RESEARCH ARTICLE

Evaluation of Structured Patient Interactions: The Diabetes Check

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Objectives. To evaluate a structured patient intervention, the Diabetes Check, in which pharmacy students ask patients with diabetes about 3 clinical targets: A1c, blood pressure, and low-density lipoprotein (LDL) cholesterol (ABC) levels. Specific objectives were to: (1) describe the effect of patients’ reactions on pharmacy students; (2) describe pharmacy students’ confidence and role beliefs; and (3) determine predictors of pharmacy students’ intention to use the Diabetes Check in the future.

Methods. After training, pharmacy students were asked to perform 10 diabetes checks and complete an evaluation. Data from the evaluations described pharmacy students’ reactions, role beliefs, and confidence. Linear regression was performed to predict intention of using the Diabetes Check in future.

Results. One-hundred twenty-eight pharmacy students used the Diabetes Check tool with over 1000 patients. Most pharmacy students were encouraged by patients’ reactions (56%). Pharmacy students’ perceptions of patients’ reaction and pharmacy students’ role beliefs about monitoring ABCs significantly predicted pharmacy students’ reported intention to use a Diabetes Check (r-squared = 0.52).

Conclusions. Pharmacy students’ perceptions of patient reactions and role beliefs about the importance of monitoring predicted their reported intention of performing a Diabetes Check in the future.

Keywords: student pharmacist, diabetes, role beliefs, patient interaction, self-efficacy

BACKGROUND

Pharmacists can play an important role in the health of people with diabetes. A growing body of research has demonstrated that pharmacists can effectively provide care to people with diabetes and in many cases improve their health outcomes.1,2 Although colleges and schools of pharmacy have adopted and educated their pharmacy students in pharmaceutical care for patients with all diseases, this paradigm has not revolutionized pharmacy practice as hoped.3 Indeed, much of community pharmacy practice remains focused on providing a product.4,5 Often, a gap exists between ideal and actual care provided in community pharmacy.

Pharmacy students are frequently called on to carry the pharmacy profession forward and provide patient-centered care.6 Pharmacy students are trained at colleges and schools of pharmacy to provide patient-centered care. Pharmacy educators strive to provide the best educational sites.7,8 While there is a growing number of community pharmacists who engage patients and provide positive role models for students, some pharmacy students may be exposed to practice sites that do not model this level of care. For many years, people have suggested that this may contribute to the disillusionment or role adjustments of pharmacy students and new practitioners.9,10

Realizing the need to provide opportunities for quality patient interaction and the limitations of current community practice, we designed a structured intervention in diabetes monitoring for all fourth-year pharmacy students regardless of pharmacy students’ skills, attitudes, or level of care provided at the advanced pharmacy practice experience (APPE) site. This brief intervention was designed to teach pharmacy students how they can interact with patients to gather clinical data and provide education in a timely manner. In this intervention, referred to as the Diabetes Check, pharmacy students asked patients with diabetes about their actual and goal A1c, blood pressure, and cholesterol (ABCs) levels using a pamphlet from the National Diabetes Education Program along with an interview guide.11 This intervention capitalizes on community pharmacy’s access to patients, particularly those with diabetes who often require multiple medications, and provides opportunities for pharmacy students to interact with patients.

This educational approach draws on Social Cognitive Theory which includes mastery modeling.12,13 Mastery
modeling is one method of observational learning proposed by Bandura that facilitates a mastery or successful learning experience. It has 3 components. First, the skill is modeled to “convey the basic rules and strategies.” Second, the learners rehearse the skill in a controlled environment and receive specific feedback. Finally, learners apply the skill in work situations that are expected to bring success. This third component has also been called enactive learning or learning from one’s experiences. The outcomes from enactive learning shape the performer’s ideas about the behavior, serve as motivators, and increase the automatic nature of the response. Mastery modeling may help pharmacy students learn and rehearse how to ask patients with diabetes about the diabetes ABCs.

Positive reinforcement contributes to the growth of interest and self-efficacy which in turn can lead to increased or improved performance of behavior. Possible sources of reinforcement for pharmacy students in their APPE sites include clinical instructors at the APPE sites, pharmacy educators, other pharmacists at the APPE site, pharmacy students, and patients. In pilot work, pharmacy students received little feedback from pharmacists and clinical instructors on the Diabetes Check. However, we did not ask clinical instructors to provide feedback as the goal of this project was for pharmacy students to perform it independently. On the other hand, it is possible that patients could spontaneously provide pharmacy students with timely feedback via their attention and responses during the Diabetes Check process.

A conceptual model (Figure 1) was developed to explain and test the impact of the Diabetes Check intervention on pharmacy students. We theorized that pharmacy students’ intentions to perform the Diabetes Check in the future would be altered based on their experience with the Diabetes Check including observing patient reactions, identifying role models, and determining the ease of the Diabetes Check technique as well as changes in self-efficacy, and role beliefs. Self-efficacy, an element of Social Cognitive Theory, is defined “as people’s beliefs about their capabilities to produce a designated level of performance that exercise influence over the events that affect their lives.” People choose to undertake activities that give them a strong sense of self-efficacy. Building on that body of research, this model suggests that pharmacy students who believe they have the skills and confidence to ask patients about their diabetes goals would be more likely to attempt this behavior in the future. Role theory examines the connection between expectations or beliefs and behavior. Role theory literature in pharmacy has demonstrated that pharmacists’ role orientations or beliefs influence patient-pharmacist interactions. Subsequently, this model proposes that pharmacy students with more positive role beliefs toward monitoring after experience with the Diabetes Check would have greater intentions to monitor patients in the future.

