.2; $p < 0.05$).

Feedback From Enhanced APPE arm Preceptors

Six of the 7 enhanced APPE arm preceptors returned their survey instrument to the SPEP office. Table 3 provides a synopsis of the preceptors' quotes that best represent the common themes. All 6 of the preceptors indicated that they preferred the 8-week option to the traditional 2 x 4 week APPE because the extended period provided a better experience for both students and preceptors. Similarly, all preceptors commented that their patients (and their store) benefited more from the 8-week student experience than the traditional 2 x 4-week experience. The preceptors noted that having the same students at 1 site for an extended time allowed the students and the patients to build meaningful relationships, hence facilitating the provision of pharmaceutical care. This included patient recruitment for comprehensive pharmaceutical care consults, conducting thorough interviews with the patients, developing and implementing care plans, and providing follow-up care to assess the impact of these interventions. Patients also recognized and appreciated the increased level of care, which led to a perception of increased professionalism in the store. Preceptors also noted that the 8-week experience not only allowed them to become more engaged with the students' activities but also helped the preceptors learn from the process. Finally, the preceptors remarked that the educational program

Table 2. Summary of Comprehensive Pharmaceutical Care Provided by APPE Students Across All 3 Study Arms

Descriptive Data	Control (Traditional) APPE Arm (Paired Sites)		Enhanced APPE Arm SDM Sites	<i>p</i>	<i>F</i>
	Non-SDM (N=7)	SDM (N=7)	(N=7)		
Number of comprehensive pharmaceutical care consults provided					
Total per arm	11	9	173		
Mean (SD) per site/paired-site	1.57 (1.13)	1.29 (0.76)	24.71 (4.89) ^a	<0.05	147.35
Number of sites/paired sites with zero consults	1	1	0		
Mean (SD) per student	0.79 (0.70)	0.64 (0.63)	13.31 (0.75) ^a	<0.05	1458.77
Number of students with zero consults	5	6	0		
Number of drug-related problems identified					
Total Number per arm	21	21	653		
Mean (SD) per site/paired-site	3.00 (2.31)	3.00 (2.58)	93.29 (27.58) ^a	<0.05	73.53
Number of stores with zero problems	1	1	0		
Mean (SD) per student	1.50 (2.02)	1.50 (1.99)	50.23 (18.80) ^a	<0.05	92.14
Number of students with zero problems	5	6	0		
Number of Interventions made					
Total Number per arm	16	13	451		
Mean (SD) per site/paired-site	2.29 (1.50)	1.86 (1.86)	64.43 (33.64) ^a	<0.05	23.93
Number of stores with zero interventions	1	2	0		
Mean (SD) per student	1.14 (1.34)	0.93 (1.49)	34.69 (19.75) ^a	<0.05	40.35
Number of students with zero interventions	6	8	0		
Number of follow-ups provided					
Total Number per arm	12	4	333		
Mean (SD) per site/paired-site	1.71 (1.60)	0.57 (1.13)	47.57 (26.94) ^a	<0.05	20.69
Number of stores with zero follow-ups	2	5	0		
Mean (SD) per student	0.86 (1.29)	0.29 (0.83)	25.62 (18.10) ^a	<0.05	26.70
Number of students with zero follow-ups	8	12	0		
Number of drug-related problems assessed to be resolved or prevented on follow-up					
Total Number per arm	9	1	218		
Mean (SD) per site/paired-site	1.29 (1.25)	0.14 (0.38)	31.14 (18.85) ^a	<0.05	18.16
Number of stores with zero DRPs resolved/prevented	2	6	0		
Mean (SD) per student	0.64 (0.93)	0.07 (0.27)	16.77 (16.05) ^a	<0.05	14.65
Number of students with zero DRPs resolved/prevented	8	13	0		

Abbreviations: SDM = Shoppers Drug Mart

^a The difference between the enhanced APPE arm and the 2 control arms was significant

helped them better understand the pharmaceutical care practice and the use of documentation tools to support patient care.

