Evaluating the Format and Effectiveness of a Disease State Management Training Program for Diabetes

Michael S. Monaghan, Paul D. Turner, Maryann Z. Skrabal and Rhonda M. Jones

School of Pharmacy and Allied Health Professions, Creighton University, 2500 California Plaza, Omaha NE 68178

The objective of this project was to determine whether a continuing educational approach to disease state management training in diabetes mellitus is an effective means of improving both cognitive knowledge and confidence levels of participants. The continuing education program utilized both lecture format and small group exercises in which participants obtained “hands-on” information related to the pharmacist’s role in the treatment of diabetes. Participants were asked to take a pre- and posttest examination which consisted of a 30-question multiple choice examination and a 15-item attitudinal questionnaire. This test-set evaluated two areas: (i) participants’ cognitive knowledge related to diabetes and diabetes-specific services; and (ii) their attitudes/confidence in providing these services. Cognitive posttest scores (68.6 percent) improved significantly (P < 0.001) over the pretest scores (49.6 percent). Likewise, the posttest scores on all 15 attitudinal items significantly improved over their pretest scores (P ≤ 0.012). This project demonstrates that a modified continuing educational format, providing small group hands-on experience, is an effective means of training pharmacists in diabetes management.

INTRODUCTION

Certificate programs in pharmacy have been defined as structured, curriculum-based, postgraduate educational and training experiences that affect cognitive knowledge, psychomotor skills, attitudes, and performance behaviors of the participants(1). Because of the potential for reimbursement for cognitive services, certificate programs are becoming more popular as a means of updating knowledge and skills for pharmacists in specific areas of disease state management.

Although certificate programs appear to be the most popular way of training pharmacists for disease state management, little has been done to study the effectiveness of such programs, or to demonstrate that the format used by the program can affect participants’ knowledge, skills, and attitudes, both short- and long-term. Based on an online literature search, no published report exists that evaluates the impact a diabetes disease state training program has on pharmacists’ cognitive knowledge, skills, or attitudes toward performing diabetes care services.

A number of studies outside of pharmacy indicate that diabetes-specific training programs can improve participants’ knowledge and the quality of services given to people with diabetes(2-4). An evaluation of the Clinical Education Program offered by the American Diabetes Association (ADA) found that this continuing education program given to 5,640 primary care physicians significantly improved participants’ diabetes knowledge, as well as their desire to improve the quality of care offered to people with diabetes. Further, the participants indicated that the conference format was more effective in influencing knowledge and practice behavior when compared to the distribution of printed material alone by the ADA(2).

A workshop developed by the Diabetes Research and Training Centers found that whether the program was given by their faculty or by faculty from the American Association of Diabetes Educators, few differences were observed in the evaluations given by participants or faculty evaluators(3). Both programs were successful at meeting goals related to improving diabetes education practice behaviors. A European study determined that a diabetes training program can increase the knowledge of the health care professional(4). In that study, diabetes knowledge scores increased significantly in both physicians and nurses who completed the training course. Posttest scores increased by approximately 20 percent in both groups of health care workers.

These data indicate that a disease state training program in diabetes can significantly improve one’s knowledge and desire to improve quality of care provided. Further, the data suggest that a continuing education format can be an effective method to convey this information to participants. The objective of this project was to determine if a modified continuing educational approach to disease state management training in diabetes is an effective means of improving cognitive knowledge, skills, and confidence levels of pharmacists.

METHODS

Program Design

The school of pharmacy was interested in designing or adapting an existing training program in diabetes management for pharmacists. Most existing programs use a traditional continuing educational format. In order to determine if this format was appropriate, a ‘mini’ disease state training program was offered that provided six contact hours and utilized both lecture format and small group exercises in which participants obtained “hands-on” information related to the pharmacist’s role in the treatment of diabetes. The objective of this pilot training program was to evaluate if this modified continuing educational format was effective in improving cognitive knowledge, psychomotor skills, and attitudes of the partici-
Enrollment was limited (maximum of 30 participants) in order to maintain group sizes for the purpose of facilitating discussions and providing a “hands-on” approach during the afternoon sessions. Each participant received a 36-page manual upon registration for the program. The manual was specifically developed for this program using primary and tertiary references and focused on diabetes care and the role of the pharmacist. Content was intended to serve as a reference to guide the pharmacist through future patient interactions while providing pharmaceutical care to people with diabetes.

