Evaluation of a Practice Enhancement Program to Implement Pharmaceutical Care

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The aim of this project was to assess the effectiveness of a practice enhancement program in training community pharmacists to provide pharmaceutical care. A mid- and post-test with no control group design was used. Nine pharmacists in five pharmacies completed the program comprised of 40 hours of face-to-face sessions, 10-weeks of structure/process changes and case work-ups for five paper cases and six practicum patients. Structure and process changes adopted and work-ups for two standard patients and a description of care provided to practicum patients were used to evaluate the program. All pharmacies implemented some of the structure and process changes. For the standard patient, the average was 59 ± 8 percent for the mid-test and 78 ± 10 percent for the post-test ($P<0.01$). Real or potential drug-related problems identified for 51 practicum patients numbered 158. Pharmacists made 57 recommendations and 61 percent were accepted by physicians. This evidence suggests that participating community pharmacists possess the capability to provide pharmaceutical care.

INTRODUCTION

Pharmaceutical care has been offered as pharmacists' societal responsibility to prevent drug-related morbidity and mortality(1,2). Yet, the adoption of pharmaceutical care among community pharmacists is not pervasive(3). This low adoption is likely due to complex interactions among a number of variables including drug product focus, lack of monetary incentives, patient attitudes and physician attitudes(4-7). Pharmacists attitudes and skills, however, may also be barriers to changing pharmacy practice(8,9).

Various program have sought to facilitate the adoption of pharmaceutical care. Programs having the most extensive evaluation focused on pharmacist competencies and on pharmacy system changes. Kimberlin, et al., sought to increase knowledge and skills in analyzing medication profiles, identifying additional information needed to solve problems, identifying drug-related problems, developing a plan to resolve problems and role-playing for interventions(10,ll). The training program for the treatment pharmacists involved a home study program and a day-long workshop. In their experimental study of 102 pharmacists and 762 patients, treatment patients reported more interactions with pharmacists, however the interactions did not lead to improvements in knowledge of medications, medication-taking behavior or detection of drug-related problems or the measures employed were not responsive. The authors suggest that environment or system changes should accompany initiatives to improve individual pharmacists' competencies.

Currie, et al., also evaluated the effect of a training program for community pharmacists on the detection and intervention of drug-related problems(12). The program focused on improving problem-solving and communicating skills not on therapeutic knowledge. Thirty hours were spent in direct contact with educators and 10 hours were spent on independent study. The pharmacy also made structural and procedural changes, as a semi-private patient care area was added. Using a randomized, prospective design in one pharmacy, treatment patients were 8.6 (95 percent confidence interval = 4.8-15.5) times more likely to have a drug-related problem identified and 8.1 (95 percent confidence interval = 4.7-14.2) times more likely to have an intervention performed than patients in the control group. While the authors argue that selection bias of the study participants was unlikely to have accounted for the large differences detected, low enrollment rates (28 percent) were noted in the treatment group. In addition, statistical comparison of the treatment and control groups in terms of demographic information was not presented. Thus, the comparability of the study groups was unclear in terms of age, sex and number of medications, particularly since the latter may be associated with number of drug-related problems.

Finally, Mehra and Wuller provided a series of six two-hour workshops and a two-hour final practicum as a means to improve clinical skills among community pharmacists(13). The goal of this program was to prepare eleven pharmacists for being preceptors. After the program, five of nine pharmacists reported they needed more training to precept students, but all

participants reported they would be ready in the near future. Most pharmacists in the program reported improvements in clinical skills, especially regarding monitoring devices. The authors suggest that clinical knowledge is critical and the most important tool in providing pharmaceutical care.

In summary, knowledge is an important key to change practice. Pharmacists' skills and their environment, however, may be more related to practice change and the maintenance of practice change. In-depth programs have not been evaluated to change practice.

OBJECTIVES

The overall aim of this project was to assess the effectiveness of a practice enhancement program (PEP) in training community pharmacists to provide pharmaceutical care. The specific goals were to develop generalists who: (*i*) implemented pharmacy systems to support pharmaceutical care; (*ii*) provided comprehensive pharmaceutical care to elderly, ambulatory patients; (*iii*) provided pharmaceutical care consistently and reproducibly; (*iv*) provided continuous care; (*v*) collaborated with patients and healthcare providers in the provision of pharmaceutical care; and (*vi*) learned via self-directed strategies. The program was based on a Social Learning Theory framework with a focus on structure and process changes in the pharmacies as well as pharmacists' competencies[1]. Importantly, we sought to raise the level of drug-related problem identification and intervention above levels reported in community pharmacy observation studies(14-16). Ethical approval was obtained from the University of Alberta Faculty of Medicine Ethics Review Committee.

