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INSTRUCTIONAL DESIGN AND ASSESSMENT

Impact of a First-Year Student Pharmacist Diabetes Self-Care Education Program

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Objective. To evaluate the effectiveness of a first-year diabetes self-care education program by measuring student pharmacists' confidence and knowledge retention, and the clinical applicability of the skills learned.

Design. Integrated into a Pharmacy Practice Course, a 9-hour program consisting of lectures, a home glucose monitor assignment, and active-learning workshops was completed by 2 cohorts of first-year student pharmacists. Three survey instruments were developed and administered to the student pharmacists prior to the program, immediately after the program, and 9 months after the program to assess confidence, knowledge retention, and the clinical applicability of the knowledge and skills learned.

Assessment. In cohort 1, 54 student pharmacists (response rate 90%) perceived that their confidence and ability improved significantly (increased by 88% and 110%, respectively, from baseline, $p<0.001$). Overall knowledge of diabetes increased as well as indicated by a 40% increase in test scores ($p<0.001$). About two-thirds of student pharmacists used their training to assist patients with diabetes within 9 months of completing the program. Findings in cohort 2 mirrored those observed with cohort 1, indicating good generalizability.

Conclusions. An innovative first-year diabetes self-care education program significantly improved student pharmacists' knowledge and confidence in providing diabetes self-care education, and the majority immediately used their leaned skills to assist diabetes patients and caregivers. Training first-year student pharmacists in diabetes care so they are prepared to use these skills as early as their first year of pharmacy school may be an effective approach to increasing the number of providers available to counsel and care for this expanding patient population.

Keywords: diabetes, survey, pharmacy education, knowledge retention, self-care

INTRODUCTION

The prevalence of diabetes has reached epidemic proportions, creating a mandate for more healthcare providers to meet the needs of this growing patient population. With one-fourth of Americans diagnosed with diabetes or at risk for developing it, increasing the number of providers who can educate and treat diabetes patients is crucial.[1-3] Diabetes patients who have greater understanding and knowledge of their diabetes medications achieve tighter glycemic control.[4] Long-term complications of diabetes can be prevented or progression halted by controlling factors such as blood glucose, blood pressure, and cholesterol levels, in addition to providing education and encouragement of proper preventative care.[5-12] Pharmacists are uniquely positioned in the community, clinic, and inpatient settings to use their expertise in drug knowledge, communication skills, and medication therapy management to optimize care and education for diabetes patients and caregivers. In addition non-pharmacological or self-care

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interventions by pharmacists also enhance patient knowledge of diabetes and improve glycemic control.[13] Specific self-care interventions include general diabetes education; preventative care for the eyes, feet, and skin; vaccinations; medical nutrition training; physical activity education; diabetes risk-factor analysis; glucose monitor selection and training; self-monitoring of blood glucose; insulin education and administration training; and prevention and treatment of hypoglycemia.

Several studies have assessed the effectiveness of diabetes teaching programs; however, the majority involved elective or therapeutics courses held during the third or fourth curricular years or postgraduation.[14-22] To date, no published studies on diabetes care training programs have evaluated the program's effectiveness by assessing confidence gained, and clinical applicability or used a knowledge test for assessment. Further, no articles have assessed diabetes self-care training programs implemented in the first year of pharmacy school. All US accredited pharmacy colleges and schools are required to provide self-care education to student pharmacists.[23,24] Moreover, student pharmacists must participate in introductory pharmacy practice experiences and internships in practice settings beginning in their first year of pharmacy school. If student pharmacists received a comprehensive diabetes self-care training program in their first-year curriculum, they could be trained to educate patients on self-care issues, and early in their career, join the increasing number of healthcare providers needed to combat the diabetes epidemic.

This study investigates an innovative first-year diabetes self-care education program at the University of California San Diego Skaggs School of Pharmacy and Pharmaceutical Sciences (SSPPS). The study objectives were to evaluate: (1) the effectiveness of the course by measuring diabetes knowledge obtained and student confidence in providing diabetes education, (2) student knowledge retention following participation, and (3) the usefulness of this knowledge in clinical practice using 3 study instruments developed by the authors. The goal was to show that student pharmacists benefit by participating in the diabetes self-care education program early in their pharmacy curriculum and that they will use the knowledge gained to educate diabetes patients. The expectation was that this training program would promote short-term and long-term retention of diabetes disease state knowledge and increases student pharmacists' confidence in their ability to educate patients.