DISCUSSION

The impact of pharmacists in optimizing drug therapy and minimizing drug-related morbidity and mortality have been well documented in the literature.^{9,11-14} There have also been studies quantifying the impact of postgraduate PharmD students on patient care, although most of these have been conducted in institutional and ambulatory

care settings.¹⁵⁻¹⁷ However, fewer studies have explored how community pharmacies can benefit as APPE placement sites.¹⁸⁻²⁰ This pilot study was unique because it not only quantified the benefits of serving as a community pharmacy APPE placement site, but also looked at the added benefits of participating in an enhanced APPE model. The study's findings demonstrated that the enhanced APPE model enabled the participating pharmacies to provide increased levels of patient care (as compared to the control arm sites) and improved preceptor satisfaction with the APPE.

Table 3. Synopsis of the enhanced APPE arm preceptors' experiences with the enhanced APPE compare to the traditional APPE

Questions	Select Preceptor Quotes Representing The Common Themes (n = 7 preceptors)
Did you prefer the traditional 2 x 4-week APPE or do you prefer the new 8-week APPE?	<ul style="list-style-type: none"> ● I wish we never to go back to 4 weeks. ● This is much more beneficial to students as well as preceptors. I'm not having to go back to the teaching period (usually up to 2 weeks); I can actually gain something back from the students. ● In short I enjoyed the SPEP program even though it requires far more input and monitoring from the preceptor than in past. I hope that program continues to grow and improve. ● The student had the most benefit . . . They were able to do in-depth interviews and actually have time to do meaningful follow up with their patients.
How did this APPE benefit your patients?	<ul style="list-style-type: none"> ● There is also less "stress" on the patient because they got to see 1 student for 8 weeks as opposed to 2. Some patients are not too keen on seeing new faces in the pharmacy (they don't like changes). In a 4-week rotation, as soon as they warm up to 1 student, the student is gone and new 1 arrives. ● My patients got spoiled with all the one-on-one attention! Seriously, several of them had positive outcomes in their diabetes control as a direct result of my students' input. ● They were very appreciative of the pharmaceutical care . . . A few patients even came into the pharmacy to say that no one has ever called to see how they were doing with their new meds.
How did this APPE benefit your store?	<ul style="list-style-type: none"> ● I found in the past students learned and I was teaching, but his time I felt that I've gained valuable services that she (student) provided the patients. ● The . . . (student) activities enhanced our store's professional image. ● It helps build and strengthens relationships with our customers. ● By practicing pharmaceutical care, it sets us apart from other pharmacies that only do 'dispensing'. ● . . . she was providing pharmaceutical care and follow up . . . that I may have not had the time to. ● The extended time really permits the student to become familiar in the store and with the patients.
How did this APPE benefit you as a preceptor?	<ul style="list-style-type: none"> ● Allowed me to watch learning process ie: saw more growth through 8-weeks. ● Able to see interactions with student and some patients more than once per rotation. ● By attending SPEP training, we understand the thought process behind writing pharmacy care plans and pharmaceutical care work-ups. ● I enjoyed the fact that student was giving me something back in this SPEP rotation. ● I benefited in this rotation in that the student had to do the soap notes for me to review. The down side is that this took time for me to read through and comment on. This was done at home on my own time.

When community pharmacy managers commit staff to precept students, this undeniably takes away time from other responsibilities; consequently, the training of APPE students is often viewed by community pharmacy managers as a burden rather than an asset. Compounding this concern is the perception that pharmacies do not derive direct benefits from training students. Consequently, to maintain APPE sites, it is essential for pharmacy schools to demonstrate to community pharmacy managers and preceptors that students can provide value-added services through pharmaceutical care/patient-centered care. Unfortunately, many schools cannot demonstrate this value due to poor documentation by students during their

APPE; a behavior that is perpetuated by a lack of consistent behavior among pharmacy practitioners to document interventions performed to optimize patient care in practice.¹⁸ However, as the role of the pharmacist in patient care expands, there is greater emphasis on patient care documentation. At UBC, the importance of documentation using pharmacy care plans is stressed to all students prior to the start of the APPE, and all students are given ample opportunity during the didactic components of the pharmacy program to become acquainted with these tools. The need for documentation is also stressed to all preceptors through telephone conversations and the APPE manual, including pharmacists whose stores were

recruited into the control arms. Although students in this study may have underreported interventions because documentation is not yet common practice in community pharmacies; results obtained for the 2 control arms were consistent with those observed in an earlier evaluation of the traditional APPE program.¹ Overall, the patient care data collected in this study provided valuable insight to all community pharmacy managers and preceptors about the students' experiences in the pharmacies.

