INSTRUCTIONAL DESIGN AND ASSESSMENT

Physician Acceptance of Pharmacotherapy Recommendations Made by Pharmacy Students in a Rural Pharmacy-based Diabetes Care and Education Clinic

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Objective. To assess outcomes from a rural, community pharmacy-based diabetes care and education program involving collaboration between local pharmacists and physicians, fourth-year pharmacy students, and University of Colorado Denver School of Pharmacy faculty members.

Design. Fourth-year pharmacy students provided education and testing (hemoglobin A1c, blood glucose, blood pressure, and lipid profiles) to diabetes patients, once a month for 6 months. Clinical notes with medication recommendations were faxed to each patient's physician following each visit.

Assessment. Twelve pharmacy students made 533 recommendations to 29 physicians for 52 patients over 18 months. Overall, 32% of the recommendations were accepted based on subsequent medication orders and patient reports. Three of the physicians accepted 50%-60% of the recommendations they received while 4 did not accept any recommendations.

Conclusions. Physician acceptance of pharmacy students' medication recommendations for patients attending a rural community pharmacy-based diabetes management clinic varied. Further study is needed to determine the reasons for this.

Keywords: advanced practice pharmacy experience, diabetes, interprofessional relationships, community pharmacy

INTRODUCTION

People with diabetes are 2 to 4 times more likely to die from heart disease-related causes than people without diabetes and 2 to 4 times more likely to have a stroke.¹ Diabetes affects over 20 million Americans, and is associated with an overall risk of death twice that of people without diabetes.¹ Direct costs to treat diabetes in 2002 were \$92 billion, double the estimate from just 5 years earlier.² Available diabetes treatment options are extensive and comprehensive evidenced-based treatment guidelines are updated annually by the American Diabetes Association.³ Despite the awareness and availability of effective treatment strategies, control of diabetes among US adults remains poor.⁴ Given these factors, new and innovative treatment strategies, models, and approaches must be investigated and evaluated critically to identify opportunities for improvement in glycemic control and patient outcomes.

Pharmaceutical care, which is the direct, responsible provision of medication-related care, has been characterized by the American Society of Health-System Pharmacists (ASHP) as pharmacists making a direct commitment to individual patients.⁵ ASHP further describes pharmaceutical care as requiring collaborative relationships between pharmacists, physicians, and other members of the health care team. Such multidisciplinary cooperation has become an essential component of health care systems. The University of Colorado Denver School of Pharmacy (UCD-SOP) faculty is committed to pharmaceutical care and believes the dedication to improving patient outcomes and quality of life must constitute the foundation of the School's doctor of pharmacy programs.

In addition to pharmaceutical care concerns, accreditation standards establish the need to educate students who can practice as competent independent practitioners upon graduation.⁶ Within this theoretical framework, the School strives to develop advanced pharmacy practice experience (APPE) opportunities for fourth-year pharmacy (P4) students to gain the patient care experience and self-confidence needed to be able to practice independently. To that end, we have worked with multiple community partners to implement a variety of disease-state

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and pharmacotherapy management programs that allow P4 students to function at the level expected of an independent practitioner. One of the programs is a community pharmacy-based diabetes care and education clinic in Sterling, Colorado. The program is novel in that students are given the opportunity to practice independently by providing year-round clinic staffing and assuming primary responsibility for clinic operations.⁷ Students assess and educate patients, and with preceptor supervision, interact with physicians by making recommendations regarding diabetes medication management. This manuscript, as part of a larger continuous quality improvement initiative, addresses the implementation and assessment of the Sterling clinic's provision of care to patients with diabetes, including data on physicians' acceptance of pharmacotherapy recommendations generated by P4 students.

DESIGN

The UCD-SOP, with funding from the Caring for Colorado Foundation, initiated a partnership with Barnes Pharmacy, a community pharmacy in Sterling, Colorado, in 2003.⁷ In this partnership, faculty members from the School, along with preceptors at the community pharmacy, established a diabetes care and education clinic within the community pharmacy. An area of the pharmacy was dedicated to clinic activities and allowed private interviews of patients by P4 pharmacy students. Patients were referred to the clinic by their primary care provider or by pharmacy staff members. There was no charge to patients for enrolling in the clinic.

An SOP faculty member provided didactic and clinical skills training for the Barnes pharmacists, wrote policy and procedure documents, generated data collection forms, and established patient care protocols in collaboration with local primary care providers. In addition, the faculty member provided care for the clinic's initial patients until the Barnes staff pharmacists were competent to provide care, and from that point on served as a consultant for the clinic. Fourth-year pharmacy students enrolled in 6-week APPE courses were assigned to the diabetes clinic to provide patient care services under the supervision of staff pharmacists. Students were provided training using point-of-care equipment for monitoring blood pressure, blood glucose (tested using instruments from various manufacturers), hemoglobin A1c (tested using DCA 2000, Bayer Healthcare, LLC, currently Siemens Medical Solutions Diagnostics, Deerfield, IL), and lipids (tested using Cholestech LDX, Cholestech Corporation, Hayward, CA).

Under the direction of the local pharmacist preceptors, individual patients met one-on-one with P4 students

for 6 visits (1 per month for 6 months) for diabetes education and clinical monitoring. Laboratory assessments of hemoglobin A1c (A1c), blood pressure, and fasting lipid profiles (low density lipoprotein [LDL], high density lipoprotein [HDL], and total cholesterol) at baseline and at 6 months were recorded in the patient chart. The students developed patient-specific treatment plans following the first visit based on the American Diabetes Association (ADA) recommendations for patient assessment.³ The care plans were then implemented during the next 6 months and covered diet, exercise, medications, and self-monitoring. Because each student staffed the clinic for one 6-week experience, patients typically saw multiple students while completing the 6-month program.