METHODS

Design. A program evaluation approach was used to assess the effectiveness of the practice enhancement program in meeting its stated objectives and used a mid- and post-test with no control group design. A formative approach was also used in that the mid-test results were provided and discussed with the participants to aid in learning(17,18). This study design was not experimental and has threats to internal validity. It is acknowledged that the pharmacists may have attended continuing education sessions or obtained clinical knowledge by other means during this program, but the focus of the program was on a systematic problem-solving process for identifying and resolving drug-related problems. It is unlikely that this particular process was learned outside of the program.

Subjects. All pharmacists in the treatment group of a larger project evaluating pharmaceutical care participated in this study. Pharmacists were recruited into the project via advertisements in the provincial pharmacy association newsletter and telephone contacts. Interested pharmacists were asked to complete an application form and attend a one-hour meeting describing the study. Site visits were made by the principle investigator or clinical coordinator prior to acceptance into the project. Commitment of time, computer resources and potential structure and process changes were discussed with decision-makers in the pharmacies. Recruitment occurred from October 1995 to February 1996. Pharmacies did not receive direct monetary compensation for participation in the study.

Intervention. A program logic model presented in Figure 1 provides an overview of PEP and illustrates how the long-term goals were to be achieved. The research team identified four major areas requiring attention, and these areas are summa

rized under main components in the logic model. Implementation objectives included specific activities, strategies and processes undertaken for each of the main components. For each of the implementation objectives, short term or immediate goals were defined to help evaluate the progress of PEP. Such a plan helped the research team remain focused on long terms goals to be achieved.

The practice enhancement program ran from April 1996 - July 1997. The program was comprised of 40 of hours face-to-face sessions, 10 weeks of structure/process changes and 14 months of paper case and practicum patient work-ups. The program was delivered primarily by the clinical coordinator who was familiar with self-directed, problem-based learning approaches from her graduate training and previous teaching experience(19). She provided individual feedback on paper cases and practicum patients and also role-played patients in the paper cases. This feedback may have included appropriate use of tools, pathophysiology, treatment alternatives, geriatric pharmacokinetics or structure/process changes. The clinical coordinator did not identify the drug-related problems or complete the interventions for the pharmacists.

The five paper cases developed by the clinical coordinator covered several topics applicable to ambulatory, geriatric patients. Topics included gastroesophageal reflux disease, chronic obstructive pulmonary disease, community-acquired pneumonia, urinary incontinence, falls, hypertension, constipation, orthostatic hypotension, benzodiazepine over-use, congestive heart failure, osteoporosis, depression, diabetes, headaches and osteoarthritis.

The initial paper cases had one drug-related problem. Over time, the number of problems increased to include a new drug-related problem and problems encountered in earlier cases. Revisiting old and familiar problems allowed the pharmacists to review their previous work-ups and reapply the knowledge to a new situation. For each of the paper cases, reading materials and patient information were provided to the participants in advance. The pharmacists were expected to work-up all paper cases individually and then collaborate with their peers to discuss the cases. For each case, the pharmacists used the tools provided in the project including: (*i*) Medication & Medical Information sheets; (*ii*) Pharmacists' Management of Drug-related Problems" (PMDRP); (*iii*) Therapeutic Thought Process" (TTP) Worksheets and Algorithm; (*iv*) List of Drug-related Problems" sheet (DRP); (*v*) Initial and Follow-up SOAP" note (subjective, objective, assessment and plan); and (*vi*) List of Things To Do" sheet. These tools have been described elsewhere(21).

The paper cases were delivered via a computer-mediated-communication package developed by the Division of Continuing Pharmacy Education at the University of Alberta(20) The pharmacists were divided into three groups to work on the paper cases, and discussions about the paper cases occurred on-line by sending e-mail messages back and forth. The pharmacists were expected to sign on the computer system at least three times a week. All tools were available to the pharmacists electronically which facilitated sharing their work. This type of delivery provided flexibility to receive or leave messages at any time and facilitated learning with peers despite geographic distance.