First, this study clearly established that participating as an enhanced APPE site gave community pharmacies more opportunity to offer pharmaceutical care, which otherwise their patients would not have received. As one preceptor put it, "... she [the student] was providing pharmaceutical care and follow-up to patients that I may have not had the time to provide otherwise..." Compared to the paired-sites in the 2 control arms, students at the enhanced APPE arm pharmacies made approximately 60% more interventions on new and refill prescriptions. Similarly, the enhanced APPE arm pharmacies observed at least a 16-fold increase in comprehensive pharmaceutical care consultations compared to the 2 control arms.

Second, no opportunity was created for 5 students in the non-SDM control arm and 6 students in the Shoppers Drug Mart-control arm to engage in comprehensive pharmaceutical care. Additionally, of those paired-sites in the 2 control arms that offered students the opportunity to provide comprehensive pharmaceutical care, none met the minimum APPE expectation of 4 comprehensive pharmaceutical care consultations per student over an 8-week period. Conversely, all the enhanced APPE arm sites surpassed this expectation, with all students having ample opportunity to engage in comprehensive pharmaceutical care with patients at their sites.

Third, when examining the number and distribution of drug-related problems identified during the provision of comprehensive pharmaceutical care, there was more than a 30-fold increase in the number of problems identified by students in the enhanced APPE arm compared to the 2 control arms. Students identified these problems during comprehensive pharmaceutical care consults that involved thorough patient interviews and comprehensive assessment processes. This increased level of care went well beyond the common practice in these stores, where pharmacists relied primarily on pharmacy profiles and screening of prescriptions to identify drug-related problems; preceptors clearly consider this "value-added care."

Fourth, more patients at the enhanced APPE arm sites benefited from an intervention by a student to address a drug-related problem identified during a comprehensive pharmaceutical care consult, and more patients in the enhanced APPE arm benefited from follow-up care by

a student who monitored outcomes from such an intervention. Consequently, a significantly greater number of patients in the enhanced APPE arm benefited from documented resolutions to their drug-related problems compared to those in either of the 2 control arms. Eight students in the non-Shoppers Drug Mart control arm and 13 students in the Shoppers Drug Mart control arm provided no follow-up care to their patients.

All enhanced APPE arm preceptors responding to the questionnaire reported that the enhanced APPE offered more benefits to students, patients, and preceptors alike compared to their previous experience with the traditional APPE (quotes included in Table 3). The preceptors also remarked that students contributed more to the care of the store's patients than during previous years. It was apparent from the responses that the enhanced APPE had increased the pharmacists' confidence in their role as preceptor, and had reaffirmed their belief that students could make positive contributions to patient care in their stores.

At first glance, much of the difference between enhanced APPE arm and control arm sites might appear to be attributed to time lost at the control arm paired-sites, since these locations provided the bulk of the early student orientation during the first of the 4-week experience. While the availability of 2 additional weeks to the enhanced APPE arm likely contributed certain advantages, this alone could scarcely account for the differences observed; and to suggest such, would imply that students in the 2 control arms could have increased the number of their comprehensive consultations by at least 16-fold and their follow-up care counts by at least 28-fold. Furthermore, the preceptors' feedback suggested that the advantages of the enhanced experience extended beyond identifying and resolving drug-related problems, and included improved relationships between students and patients as well as students and preceptors. It is, therefore, most probable that the value-added experience was a result of combined effect from all the interventions introduced in the enhanced APPE. As this study was not designed to decipher how much each of the 3 enhanced interventions contributed to the study results, future studies will need to explore the relationship between these 3 interventions.