Table I. Questionnaire results evaluating participant attitudes and confidence in providing diabetes services

<table>
<thead>
<tr>
<th>Questions regarding the provision of services to people with diabetes</th>
<th>Median</th>
<th>Pretest scores</th>
<th>Posttest scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am confident in my ability to educate patients with diabetes on the major areas necessary for self-management.</td>
<td>3.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can select a patient-specific regimen for a person with type 2 diabetes mellitus.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can discuss the basics in the use of nutrition as a therapeutic modality for the treatment of diabetes.</td>
<td>3.5</td>
<td>4.0**</td>
<td></td>
</tr>
<tr>
<td>I can discuss the basics in the use of exercise as a therapeutic modality for the treatment of diabetes.</td>
<td>4.0</td>
<td>4.5*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately select a patient-specific blood glucose meter for self-monitoring of blood glucose.</td>
<td>3.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately teach a patient with diabetes how to use a blood glucose meter.</td>
<td>2.5</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can interpret finger-stick glucose readings sufficiently to recommend changes in insulin dosing.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately select a patient who meets the criteria for intensive insulin therapy use.</td>
<td>2.5</td>
<td>4.0***</td>
<td></td>
</tr>
<tr>
<td>I can identify the goals of glucose control for people with diabetes as recommended by the American Diabetes Association.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately identify patients at risk for the development of diabetes mellitus and know how and when to perform screening tests.</td>
<td>3.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately initiate insulin therapy in a person with type 1 diabetes.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately initiate insulin therapy in a person with type 2 diabetes.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I can appropriately use glycosylated hemoglobin (HbA1c) measurements as an assessment of a person’s risk for developing long-term complications from diabetes.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I am confident in my knowledge about diabetes.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
<tr>
<td>I know how to comprehensively provide professional services to a person with diabetes.</td>
<td>2.0</td>
<td>4.0*</td>
<td></td>
</tr>
</tbody>
</table>

*1 = strongly disagree 2 = disagree 3 = undecided 4 = agree 5 = strongly agree.  
*P < 0.001; **P = 0.012; ***P = 0.002.

Psychomotor skills refer to those dexterous skills needed when teaching another person the proper technique for use of home blood glucose monitoring. These “how to” skills can be found in teaching guides provided by organizations such as the American Association of Diabetes Educators (AADE)(5).

The content of the program was based on the core curriculum for diabetes education by the AADE and basic psychomotor skills necessary for proper blood glucose monitoring. During the morning, traditional lecture material was presented, including a disease overview and the pharmacotherapeutic treatment of type 1 and type 2 diabetes. The afternoon consisted of breakout sessions where participants acquired “hands-on” experience in smaller groups. The two sessions focused on monitoring diabetes and on case studies. Participants rotated through both sessions. During the monitoring session, participants gained experience with different blood glucose monitors through control strip testing and self-testing of their blood glucose. Advantages and disadvantages were discussed in terms of aiding monitor selection for different patients with diabetes. During the case studies session, cases focused on problem-solving and pattern management, and the pharmacist's role in diabetes management was modeled.

Enrollment was limited (maximum of 30 participants) in order to maintain group sizes for the purpose of facilitating discussions and providing a “hands-on” approach during the afternoon sessions. Each participant received a 36-page manual upon registration for the program. The manual was specifically developed for this program using primary and tertiary references and focused on diabetes care and the role of the pharmacist. Content was intended to serve as a reference to guide the pharmacist through future patient interactions while providing pharmaceutical care to people with diabetes.

Program Evaluation
Participants voluntarily took part in this project. They were asked to take a pre- and posttest evaluation consisting of a 30-question multiple-choice examination and an attitudinal questionnaire. The same test was used for both the pre- and posttest evaluations. This test-set evaluated two areas: (i) participants' cognitive knowledge related to diabetes and diabetes-specific services; and (ii) their attitudes/confidence in performing these skills for people with diabetes. The questionnaire (see Table I) was developed specifically for this study and consisted of 15 items using a five-point scale ("strongly disagree," "disagree," "undecided," "agree," and "strongly agree"). Both the multiple-choice examination and the questionnaire were reviewed and field-tested initially to refine the questions/items in terms of reliability and validity issues. The review consisted of having a faculty panel take the examination, complete the questionnaire, and make suggestions regarding question format and content. The result of the field test helped refine the questions through item analysis in addition to accumulating evidence for content validity. The panel was also asked to classify the difficulty of the multiple-choice examination. The panel rated the level of the cognitive examination as “expert.”

Approximately 14 months after the program, the test-set was mailed to all participants. Participants were asked to again complete both sections of the evaluation in order to determine if the program format was effective in improving long-term cognitive knowledge and attitudes/confidence levels in diabetes management skills. The test-set was mailed out only once.

Statistical Analysis
Descriptive statistics were performed on all returned evaluation sets. The cognitive and attitudinal pre- and posttest
scores were statistically evaluated using the Wilcoxon Signed Ranks Test (corrected for tied ranks) and Sign Test, respectively (6). Reliability of the cognitive pre- and posttests were evaluated using the measure of internal consistency, coefficient α (KR-20). This test provides a good estimate the reliability where sampling of content is the major source of measurement error (7).