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[1]Volume, C.I., Cox, C, Farris, K.B., Kassam, R. and Porting. A.I., "Practice enhancement program within pharmacies providing pharmaceutical care: An application of Social Learning Theory," Association of Faculties of Pharmacy of Canada Annual Conference, Calgary, AB (1996).

Main components	Ensure time to provide pharmaceutical care (PC).	Adopt tools & processes to develop competencies & relationships.	Deliver PEP using self-directed/ problem-based learning approach.	Provide ongoing support by trained clinician
Implementation objectives	1. Discuss how to find time in face-to-face session. 2. Video conference with Iowa & Minnesota pharmacists. 3. Visit twice monthly to reinforce & discuss progress. 4. Assess checklist & timelines re structure changes including purchase of drug references, setup of patient care area & files and assess technician skills. 5. Assess checklist & timelines re process changes including phone answering procedures, prescription filling procedures & holding regular staff meetings. 6. Develop promotional materials.	1. Introduce therapeutic relationship with patients via articles & ongoing discussions. 2. Improve interviewing skills via videotaping & feedback with 3 simulated patients. 3. Introduce PC Process for consistent & stepwise approach to care. 4. Adopt tools to collect specific patient data, develop a systematic approach to problem-solving, learning & critical thinking, facilitate consistent documentation and execute tasks outlined in the PC Process. 5. Suggest processes to foster relationships with health care providers & patients.	1. In face-to-face sessions (1) introduce PC philosophy & Process & define drug-related problems, and (2) use 2 paper cases to illustrate PC Process & tools. 2. Work-up 5 paper cases in small groups over 8 month period to ↑ comfort with problem-based learning, PC Process, tools & therapeutic knowledge of common medical problems in ambulatory geriatrics. 3. Provide PC to 6 practicum patients using tools and Process used in the paper cases over 6 month period. Ensure collaboration, follow-up & documentation.	1. Instruct, facilitate &/or mentor. 2. Emphasize self-directed problem-based learning. 3. Facilitate paper cases with feedback to each group on their work-ups via Computer-Mediated-Communications. 4. Meet twice monthly with pharmacists for 2 hours to (1) ensure uptake of tools & PC Process, (2) provide feedback on completed work-ups, (3) identify & meet learning needs and (4) reinforce completion of all work & meeting timelines. 5. Help pharmacists develop relationships with patients & healthcare providers. 6. Ensure allocation of time by structure & process changes.
Immediate goals	Pharmacists complete structure & workflow changes to provide minimum of 15 hours per week to PC activities.	Pharmacists are • Understanding the tools' relevance in problem solving. • Developing therapeutic relationships with patients. • Acquiring relevant patient data from patients & health care providers. • Identifying & resolving more complex & ↑ number of drug-related problems. • Assuming responsibility for patient outcomes by providing follow-up as required. • Documenting care for all patients receiving PC • Applying knowledge & skills to solve similar & different problems in practice. • Expanding their information files by developing disease & treatment modules. • Using the PC Process & providing PC on a patient-specific basis.		Pharmacists are • Transferring competencies acquired during paper cases to actual patients in their practices. • More confident in assessing, identifying & resolving drug-related problems. • Using self-directed & critical thinking strategies to apply that knowledge and improve patient outcomes in practice.
Long-term goals	(1) Implement pharmacy systems to support pharmaceutical care; (2) Provide comprehensive pharmaceutical care to elderly, ambulatory patients & to expand provision of pharmaceutical care to other patients at their sites; (3) Provide pharmaceutical care consistently and reproducibly, (4) Provide continuous care, (5) Collaborate with patients & healthcare providers in the provision of pharmaceutical care, and (6) Learn via self-directed strategies.			

Fig. I. Program logic model describing the Practice Enhancement Program (PEP)

One simulated patient with chronic pain was used for the pharmacists to practice their patient interviewing. Strengths and weakness of each pharmacist were identified via videotape. Additional patient interviewing training occurred by role-playing with the clinical coordinator. The two standard patients for program evaluation (discussed in next section) were also used to provide feedback on pharmacists' interviewing skills. To ensure learning from the paper cases was applied, practicum patients were individuals selected by the study pharmacists from their pharmacies who agreed to work with them. The practicum patients had been receiving services from the study pharmacists for numerous years and were familiar to the pharmacists. Some of the practicum patients had diseases that had been worked-up previously in the paper cases, but none of the practicum patients were 65 years old or greater and eligible for the larger study. The pharmacists interviewed the patients and completed the appropriate tools to identify drug-related problems. They also developed a care plan, intervened on one drug-related problem and documented their care.