As pharmacy education attempts to make curricular decisions based on best available evidence, it is crucial to test educational assumptions through well-designed studies. In a recent communication to the *American Journal of Pharmacy Education*, Chase²¹ suggested that colleges and schools would be wise to implement evaluation processes in their APPE programs to demonstrate the value of pharmacy students to placement sites, based on what

students contribute to the quality of patient care: "Sites, quite simply, must see the value of our students and they must need our students."²¹ This pilot study demonstrated to preceptors and store managers that pharmacy students can contribute to patient care activities at their sites. Furthermore, comparisons across the 3 study arms made the study results generalizable to non-SDM community pharmacies. In the end, as a direct consequence of this study, the way the community pharmacy APPE program was delivered at UBC changed. The current partnership with Shoppers Drug Mart was extended for an additional 4 years, and similar partnerships were developed with 2 other national chains and consortium of independently owned pharmacies.

Limitations

While this study showed the impact of students on patient care, it clearly did not present all the answers. The study design included 2 control arms (one with a single national chain Shoppers Drug Mart and one with a variety of non-associated locations outside the Shoppers Drug Mart chain) to ensure that differences seen between the enhanced APPE arm and control arms were not due to the Shoppers Drug Mart chain's practice environment. Nevertheless, study results should be generalized cautiously to settings outside British Columbia. The sample size for students and community pharmacies was small, as befits a pilot study. All preceptors across both study arms and the enhanced APPE arm students were selectively recruited; hence it would be reasonable to wonder if the superior performance among students in the enhanced APPE arm may have been due, in part, to increased motivation. Whether more mainstream participants (both preceptors and students) would demonstrate similar improvements remains to be tested. Additionally, the enhanced APPE intervention used a 3-prong approach: preceptor education, student orientation, and a modified 8-week APPE structure. There are limitations associated with such a mixed intervention model and the current study design and participant counts do not allow for a direct analysis of their interactions. It is difficult to know whether a different outcome would have resulted had all students completed their APPE at 1 site for a period of 8-weeks. Despite the clear advantage of designing a program enhancement process with only one intervention being tested at any one time, the real-time needs of our faculty members, the community pharmacy managers, and the preceptors made a different approach necessary. SPEP faculty members could not unilaterally modify the current (traditional) 8-week APPE model without faculty and University Senate Committee approval, without support from community pharmacy managers to commit

their pharmacists' time to precept APPE students over an extend period of time (4-weeks versus 8-weeks), or without buy-in from preceptors to take on such responsibilities. Such challenges are common in practice-based research where stakeholders' perspectives, needs, and sense of urgency may differ from those of the researchers. However, adopting a methodology that balances the needs of all the stakeholders and ensures change using a participatory and cooperative approach has its own unique advantages, where change is seen as more of a collaborative process than a top-down directive. At UBC, this approach led to an additional commitment of 4 years of funding from Shoppers Drug Mart and other pharmacies and long-term enhancement of the community APPE program.

CONCLUSION

This study showed that an enhanced APPE program can have a positive impact on placement sites and preceptors. Patients from community pharmacies whose pharmacists participated in the enhanced APPE arm unmistakably experienced enhanced patient care from the students, including more student-led interventions for optimizing new and refill prescriptions as well as comprehensive pharmaceutical care consultations. The positive outcomes of this study helped the SPEP faculty forge new partnerships with community pharmacy chains and independent British Columbia pharmacies. As well, the study corroborates the idea that an enhanced APPE program can help community pharmacies better meet patient expectations, especially as pharmacy practice expands to incorporate disease management and health promotion services.

REFERENCES

1. Kassam, R. Evaluation of pharmaceutical care opportunities within an advanced pharmacy practice experience. *Am J Pharm Educ.* 2006;70(3):Article 49 <http://www.ajpe.org/view.asp?art=aj700349&pdf=yes>. Published June 15, 2006, Accessed January 26, 2009.
2. Kassam R. Students' and preceptors' experiences and perceptions of a newly developed community pharmacy pharmaceutical care clerkship. *Pharm Educ.* 2006;6(3):179-88.
3. Cerulli J, Briceland LL. A streamlined training program for community pharmacy advanced practice preceptors to enable optimal experiential learning opportunities. *Am J Pharm Educ.* 2004;68(1):Article 9 <http://www.ajpe.org/view.asp?art=aj680109&pdf=yes>. Published March 12, 2004, Accessed January 26, 2009.
4. MacKinnon III GE. Documentation: A value proposition for pharmacy education and the pharmacy profession. *Am J Pharm Educ.* 2007;71(4):Article 73 <http://www.ajpe.org/view.asp?art=aj710473&pdf=yes>. Published August 15, 2007. Accessed January 26, 2009.
5. Nemire RE, Meyer SM. Educating students for practice: educational outcomes and community experience. *Am J Pharm Educ.* 2006;70(1):20. <http://www.ajpe.org/view.asp?art=aj700120&pdf=yes>. Published February 15, 2006. Accessed January 26, 2009.