RESULTS
Twenty-seven pharmacists participated in the training program. Of the 27 participants, 25 (93 percent) voluntarily completed the cognitive pre- and posttests during the initial evaluation, while 18 (67 percent) completed the attitudinal counterpart. Cognitive posttest scores (mean = 68.6, SD = 15.85) improved significantly (z = 4.11, P < 0.001) over the pretest scores (mean = 49.6, SD = 15.12). Likewise, the posttest scores on all 15 attitudinal items significantly improved over their pretest scores (P < 0.012). The individual attitudinal items, median scores, and Sign Test results are presented in Table I.

Five of the 27 original participants returned the second evaluation set which occurred 14 months after the program. For the five returned 14-month cognitive posttests, scores ranged from 63 percent to 97 percent, with a mean of 78.8, median of 77.0, and SD of 12.13. Two individuals had a lower 14-month posttest cognitive score than their earlier pretest score, while the remaining scored the same or higher. One participant, who received the 97 percent score, had taken a 27-hour diabetes training program offered by the school between evaluations, and this was thought to explain his high score (both subjectively by the participant as recorded on a note returned with the test set and by the investigators). Only four completed the attitudinal items; the investigators believed that it was too difficult to conclude much from their response patterns, so these data are not shown. Reliability assessments of the cognitive pre- and posttests using coefficient a produced values of 0.62 and 0.79, respectively.

DISCUSSION
We showed that a continuing educational format providing hands-on experience can be used to significantly improve short-term (and perhaps long-term) cognitive knowledge (P < 0.001). Questionnaire results (Table I) indicated that participant confidence improved in all areas evaluated, including the major areas necessary for self-management (goals of glucose control, basics of nutrition and exercise), how to select patient-specific drug regimens, and how to introduce self-monitoring of blood glucose and interpret test results. Further, the program significantly improved participants’ confidence in their ability to provide comprehensive professional services to a person with diabetes, and participants believed this program will influence the way they practice pharmacy and would recommend this type of program to others.

The evaluation set used in this study was difficult and time-consuming, ten pages in length. Participation in this project was voluntary and some participants chose not to complete all the material requested, especially the 14-month long-term evaluation set. This lack of data limited the study, especially when assessing the program’s long-term effect on participants’ diabetes knowledge, skills, and confidence.

In a recent review of postgraduate educational programs in pharmacy, Fjortoft et al. discussed the fact that the topics of most educational programs are determined by pharmaceutical companies or the current interest of pharmacists (8). These programs, being topic-based and short-term, provide little or no assessment of educational outcomes. Further, the authors note that although current certificate programs are generally oriented toward providing new practice competencies rather than providing information, there has been little research on the long-term effects of certificate courses.

Several rigorous certificate programs in diabetes disease state management exist. For example, a program developed by the University of North Carolina requires on average 57 hours for completion and includes interactive workshops providing hands-on sessions for the development of psychomotor skills (9). This certificate program further requires participants to document how they implemented the course content in actual patient encounters, demonstrating a focus clearly aimed at changing participants’ practice related to diabetes and ultimately affecting patient outcomes. Unfortunately, no data related to the short- or long-term effects the program had on participants’ cognitive knowledge, psychomotor skills, attitudes, or practice behaviors were presented.

Third-party payers are willing to reimburse pharmacists for diabetes self-management training (10,11). In order to receive reimbursement for working with a patient who has diabetes, a pharmacist must have completed a disease state training program approved by the state’s board of pharmacy. This legislation is being considered by other states, including Nebraska. If data were available that showed the long-term effect of these certificate programs in diabetes self-management training, the process for passing the legislation may be easier. Our pilot study is the first step toward this goal.

The report of the second AACP/ACPE Invitational Conference on Certificate Programs in Pharmacy has helped define the purpose of certificate programs (12). These programs are not only for professional development and career advancement, but are mainly for educational preparation in support of certification and recertification. Some standards of quality will soon be developed and future certificate programs in disease state management must meet these qualifications to be ACPE-accredited. These authors feel that some of the existing programs, such as the University of North Carolina program, are of high quality and can change the future practice of pharmacy. But their outcomes data should be published to aid in the advancement of certificate programs in disease state management.

CONCLUSION
This project demonstrates that a continuing educational format, providing small group hands-on experience, is an effective means of imparting cognitive knowledge, increasing psychomotor skills, and instilling confidence to pharmacists in the area of diabetes self-management training. The long-term effect of these programs on patient outcomes remains to be documented. Certificate programs in disease state management must publish their data to aid in the advancement of pharmacists as primary care providers.

Acknowledgments. The assistance of Carolyn C. Meeks, M.A., Office of Grants Administration, Creighton University, in the preparation of this manuscript is deeply appreciated.

References
(2) Mazze, R., Deeb, L., Palumbo, P.J., “Altering physician’s practice patterns—a nationwide educational experiment: evaluation of the Clinical


(10) Snyder, K., “It’s the law. N.J. pharmacists to be paid for diabetes education.” *Drug Topics*, 76(Feb 5, 1996).