Measures/Analysis. Table I shows the measures used to assess progress toward the study goals. Twice monthly visits to phar

Table I. Assessment mechanisms for program goals

Goal	Assessment mechanisms
1. Implement pharmacy systems to support pharmaceutical care	(a) self-reported changes in pharmacy, (b) observed changes in pharmacy
2. Provide comprehensive pharmaceutical care to elderly, ambulatory patients, and	(a) standard patient Pharmacists Management of Drug-Related Problems, (b) standard patient Therapeutic Thought Process (c) standard patient List of Drug-Related Problems and (d) practicum patients' List of
3. Provide pharmaceutical care consistently and reproducibly	Drug-Related Problems
4. Provide continuous care	(a) quantification of standard patient Subjective-Objective-Assessment-Plan documentation
5. Collaborate with patients and healthcare providers	(a) recommendations accepted among practicum patient interventions
6. Learn via self-directed strategies	(a) number of articles requested for photocopy, (b) practicum patients begun with new Therapeutic Thought Process forms and (c) use of the "To-do list" in the Pharmacists Management of Drug-Related Problems

macies during the 10-week structure/process change period documented pharmacists' initial changes. Subsequent twice monthly visits by the clinical coordinator also assessed maintenance of the changes. Descriptive information was summarized.

Two standard patients were used to assess Ojectives 2-4(22,23). The mid-test standard patient was a pharmacy student actor playing an elderly man who went into a pharmacy to get a nonprescription codeine product. The pharmacists were expected to identify that the patient was experiencing falls secondary to drug therapy with imipramine and alprazolam. The pharmacists were also expected to identify the inappropriate use of imipramine for treatment of the patient's urge incontinence because of falls and poorly controlled incontinence. The post-test standard patient involved a pharmacy student actor playing an elderly diabetic man who went into the pharmacy for a calcium channel blocker for his hypertension. The pharmacists were expected to identify that the patient was at increased risk of nephropathy due to not receiving a medication to reverse his microalbuminuria. Also, the patient was at risk of experiencing worsening kidney function secondary to receiving a nonsteroidal anti-inflammatory drug for arthritis. The pharmacists interviewed the standard patients in their pharmacies, completed all relevant tools introduced in PEP, identified all drug-related problems and developed a care plan to resolve the main drug-related problem.

The clinical coordinator of the program prepared answers for the tools for the standardized patients. The answer documents were independently reviewed by two clinical pharmacists for accuracy and completeness, and changes were made to the answer documents based upon the reviewer comments. Answer documents were then used by trained students to mark the pharmacists' completed forms. The clinical coordinator, blinded to the identity of the pharmacists, used these markings in addition to her own clinical judgements to provide a quantitative assessment of the care that had been provided. The overall assessment form for the standard patient included sections related to each of the study tools. Table II shows the items evaluated for the pharmacists' standard patient documented care. Scores were computed and compared for the mid-test and post-test standard patients. A Wilcoxon sign rank test was used to assess statistically significant differences. Multiple comparisons were made and a resulting alpha of 0.004 was conservatively used.

The completed tools identifying drug-related problems and documenting interventions for the practicum patients were collected and input into a database. Descriptive statistics about the number and types of drug-related problems as well as the acceptance of recommendations were calculated.

Table II. Assessment form for standard patient evaluation[a]

Pharmacists' Management of Drug-Related Problems
  Form complete
  Information relevant
  Information accurate
  Information collected without assistance[b]
  "To Do List" being used to guide self-learning
  Use the information gathered in the form to help identify all DRPs
Therapeutic Thought Process Worksheets
  Accurately answer all relevant questions
  Apply the TTP to a specific patient
  Support the conclusions made
Drug-Related Problems Identified
  Accurately state all drug-related problems
  Prioritize drug-related problems in terms of urgency, patient needs and time
SOAP Documentation
  Outcomes
    Identify appropriate clinical outcomes without assistance[b]
    Correctly identify desired pharmacotherapeutic endpoints[b]
    All components included in pharmacotherapeutic endpoints
  Recommendations
    Make a patient-specific recommendation
    Justify recommendation based on efficacy, time frame, toxicity, drug interactions, convenience and costs
  Monitoring
    Identify correct positive and negative therapeutic endpoints for monitoring
    Includes all components of positive and negative therapeutic endpoints
    Develop monitoring plan that ensures therapeutic endpoints are assessed
  General
    Complete
    Clearly documented