6. Zarembski DG, Boyer JG, Vlasses PH. A survey of advanced community pharmacy practice experiences in the final year of the PharmD curriculum at the U.S. colleges and schools of pharmacy. *AHPE*. 2005;69:Article 2.
7. Kassam R, Volume-Smith CI. Focus group methodology to develop a community pharmaceutical care clerkship program. *Am J Pharm Educ*. 2003;67(3):633-73. <http://www.ajpe.org/view.asp?art=aj670388&pdf=yes>. Accessed January 26, 2009.
8. Lee, KW, Machado MR, Wenzel MM, Gagnon JM, Calomo JM. An advanced professional pharmacy experience in a community setting using an experiential manual. *Am J Pharm Educ*. 2006;70(2):42. <http://www.ajpe.org/view.asp?art=aj700242&pdf=yes>. Accessed January 26, 2009.
9. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm*. 1990;47:533.
10. Kassam R, Farris KB, Cox CE, Volume CI, Cave A, Schopflocher DP, Tessier G. *J Am Pharm Assoc*. Tools used to help community pharmacists implement comprehensive pharmaceutical care. 1999;39:843-56.
11. Kassam R, Farris KB, Burback L, Volume CI, Cox CE, Cave A. Pharmaceutical care research and education project: pharmacists' interventions. *J Am Pharm Assoc*. 2001;41:401-10.
12. Hanlon JT, Shimp LA, Semla TP. Recent advances in geriatrics: drug-related problems in the elderly. *Ann Pharmacother*. 2000;34:360-5.
13. Armour CL, Taylor SJ, Hourihan F, Smith C, Krass I. Implementation and evaluation of Australian pharmacists' diabetes services. *J Am Pharm Assoc*. 2004;44:455-66.
14. Cranor CW, Christensen DB. The Asheville Project: factors associated with the outcomes of a community pharmacy diabetes care program. *J Am Pharm Assoc*. 2003;43:160-72.
15. Carter JT, Draugalis JR, Slack MK. Impact of clerkship students on pharmacy site outputs. *Am J Health-Syst Pharm*. 1996;53:1694-700.
16. Dennehy CE, Kroon LA, Byrne M, Koda-Kimble MA. Increase in the number and diversity of clinical interventions by PharmD students over a clerkship rotation. *Am J Pharm Educ*. 1998;62(4):373-9.
17. Briceland LL, Krane MP, Hamilton RA. Evaluation of patient-care interventions by Pharm.D. clerkship students. *Am J Hosp Pharm*. 1992;49:1130-2.
18. MacKinnon III GE. Analysis of pharmacy student interventions collected via an internet based system. *Am J Pharm Educ*. 2003;67(3):Article 90. <http://www.ajpe.org/view.asp?art=aj670390&pdf=yes>. Accessed February 6, 2009.
19. Reddick JB, JE Murphy. Evaluating the clinical interventions of students during their clerkships using a cognitive services claim form. *Am J Pharm Educ*. 2000;64(1):38-43.
20. Turner CJ, Ellis S, Giles J, Maffeo C, Hansen L, et al. A strategy to develop advanced pharmacy practice experiences. *Am J Pharm Educ*. 2007;71(3):Article 46. <http://www.ajpe.org/view.asp?art=aj710346&pdf=yes>. Accessed February 6, 2009.
21. Chase P. Rethinking experiential education (or does anyone want a pharmacy student?). *Am J Pharm Educ*. 2007;71(2):Article 27. <http://www.ajpe.org/view.asp?art=aj710227&pdf=yes>. Accessed February 6, 2009.