DESIGN

A diabetes self-care education program was taught in the second quarter of the required Pharmacy Practice Course series in the first-year of the PharmD curriculum. The program's curricular content was adapted from the diabetes chapter in the *Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care,*[25] a text widely used by colleges and schools of pharmacy, as well as other nationally recognized diabetes educators.[26-29] The 9-hour program consisted of 3 sections: (1) lectures, (2) a home glucose monitor assignment, and (3) active-learning workshops. The lecture portion included 2 hours on nonprescription diabetes care to provide student pharmacists with a strong background and foundation in diabetes care and management. One hour focused on an overview of the disease and preventative care. The objectives of this lecture included comparing and contrasting the differences between type 1 and 2 diabetes and identifying the signs and symptoms of diabetes. It described the diabetes care plan, nonpharmacologic therapy (such as preventative care, medication nutrition therapy, and physical activity), and a pharmacist's role in screening patients for diabetes. The preventative care portion focused on recommended vaccinations as well as dental, oral, and eye care. The next hour focused on insulin use in people with diabetes including an introduction to insulin pharmacology, available insulin products, drawing the pharmacokinetic profiles of various insulin regimens, adverse drug reactions, precautions involved with insulin, traveling with diabetes, and the role of pharmacists in providing patient education, training, and support for insulin therapy.

The second section was the home glucose monitor assignment, designed to provide the student pharmacist with an opportunity to learn the process of self-monitoring blood glucose, and included glucose monitor selection, operation, and training on use, as well as logging results, so that student pharmacists would have an appreciation of what is required of diabetes patients on a daily basis. Each year, 5 different models of glucose monitors donated by various manufacturers were selected to use in the course to reduce bias or brand name loyalty. Each student pharmacist was provided with a glucose monitor, 10 test strips, 10 auto-retractable disposable lancets, and a logbook to document glucose values, meals, and personal comments. Student pharmacists were required to read through the instruction manual and then set up and code their glucose monitor. Each student pharmacist was required to perform a minimum of 5 self-monitored blood glucose evaluations (before meals, 2 hours following a meal, or at bedtime) over 1 to 2 days and record their results in the logbook. Upon completion of this assignment, student pharmacists compared glucose monitors and their own personal experiences at the diabetes workshop and identified features that might be helpful for specific patient populations. This assignment provided student pharmacists

with the opportunity to learn the details of self-monitoring such that they were able to teach another student pharmacist during a workshop. The goal of this assignment was to familiarize student pharmacists with glucose monitor selection and operation and performing finger sticks so that they would have develop empathy and an appreciation for what is asked of patients with diabetes.

The diabetes workshops were presented in two 2-hour sessions. The first session included an integrated lecture with "hands-on" exercises in insulin administration. Student pharmacists were educated regarding injection routes and sites of administration, factors affecting absorption rates of insulin, proper insulin administration techniques, hypoglycemic treatment and prevention, glucose monitoring methods, and glucose monitors. Using normal saline in place of insulin, student pharmacists prepared "insulin" doses and performed subcutaneous injections on themselves. Differences between available types of glucose monitors and the results of the home glucose monitor assignment were also discussed. At the end of the session, student pharmacists applied their knowledge to a patient case.

The second workshop focused on how to care for the diabetic foot. An integrated lecture and workshop addressed the etiology and signs and symptoms of foot disorders, nonpharmacologic and pharmacologic treatment options, general foot care recommendations, a foot examination, and a patient case. All student pharmacists performed foot examinations on themselves and each other by using a "look, listen, and feel" approach, as well as palpating pedal pulses and using 10-gram monofilaments to test for pedal sensation. All 3 aspects of the diabetes education program are aimed to address the course and study objectives.

In the absence of survey instruments published in the literature, 3 survey instruments were developed based on feedback gathered from external reviews and internal review via a focus group. The purpose was to create instruments that could be used to measure diabetes knowledge obtained, student pharmacist confidence in providing diabetes education, and the extent to which the student pharmacists used the diabetes education in real clinical practice.

The survey content was adapted from published survey instruments previously used to evaluate pharmacy and medical school teaching programs for various topics, and then tailored to the educational content of the diabetes self-care education program.[14-20, 30-32] To refine these surveys instruments for use, external review was sought from 2 researchers with expertise in educational and behavioral science. Because confidence does not necessarily demonstrate knowledge, the outside reviewers recommended adding a case-based knowledge test to each survey instrument to assess real knowledge obtained, application, and synthesis of information. This case-based knowledge test had 16 multiple-choice questions about issues with patients with type 1 or type 2 diabetes.