[a] A five-point scale from none to all, never to always or unacceptable to excellent was used for all scales unless otherwise indicated.
[b] Four-point scale from unable to always able

RESULTS

Program Participation. All pharmacies were initially independently-owned, but one pharmacy was purchased by a chain during the program. Migration into and out of the program did not change the mix of pharmacists regarding percent female (40 percent) or percent owner (40 percent). At the end of the program, the pharmacists' average number of years in practice had reduced from approximately 16.1 ± 10.9 to 13 ± 10.9, due to the entrance of a new graduate at the end of the program. Pharmacies with low prescription volumes dropped out of the project in Spring 1997 and caused an increase in the average

Table III. Quantification of tools completed for standard patients (n=9)

	Percent		
	Mid-test	**Post-test**	*P*[a]
Pharmacists' Management of Drug-Related Problems			
Completeness	81 ± 18	87 ± 9	0.48
Relevance	53 ± 13	82 ± 8	0.007
Accuracy	97 ± 5	87 ± 5	0.02
Assistance	57 ± 11	75 ± 25	0.07
Overall PMDRP average	72 ± 7	83 ± 9	0.008
Therapeutic Thought Process	51 ± 16	74 ± 19	0.008
Drug-related Problems	28 ± 6	81 ± 15	0.008
SOAP Documentation			
Outcomes	65 ± 13	79 ± 15	0.03
Recommendations	38 ± 13	65 ± 15	0.01
Monitoring plan	58 ± 19	71 ± 18	0.06
General	61 ± 19	81 ± 9	0.02
Overall SOAP average	55 ± 12	74 ± 12	0.01

[a]Two-tailed Wilcoxon signed rank test.

number of prescriptions per day from 100 ± 59.3 to 118 ± 67.0 among the participating pharmacies.

Eighteen pharmacists (full and part-time) in eight treatment pharmacies began the program. Over the 16 months, ten pharmacists changed employment or withdrew and two pharmacists were added resulting in ten pharmacists (all full-time) in five pharmacies. One of the pharmacists was added to the program near its completion and is not represented in the cohort of nine pharmacists who participated in PEP for the entire time period.

Three pharmacies representing five pharmacists withdrew during the practice enhancement program for various reasons. One pharmacy was purchased by one of the study participants and his/her pharmacy responsibilities expanded beyond patient care. The second pharmacy dropped out because it had a declining prescription volume: it was located in small rural community and was unable to attract a full-time physician. Pharmacists in the third pharmacy were unable to provide care because their non-pharmacist owner no longer supported the project one year after it began.

Goal 1. Pharmacies remaining in the project were successful in implementing some of the structure and process changes. In terms of structure-related changes, they all added patient consultation areas, up-to-date drug references, drug and disease files and patient care files. Up-to-date drug references including a new therapeutics text, therapeutics handbook, *AHFS Drug Information* and two primary journals were provided for the study pharmacies by one of the study sponsors. Four of the five pharmacies hired technical staff, except for one pharmacy that filled approximately 50 prescriptions per day. All pharmacies were capable of connecting to the University library system to request journal articles. All pharmacies conducted staff meetings at the initiation of the project to discuss the upcoming changes in the pharmacy, however the pharmacies did not continue to hold regularly scheduled staff meetings.

In terms of process-related changes to the pharmacies, telephone answering procedures and prescription workflow were stressed by the research team and adopted to varying degrees. Although a separate in/out area for all pharmacies was considered optimal, one pharmacy did not use this approach, and we observed that the remaining pharmacies varied in utilization of "out" stations. For documentation, all pharmacists used the Pharmacists' Management of Drug-Related Problems

forms to document medication histories and SOAP notes to document drug-related problems, recommendations, results of recommendations, monitoring parameters and follow-up.