Students faxed their clinical notes and pharmacotherapy recommendations (start/stop or dosage change) to each patient's physician following each visit based on clinical parameters and current medications for each patient. If accepted, physicians returned the approved recommendations by fax to the clinic to allow the prescription orders to be implemented. The physician's acceptance (yes/no) of each recommendation, as evidenced by initiation of new medications or dose changes, was noted in the patient record. Baseline and 6-month clinical data and information about acceptance of recommendations that had been recorded were extracted from patient charts and entered into a computer database. The recommendation-related parameters recorded were the number of recommendations, medication type (eg, insulin, oral antidiabetic agent, statin, aspirin) recommendation category (eg, start/stop medication, change dose, administer immunization), whether the recommendation was accepted, and a provider identifier. Medication recommendation acceptance rates by drug, type of recommendation, and provider were determined. Repeated recommendations were tracked and considered to be independent recommendations in these analyses as each represented an opportunity for the provider to take action.

ASSESSMENT

The clinic was staffed by 12 pharmacy students during the initial 18-month period. Clinical outcomes of the program have been reported previously⁸ and will be noted here briefly. Observed reductions (between baseline and 6 months) in patients' mean A1c levels, LDL-cholesterol, diastolic blood pressure, and weight were significant ($p < 0.01$). There was a significant increase in patients' HDL-cholesterol ($p < 0.01$) and a significant decrease in their mean diastolic ($p < 0.01$) and systolic blood pressure ($p = 0.03$). For the first cohort of patients completing all 6 visits ($n = 52$), students made 533 patient-specific medical recommendations. The recommendations, along

with any clinical notes for each of the 52 patients, were faxed to the patients' respective physicians ($n = 29$). The most common recommendations were for medications to treat elevated cholesterol (134), followed by oral anti-diabetic medications (131), blood pressure medications (129), and insulin (89) (Figure 1). The overall physician acceptance rate for all categories of recommendations was 32%. With regard to specific categories of recommendations, acceptance rates were 35% for dose changes and 28% to start or stop a medication. Regarding medication classes, acceptance rates (in all categories) were highest for aspirin (61%), followed by pain medications (40%) and insulin (34%; Figure 2). All 7 recommendations for pneumococcal and influenza vaccinations were accepted. Of the 533 recommendations, 214 represented a repeated recommendation. Recommendation acceptance rates evaluated by physician varied. Three physicians accepted more than half of the recommendations they received (55%, 56%, and 59%), while 4 physicians did not accept any of the recommendations.

DISCUSSION

A community-based diabetes monitoring and education clinic was successfully implemented in a rural Colorado community pharmacy as a result of collaboration between the pharmacy, local physicians, and UCD-SOP faculty members and P4 students completing APPEs. Students worked closely with onsite preceptors and provided diabetes education and clinical monitoring for patients completing the full 6-month program. Based on clinical improvements between baseline and the end of the program, the monthly clinic visits were effective in helping patients achieve their clinical goals for diabetes management.⁸ Significant improvements were shown in glycemic

Figure 1. Medication recommendations made by pharmacy students participating rural pharmacy-based diabetes care and education clinic.

Figure 2. Physicians' acceptance of medication recommendations made by pharmacy students participating in a rural pharmacy-based diabetes care and education clinic.

control, lipids, blood pressure, and weight. While there was no direct charge to patients for the 6 clinic visits, patients may have incurred indirect costs, such as transportation or taking time off from work. Thus, this cohort likely represents highly motivated patients, a factor that should be considered when assessing the generalizability of the results presented here.

Educating patients about effective self-care activities has been shown to improve glycemic control.⁹⁻¹² The ADA recommends that patients receive diabetes self-management education based on demonstrated improvements in diabetes knowledge, self-care activities, and improved glycemic control.³ Accordingly, interventions in this program included self-care education for patients as well as pharmacotherapy recommendations to physicians. Given the low rate of physician acceptance of students' medication recommendations, the improved clinical outcomes may be associated with enhanced patient self-care activities rather than medication changes. Clinic procedures have been revised to allow assessment of self-care activities at baseline and at the end of the program to determine relative impact of each factor on clinical outcomes.¹³

The cause of the variability in the acceptance rates is unclear. One possibility is that some providers are taking recommendations under advisement, but are waiting to implement them until they see the patient again or until they get confirmatory laboratory results. A second possibility is that primary-care providers' acceptance of a clinic run by pharmacy students is low. A limitation of the current program is the lack of information from physicians regarding reasons why specific recommendations were not accepted. To address these issues, a physician from the University of Colorado Denver Department of Family Medicine has been added to the program. The physician

will work with local providers and UCD-SOP faculty members in the ongoing operation of the clinic at Barnes Pharmacy and the implementation of future clinics in order to improve coordination of care for clinic patients. Further study of individual recommendations is planned to determine the reasons for that variation. Finally, the assessment of the clinic experience by students has been positive. Formal student satisfaction assessments are being developed to quantify student perceptions.

SUMMARY

While a few physicians accepted as many as 59% of the pharmacotherapy recommendations made by pharmacy students working in a community-pharmacy-based clinic, most accepted only a small percentage. Further research is needed to investigate reasons for this variability and to estimate the relative impact of pharmacotherapy changes versus improvement in self-care on patients' reaching their clinical goals for diabetes.

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