In parallel with external review, a pilot study was conducted using a focus group to test and refine the survey instruments. A call for volunteers was sent out to student pharmacists who had previously completed the program. All focus group subjects provided informed consent prior to participation. An open-forum discussion between focus group subjects and the study investigators followed each group meeting, and feedback was offered regarding survey formatting, content, and readability. In addition to the case-based knowledge test, all survey instruments contain 19 multipart questions pertaining to overall knowledge and confidence in performing finger-stick glucose tests, insulin injections, and foot care. Most survey questions used a 5-point Likert scale rating of 1-5, with 1 representing the lowest answer (poor, not at all, or strongly disagree), and 5 representing the highest answer (excellent, extremely, or strongly agree). The pre-program survey instrument contained questions on basic demographics and baseline assessment of student pharmacists' knowledge prior to completing the diabetes training program. This survey was administered prior to the student pharmacists beginning the Pharmacy Practice course (3 months before the program began). The post-program survey instrument was a follow-up assessment administered after completion of the program. This survey instrument was an exact duplicate of the pre-program survey instrument minus the demographic questions. This survey was administered 2 weeks following completion of the diabetes self-care education program. The third instrument, called the follow-up survey, contained all of the content from the post-program survey instrument but also assessed clinical use of what of what student pharmacists had learned. It included an additional 41 questions pertaining to exposure to clinical practice opportunities since completing the program and the applicability to practice of the knowledge obtained from the program, and assessed use of knowledge and skills in the "real world." This survey was administered approximately 1 year after the baseline pre-program survey. The timing was selected to allow student pharmacists time to apply their knowledge in their pharmacy internships during the summer following the training program. All 3 survey instruments are available from the author upon request.

All 60 first-year student pharmacists (class of 2011) enrolled in the first-year Pharmacy Practice courses were asked to volunteer for this study and 59 agreed to participate. Student pharmacists who had completed the

Pharmacy Practice course or who did not participate in or complete the Diabetes Self-Care Education Program were excluded from the study.

To assess generalizability of the findings, a second cohort (class of 2013) was evaluated and the same study methods and consent processes were used. Participants in each cohort were entered into a drawing for a $30 gift card for the University of California San Diego Book Store. Informed consent was obtained from all study subjects. This study was reviewed and approved by the University of California San Diego Human Research Protections Program.

Descriptive statistics were used to summarize findings. Friedman tests assessed within-subject differences at the 3 time points. Wilcoxon signed-rank tests were used for pairwise comparisons within each individual cohort, and Wilcoxon rank-sum tests compared results between the 2 cohorts, with $p<0.05$ in 2-tailed tests considered significant. This project was reviewed and approved by the University of California San Diego Human Research Protections Program.

EVALUATION AND ASSESSMENT

Of the 60 first-year student pharmacists, 59 (98%) agreed to participate in the study as cohort 1 and completed the pre-program survey instrument. Fifty-eight of the 59 enrolled subjects completed the post-program survey instrument (1 subject was lost to follow-up). Baseline demographics reflected those of the school's entire/overall student pharmacist population. The majority of subjects were female and Asian, with a mean age of 24 years. None reported having diabetes; however, 21 subjects (36%) reported having a family member with either type 1 or 2 diabetes. Only 1 (1.7%) subject reported having experienced prior formal diabetes training. Fifty-six subjects completed the follow-up survey instrument, but 2 of these survey instruments were missing key data (subject ID number) and were excluded from analysis.

Comparison of the pre- and post-program survey scores showed significant increases in student pharmacists' confidence and ability after participating in the diabetes self-care education program ($p<0.001$). Prior to the program, 1.7% of subjects rated their overall confidence in helping patients with diabetes as very or extremely confident compared to 63.8% after completing the program and 44.4% in the follow-up survey ($p<0.001$). A little more than 3% of participants reported very good or excellent ability to help patients with diabetes on the pre-program survey, compared with 58.6% on the post-program survey, and 38.9% on the follow-up survey ($p<0.001$).