Goals 2 and 3. Table III shows the clinical coordinators' average ratings of the PDMRP, TTP and Identifying DRP forms (using the criteria shown in Table II) which were used to assess this goal. From mid-test to post-test, the pharmacists showed improvement on three criteria of the PMDRP. If one considers 70 percent an acceptable level of competency on all three criteria of completeness, accuracy and relevance, only one pharmacist met this criterion at mid-test. However, all nine pharmacists met the criterion at post-test. The level of assistance was a retrospective, subjective assessment by the clinical coordinator about the pharmacists' ability to complete the PMDRP without her assistance and prompting and showed improvement.

The pharmacists' use of the TTP form did not show statistically significant improvement using the conservative multiple-comparison *P*-value. In addition, the pharmacists ability to identify drug-related problems was not statistically different from mid and post-test (*P*=0.008) using the multiple comparison p-value. The average across all criteria in Table III was 59 ± 8 percent for the mid-test and 78 ± 10 percent for the post-test, and the difference was not statistically significant (*P*=0.01). However, all but one pharmacist improved by at least 50 percent from mid- to post-test on the standard patient evaluation.

Pharmacists also worked with 51 practicum patients during PEP. Using the tools provided in the project and with the clinical coordinator's reinforcement, 158 real or potential drug-related problems were identified. The types of drug-related problems identified included required drug therapy (37 percent), received wrong drug or product (17 percent), experienced adverse drug reaction (15 percent), experienced drug interaction with other drug, disease or food (10 percent), received incorrect drug (eight percent), received too little drug (six percent), received drug with no valid indication (five percent) and received too much drug (one percent). There was an average of 17.5 drug-related problems identified per pharmacist (95 percent confidence interval, 11.7-23.4).

Goal 4. The quantification of pharmacists' SOAP notes for the standard patients was used to assess the degree to which phar

macists provided continuous care. These results are also shown in Table III. Improvement in documentation was not seen for the standard patients from mid to post-test (*P*=0.01) at the 0.004 level.

Goal 5. For goal five, interventions for practicum patients were counted to determine if the study pharmacists were initiating interprofessional communications via recommendations. Of the 158 real or potential drug-related problems identified among the practicum patients, pharmacists prioritized the problems and completed SOAP notes with recommendations for 57 drug-related problems. Recommendations were accepted in 35 problems (61 percent), not accepted in three problems, modified in six problems, no decision in three problems and incomplete documentation in 10 problems.

Goal 6. One goal of this study was for the pharmacists to use self-directed learning strategies to continue learning once the project was completed and the clinical coordinator had stopped providing support and mentoring. At the end of the program, 51 practicum patients were assessed by the nine pharmacists with the completion of 23 new TTPs. Two pharmacists completed only four and five practicum patients due to new graduate status and part-time status, respectively. All pharmacists completed one new TTP for one of their practicum patients, and one pharmacist completed five TTPs. Pharmacists were also able to request photocopies of articles via the University library, and two pharmacists requested articles.

Self-directed learning was also assessed using a portion of the PMDRP. A to-do list was provided in this form which identified learning topics and resources for the pharmacists. At the mid-point, eight pharmacists were rated as not using the list at all and one pharmacist was rated as using the list, but topic and resources were general. At the post-test standard patient, three pharmacists were ranked at four implying that the list was being used with specific learning topics, however the resources were general. Four pharmacists were rated as the using the list, but topic and resources were general and two pharmacists continued to not use the list.

DISCUSSION

The overall aim of this project was to assess the effectiveness of a practice enhancement program in training community pharmacists to provide pharmaceutical care. The pharmacists participated in an intensive, 16-month, case-based and clinician-supported program where they learned a systematic process to collect patient information, analyze drug and disease information, problem solve to identify drug-related problems and identify and make recommendations about drug therapy. Within this general pharmaceutical care process was also an explicit process to learn new disease states and drug therapies. Specifically, pharmacists could use the TTP to identify and resolve drug-related problems that required knowledge that they did not possess at the time of the patient interview.