Immediately after the educational program, students pharmacists perceived that their overall knowledge of diabetes had improved 79% from baseline, and this improvement remained 57% above baseline 8 months after completion of the program (Table 1). There was more than a twofold increase from baseline in student pharmacists' confidence in using glucose monitors and performing finger sticks. Confidence in the area of insulin use and performing diabetic foot examinations increased greater than 2.5 times from baseline, with all differences being significant ($p<0.001$).

Analysis of the student pharmacists' test scores pre- and post-program reflected significant increases in scores on their overall knowledge test as well as on their individual case-based questions, which involved patients with both type 1 and type 2 diabetes (Table 2). The percent of questions answered correctly more than doubled when comparing pre- and post-program scores ($p<0.001$). While the overall follow-up test scores were lower compared to post-program scores, the actual difference was slight (85% vs 79%), and both scores were considered "passing." Overall knowledge test scores on both the post-program survey and follow-up survey were more than 35% higher than baseline pre-program scores.

Of the 54 subjects who completed this follow-up survey instrument, almost two-thirds had the opportunity to assist diabetes patients or their caregivers. The opportunities to assist occurred mostly in large community-based pharmacies and the length of time over which they delivered diabetes care ranged from 1 to 8 months, likely because they worked in these settings over the summer months (Table 3). Student pharmacists were further asked to estimate how many times they were able to assist patients and their caregivers on specific topics of diabetes (Table 4). Seventy-eight percent of subjects (42/54) had the opportunity to apply their clinical knowledge of diabetes in areas such as conducting risk screening, responding to general questions, and providing education on self-monitoring of blood glucose. Sixty-one percent (33/54) of student pharmacists assisted a diabetes patient, with an average of 39 patient assists per student pharmacist (1295/33). Also, 17% (9/54) of student pharmacists assisted a caregiver, with an average of 13 caregiver assists per student pharmacist (118/9), indicating student pharmacists had a higher rate of interaction with patients than caregivers.

Using a 5-point Likert scale, student pharmacists were asked to rate how strongly they agreed or disagreed with 6 statements assessing the diabetes self-care education program. Student pharmacists gave a median response of 5 (strongly agree) when asked if participating in the program increased their overall knowledge of diabetes. A median response of 4 (agree) was given when student pharmacists were asked whether their overall confidence in

Table 1. Pharmacy Students' Overall Knowledge of Diabetes and Confidence with Glucose Meters, Insulin Use, and Performing Diabetic Foot Examinations[a]

	Pre-Program Survey		Post-Program Survey		Follow-Up Survey	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Overall knowledge of diabetes						
Diabetes as a disease	3	2	4	4	4	3
Risk factors for diabetes	3	2	4	4	4	3
Complications of diabetes	2	2	4	4	4	3
Differences between type 1 and type 2 diabetes	3	3	4	4	4	3
Signs and symptoms of diabetes	2	2	4	4	4	3
Nutrition therapy	2	2	4	4	4	3
Exercise guidelines	2	2	4	4	4	3
Insulin therapy	2	1	4	4	3	3
Glucose monitors	2	2	4	4	4	3
Diabetic foot examinations	1	1	4	4	3	3
Confidence with glucose monitors and finger-sticks						
Explaining how to use a glucose monitor	1	1	4	4	4	4
Recommending a glucose monitor to a patient	1	1	4	4	3	3
Performing a finger-stick test on yourself	1	1	5	5	5	4
Performing a finger-stick test on a patient	1	1	4	4	4	4
Teaching patients how to perform a finger-stick test	1	1	4	4	4	4
Confidence with insulin use						
Explaining the different types of insulin and their actions (onset, peak, duration of action)	1	1	4	4	3	3
Teaching a patient the proper technique for insulin injection	1	1	4	4	3	3
Discussing insulin therapies with a patient	1	1	3	3	3	3
Administering an insulin injection to yourself	1	1	4	4	4	3
Administering an insulin injection to a patient	1	1	4	4	3	3
Teaching patients the signs and symptoms of low blood glucose	2	1	4	4	4	3
Teaching patients how to treat low blood glucose	1	1	4	4	4	3
Confidence with diabetic foot examinations						
Performing a diabetic foot examination	1	1	4	4	3	3
Teaching patients how to perform a diabetic foot examination on themselves	1	1	4	4	3	3
Discussing with patients the importance of daily foot examinations	1	1	4	4	4	3
Discussing with patients the risk factors for developing foot problems	1	1	4	4	3	3
Recommending non-pharmacologic foot care	1	1	4	4	3	3

[a] Responses to survey questions were based on a 5-point Likert scale on which 1 represented the lowest answer (poor, not at all, or strongly disagree), and 5 represented the highest answer (excellent, extremely, or strongly agree).

helping people with diabetes had increased; whether the program prepared them to educate people with diabetes; whether the program increased their interest in diabetes; and whether they planned to pursue further diabetes education as a result of their experience in the program.