Using the conservative P-value of 0.004, no mid to post-test comparisons were statistically significant. However, some statistical results were compelling, particularly the mid to post-test differences in pharmacists' use of the TTP (*P*=0.008) and their ability to identify drug-related problems (*P*=0.008). The descriptive data of the pharmacists' provision of care to the practicum patients was also encouraging. During the practicum, pharmacists developed new TTPs on disease states for which they were unfamiliar. After a comprehensive interview and work-up using the tools provided in the project, the

pharmacists identified 158 real or potential drug-related problems among patients who had been receiving care in their pharmacies. In fact, the distribution of drug-related problems identified by the pharmacists suggests that underuse of medications was problematic. The problems categorized as incorrect drug were classified as such primarily because of poor responses among the patients, *i.e.*, the drug was not working. These findings, taken together, suggest that level of problem identification among these pharmacists was higher than previous. It appears that pharmacists' pharmaceutical care skills improved, although a conservative statistical test was not significant.

The number of drug-related problems identified for practicum patients suggests that the systematic and comprehensive approach to problem-solving provided by the PMDRP and TTP helped the pharmacists collect relevant patient data and identify drug-related problems. The pharmacists recognized that they previously made assumptions about patients' drug-related needs, medical problems, appropriateness and efficacy of therapies that resulted in incorrect conclusions and missed drug-related problems. However, the time required in completing the patient interviews and work-ups was the most negative issue for the pharmacists. As well, the accuracy with which pharmacists completed the PMDRP lowered as they began to gather more information. Pharmacists were given a similar amount of time to complete the patient interviews during the mid- and post-tests. The lower accuracy rating may have resulted because they did collect more and more relevant information, but in a more hurried fashion.

Given time constraints, the pharmacists varied in their ability and/or work environments to relinquish prescription filling and/or administrative roles to assume patient care roles. The mechanism each pharmacy intended to use to find time was different. For example, one pharmacy, a low-volume pharmacy with no technician, blocked two hours five times per week to free time to provide pharmaceutical care. Another pharmacy gave each of three pharmacists' five hours per week and incurred increased wages to provide overlap. While these mechanisms and others were reinforced to the pharmacists during visits, the reality is that the pharmacists often completed their work-ups and SOAP notes during the several days preceding visits by the clinical coordinator.

In fact, SOAP notes were a difficult area for the study pharmacists, as documentation was not traditionally part of pharmacy practice. Although the pharmacists became comfortable with developing a SOAP note, they needed continuous prompting from the clinical coordinator to document the care they provided during the practicum phase. They were more apt to document the initiation of care using the Initial SOAP Note, but needed continuous reinforcement to document their follow-up care. Discussions with the study pharmacists towards the end of the project resulted in an abbreviated SOAP note.

In terms of recommendations, pharmacists phoned physicians if there was a concern or a drug-related problem identified. However, early in the program, they seemed reluctant to make specific recommendations despite having developed a SOAP note. Some of the concerns voiced by the pharmacists included overstepping their responsibilities, offending physicians, making recommendations that would not be accepted and assuming the responsibility for the outcomes of the recommendations made. During the practicum, pharmacists did, however, make some specific recommendations to physicians that were accepted almost two-thirds of the time.

From a causal perspective, it is possible that pharmacists not receiving the training and feedback about the various tools

in this program may learn to use them, and the ratings of care for a standard patient may improve over a similar time period. However, it is unlikely that without reinforcement from the study's clinical coordinator, few of the study pharmacists would have completed this lengthy, intensive program alone. Our experience suggests that the clinical coordinator's twice monthly visits to each study pharmacist were paramount in sustaining the pharmacists' motivation to learn. This perspective suggests that significant practice change to provide comprehensive pharmaceutical care in community pharmacies may require numerous resources in terms of time for learning and facilitation. Our experience suggests that such change in community pharmacies is unlikely to occur without outside support from pharmacy associations and/or universities. In fact, the practice enhancement program required 1.0 FTE clinical pharmacist and 0.5 FTE secretarial support for 10 pharmacists over 1.5 years, in addition to university computer support of the communication systems. Trying to change practice was resource intensive.

From the investigators' perspectives, there were several things that could have been done differently. First, using participatory research methods may be more likely to produce sustainable practice change(24). This approach would involve pharmacists in all stages of the research process including identifying the research question, establishing the study protocol, implementing the study, analyzing the data and writing reports. Thus, the project would have ownership among all participants. However, generalizability of such a program would seem limited to highly motivated pharmacists.