For 60 participants in cohort 2 (class of 2013) who enrolled and completed the pre-program survey instrument, the majority were female, 36% were Asian, and their mean age was 24 years. While no participants had diabetes, 27% had a family member with diabetes and 3% had prior diabetes training. Fifty-two and 48 participants completed the post-program survey instrument and follow-up survey instrument, respectively. Cohort 2 survey results followed the same pattern as seen with

Table 2. Performance on Case-Based Knowledge Test

	Pre-ProgramSurvey, %		Post-ProgramSurvey, %		Follow-UpSurvey, %	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Case 1: T2DM percent correct	46	44	94	88	88	82
Case 2: T1DM percent correct	32	32	79	76	79	60
Overall percent correct	40	39	87	83	79	73

Abbreviations: T2DM = type 2 diabetes mellitus; T1DM = type 1 diabetes mellitus.

cohort 1 (Table 1). Scores were lowest on the pre-program survey, highest on the post-program survey, and slightly lower than the post-program survey but still significantly above the pre-program survey on the follow-up survey. Answers to each survey question were significantly different in all pairwise comparisons between the 3 time points. Comparing cohort 1 to cohort 2, no significant differences were found between groups on the pre- or post-program surveys. On the follow-up survey, no significant differences were found on 36% of the questions, while cohort 1 had significantly higher scores on 64% of the questions. The median score on confidence and perceived knowledge was 4 (agree) on a 5-point Likert scale, while the median score on these items for cohort 2 was a 3 (neutral). The overall percent of items answered correctly on the case-based knowledge test was 79% for cohort 1 and 73% for cohort 2 at the follow-up visit (Table 2). For cohort 2, 73% (35/48) of student pharmacists assisted a diabetes patient, providing an average of 19 patient assists per student pharmacist (664/35), and 19% (9/48) of student pharmacists assisted a caregiver, providing an average of 11 caregiver assists per student pharmacist (138/9) following completion of the program. Moreover, similar to the results found in cohort 1, cohort 2 gave a median response of 4 (agree) for the same 6 statements assessing the impact of the diabetes self-care education program.

DISCUSSION

Evaluations of first-year diabetes self-care training in pharmacy school curricula are lacking and no published studies evaluate the impact of a diabetes self-care training program on the long-term improvement in student pharmacists' knowledge retention, confidence in providing diabetes care, or use of the training in clinical practice. We developed 3 survey instruments to assess the first-year diabetes self-care education program at the University of California San Diego SSPPS. Creation of the 3 survey instruments followed by refinement of the questions and formatting by means of a focus group was a productive process for survey development and assessment. The internal review completed by the student pharmacists coupled with the external review by experts in survey instrument development strengthened the survey instruments. This approach was a way to develop evaluation instruments when no such instruments existed in the literature. The focus group was important in 2 main areas: (1) identifying confusing survey questions, allowing refinement of the research survey instruments prior to their prospective use, and (2) providing a dry run with pilot data of the data capture and analysis plans for the prospective study to ensure that the study design was feasible and appropriate. Suggested format and wording changes were made to the survey instrument following feedback in order to increase the probability of capturing the appropriate data to evaluate the program.

Table 3. Average Time Spent in Various Pharmacy Settings Since Participating in a Diabetes Self-Education Program

	Duration of Time Spent in Setting[a]	
Types of Pharmacy Setting	Cohort 1	Cohort 2
Large chain community pharmacy (eg, Longs, CVS, Rite-Aid)	3.0	2.4
Clinic/community pharmacy (including UCSD Free Medical Clinic, Health Fairs or mobile clinics)	2.1	2.5
Community mass-merchandise pharmacy (eg, Costco, Target, Walmart)	1.7	1.5
Inpatient hospital pharmacy	1.7	1.6
Other: independently-owned community pharmacy, supermarket pharmacy, small chain community pharmacy, outpatient hospital pharmacy, or others not listed	≤ 1.4	<1.7

[a] Rating scores of 1-5, where 1=never; 2= ≤ 1month; 2-3 months; 4-6 months; >6 months

Table 4. Mean Number of Times Student Pharmacists Helped Diabetes Patients or Caregivers (N=42)

Specific Area of Diabetes Education	Estimated Mean Number of Assists per Student	
	Cohort 1	Cohort 2
Using my overall knowledge of diabetes	28	15
Informally or formally screening a person for diabetes	20	14
Performing a finger-stick test on a patient	18	14
Discussing the risk factors involved with diabetes	17	10
Providing glucose monitor education	13	6
Discussing pre-diabetes with a patient	13	6
Other[a]	<12	<7

[a] Discussing with a patient/caregiver the different types of diabetes, signs/symptoms of diabetes, dietary recommendations, goals of therapy, glucose monitor selection/information, insulin therapy/education/administration, foot examinations, nonprescription foot care recommendations.

This innovative hands-on diabetes self-care education program taught in the first year of a PharmD curriculum was effective in increasing student pharmacists' confidence, knowledge, and ability. The study subjects perceived that their confidence increased by 88% and their ability to help patients with diabetes increased by 110% from baseline. Perceived confidence and ability for specific areas such as blood glucose monitoring, foot examinations, and insulin use all improved significantly. Scores on the type 1 diabetes knowledge test portions rose from a baseline of 32% to a posttest score of 79%, and type 2 diabetes knowledge test scores rose from 46% to 94%. Interestingly, student pharmacists had higher than expected baseline knowledge examination scores. Because of the design of the knowledge test portion of the survey instrument, the subjects had a 1 in 4 chance of answering the questions correctly. This high baseline knowledge test score might reflect 2 factors: first, all the subjects enrolled had a health science background, and second, about one-third had a family member with diabetes, which may have translated into heightened awareness about the disease. Another reason may have been that a few of the questions contained some fundamental information that even patients with diabetes might know. Results from the knowledge test on the post-program and follow-up surveys reflect a significant increase in knowledge after participating in the program. These promising outcomes show that first-year student pharmacists are capable of successfully assimilating and maintaining knowledge from this diabetes self-care education program. Findings in cohort 2 mirrored those observed with cohort 1, indicating good generalizability of our study findings.

This study found that following completion of the diabetes self-care education program, over half of the student pharmacists had opportunities to assist diabetes patients and caregivers. Additionally, over three-quarters of them applied their clinical knowledge gained in a clinical setting within their first year in the PharmD program, reflecting the value of having early, diabetes education to help increase the number of healthcare professionals available to meet the needs of the growing population of patients with diabetes. We hope to improve upon traditional diabetes education, increase awareness of the value of developing a first-year diabetes self-care education program, and provide a model for other colleges and schools of pharmacy to consider, yielding more effective student pharmacist diabetes educators nationwide. According to AACP, there were 61,275 first degree PharmD student pharmacists enrolled nationwide in 2012.[33] Even if half of first-year student pharmacists completed a first-year diabetes self-care education program, the number of healthcare providers available to help patients with this disease would significantly increase. Further, colleges and schools should consider offering an advanced diabetes elective course similar to that reported by Westberg and colleagues in the second year to expand and complement the diabetes self-care education program.[21]

Because no published survey instruments evaluated all components of the diabetes self-care education program, including confidence, knowledge, and clinical applicability, we had to create survey instruments for this study. Although our internal validation process for the survey instruments included review of the literature, an internal focus group, and input from external experts, the instruments must be used and evaluated in other studies before they can be considered validated. Our use of a second cohort in this study was a first step in this direction, but we could only infer some generalizability from the results. Future directions for the diabetes self-care education program study will involve using the follow-up survey to assess the impact of all clinical years as well as postgraduation. Long-term outcomes on the impact of the diabetes self-care education program will be evaluated.

CONCLUSION

A diabetes self-care education program successfully prepared first-year student pharmacists in diabetes self-care and management of diabetes patients. Student pharmacists'

confidence, knowledge, and skills increased and they were able to apply these in clinical settings. By disseminating the description and outcomes of this program and the survey instruments created to assess it, other colleges and schools may implement similar types of diabetes educational programs for their student pharmacists, ultimately enhancing the capabilities of educators, increasing the training of student pharmacists, and contributing to the number of healthcare providers available to meet the needs of people with diabetes.

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