Second, creating the need for pharmacy system structure and process changes rather than requiring it at the outset may have been more effective. For example, completing one paper case followed by a practicum patient may have made the pharmacists acutely aware of the time required and motivated them to devise ways to find time. The program focused on specific structure and process changes at its beginning. These changes, however, appear to have been initially adopted, but some were subsequently dropped because of lack of reinforcement. As long as the clinical coordinator visited the pharmacies, the pharmacists seemed diligent in their attempts to maintain changes.

Finally, practicum patients could have been incorporated prior to completing all the paper cases. For example, two paper cases followed by a practicum patient and repeated rather than five paper cases followed by six practicum patients may have been more insightful for the pharmacists in the early stages of the project. Alternatively, following one complex patient for the entire program may have been useful to model and mentor the continuity aspects of care using SOAP follow-up notes.

As practice-based researchers are aware, we must leave the study sites at some point to determine the impact of interventions and the pharmacists' subsequent impact on processes of care and patient outcomes. However, we suggest that sustaining practice change without external, professional reinforcement is questionable. It is rare for behavior change programs to include no support or reinforcement after a period of time, yet positivistic researchers assume that absence of researchers creates a non-biased intervention. During our project evaluating the impact of the care these pharmacists subsequently provided to senior Albertans over a one-year period, the clinical coordinator continued to visit the sites monthly to ensure that documentation was on-going. The analysis is currently underway among some 300 research patients.

Limitations of this program evaluation include the obvious lack of a control group as well as the lack of a pre-test. Because this evaluation focused on determining if we had achieved the practice enhancement program goals, it did not seem expedient to assess the goals prior to some instruction. In addition, the evaluation generally focused on the pharmacists' ability to use the tools in providing pharmaceutical care, and we assumed that instruction would be necessary prior to their use. Using a pre-test, however, may have given us information about specific areas to focus the practice enhancement program and may have produced statistically significant findings. However, we believe that the data, particularly from the practicum patients support goal attainment at the end of the practice enhancement program. The generalizability of this program is limited to highly motivated pharmacists who have some control over their work environments, exemplified by pharmacy owners' or managers' full participation in the project initially. The effect of age and years of practice were not studied given the small number of participants.

Regarding measurement of the standard patient work-ups, a second evaluator could have been included because the clinical coordinator could have assessed the pharmacists' work in a biased manner due to personal relationships. However, marking the standard patient work-ups by students with a peer-reviewed key and blinding the clinical coordinator to the pharmacists were used to reduce this potential bias. No blinding for time was used given the formative evaluation procedure to ensure that changes could be made to the program. Yet, the practicum patient results support the standard patient results suggesting that the pharmacists' abilities did improve because they identified drug-related problems for patients to whom they had been providing care prior to the program. This program motivated and supported pharmacists to make time and use their updated knowledge and skills to provide pharmaceutical care to selected patients in their practice.

Finally, the time required by the pharmacists to complete this program was significant. Although pharmacists did not track their time explicitly when working-up paper cases or practicum patients, they estimated that it required about 24 hours over a four to six week period for each case. In terms of continuing education credits for this project, the pharmacists were given five hours for PMDRPs, four hours for TTPs and three hours for SOAPs. These estimates were based upon pharmacists' self-reporting and the clinical coordinators' observation. Given the time required, we believe that this project represents pharmaceutical care that will be provided by innovative practitioners(24). It is not likely to be adopted by the majority of pharmacists without significant system changes of two key barriers, *i.e.*, physician relationships and reimbursement(5,6,25).

Several educational programs to implement pharmaceutical care have now been developed, but further research is needed. Follow-up on these endeavors is needed to determine the extent to which practice change has been maintained. Building interprofessional relationships, particularly with physicians, should be examined as an explicit mechanism to implement pharmaceutical care. As well, future research should examine the amount and type of clinical reinforcement that may be necessary to maintain practice change.

CONCLUSIONS

Community pharmacists participated in a comprehensive 16-month practice enhancement program focused on pharmacy systems and pharmacists' competencies to implement pharmaceutical care. The structure and process changes were imple

merited initially but languished without continual reinforcement. Evidence from standard and practicum patient evaluation suggests that participating pharmacists possess the capability to provide pharmaceutical care at a level which is likely to exceed intervention rates previously reported by community pharmacy observation studies. Continuous discussion and reinforcement from a clinical pharmacist were crucial to maintain progress through the program.

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