OBJECTIVES

The purpose of this study was to evaluate the Diabetes Check, a structured intervention where pharmacy students ask patients with diabetes about A1c, blood pressure, and cholesterol levels. Specific objectives were to: (1) describe the effect of patients’ reactions on pharmacy students, (2) describe pharmacy students’ self-efficacy and role beliefs, and (3) determine predictors of pharmacy students’ intention to use the Diabetes Check in the future.

METHODS

All senior pharmacy students were asked to perform 10 Diabetes Checks and complete an evaluation as part of the required activities in the Ambulatory Pharmaceutical Care Clerkship. These APPE sites are community, chain, or clinic pharmacies. Pharmacy students were encouraged to ask patients with diabetes if they had time to talk about some diabetes information. If so, patients were then asked to share their A1c, blood pressure, and LDL-cholesterol levels and target numbers. This information was recorded for each patient on the interview guide and submitted to the course instructors over a secure web site. Approximately 120 pharmacy students each recruited 10 patients. Pharmacy students were asked to select a convenience sample of patients with diabetes (either type 1 or 2) who were over 18 years and did not have gestational diabetes. There were no material inducements; however, this assignment and its evaluation were required in the course.

Two of the 3 elements of mastery modeling from social cognitive theory, namely modeling and enactive learning, were explicitly used in training the students and in patient interactions. The training for the Diabetes Check took place in a 15-minute session during a daylong APPE orientation. Students were presented with background on the importance of asking patients with diabetes about ABCs, directions on how to carry out...
a diabetes check using the interview guide and patient handout, and how to submit the completed assignment and evaluation online. In order to put the pharmacy students at ease, a young faculty member and a familiar teaching assistant who were closer to the average APPE student’s age demonstrated the Diabetes Check. Pharmacy students were provided with an interview guide that contained directions and wording for question. Students were encouraged to paraphrase the interview guide and use it to track all 10 interviews. Directions and patient handouts were also available for students on the course web site. Second, pharmacy students were asked to use the Diabetes Check with 10 patients as a form of enactive learning. Students were encouraged to approach patients over 18 years of age with either type 1 or 2 diabetes (not gestational diabetes). By interviewing multiple patients, we hypothesized that pharmacy students would receive positive feedback from at least 1 patient. Limiting the experience to 1 interview may not have allowed the pharmacy students to have a mastery learning experience.

Data from the online course evaluations were used to determine the effect of patients’ reactions, student’s beliefs about the pharmacist’s role in patient care, and students’ level of self-confidence and to predict students’ intention to use the Diabetes Check in the future. Data collection started in May 2003 and continued until May 2004. The project was reviewed and approved by the University of Wisconsin-Madison Health Sciences Institutional Review Board. While the students were informed about the nature of the assignment and its evaluation, students were not required to sign a consent form for the study. Patients received an information sheet explaining the Diabetes Check and provided verbal consent.

An online course evaluation was used to survey pharmacy students’ perceptions regarding ease of use of the interview guide, most common patient reaction, role models, mentors, effect of the overall patient reaction on student pharmacist, pharmacy students’ confidence or self-efficacy in doing the Diabetes Check, importance of monitoring diabetes or role beliefs, intention of future use of the Diabetes Check, and demographics. The survey instrument is available from the corresponding author. Single items measured were used to keep the course evaluation brief. Measures of intention to use the Diabetes Check in the future, the most common patient reaction, self-efficacy, and role beliefs were based on a previously developed instrument for pharmacists and adapted for the course evaluation. Through the use of cognitive interview techniques with community pharmacists and pharmacy students, these items were found to measure the constructs of interest. This provides evidence of validity. The reliability of these items has not been established.

Pharmacy students whose APPEs took place near the school of pharmacy were asked to participate in a post-assignment debriefing. This was not a required part of the assignment. In small groups of 2-3, pharmacy students were asked to describe their experiences using the Diabetes Check and provide feedback on the course evaluation.

Data from the course evaluations were used to characterize pharmacy students’ experiences, reactions, role beliefs, and self-efficacy. Descriptive statistics were used to describe role beliefs, self-efficacy, and intention to use the Diabetes Check in the future.

Linear regression was used to determine if intention to use a diabetes check in the future was affected by the ease of use of the Diabetes Check, presence of role models, pharmacy students’ gender, as well as pharmacy students’ perception of the patient reaction, self-efficacy in asking about diabetes ABCs, and role beliefs about the importance of pharmacy students’ asking about diabetes ABCs. Regression assumptions and the presence of marked outliers were examined. Analysis was performed with SPSS (Version 11.5, 2002) and ARC (Version 1.06, 2004).

**RESULTS**

Over the course of a year, 132 pharmacy students approached 1299 patients or 8.6 patients per student pharmacist (range from 3 to 10). Of the 1299 patients, 1115 patients agreed to talk to pharmacy students. A total of 128 pharmacy students completed the course evaluation resulting in a response rate of 97%. The majority of pharmacy students were female (68%), had a pharmacy mentor (57%), and had not worked with a pharmacist role model who provided care similar to the Diabetes Check (64%). Fifty-seven percent of pharmacy students found the ABC interview guide “easy” to use, 34% found it “extremely easy” to use, and the remaining 9% gave a “neutral” response. Three quarters of pharmacy students agreed that the Diabetes Check opened up opportunities for conversation (77%), while 13% disagreed and 10% were not sure. Pharmacy students reported that patients were most often passive, meaning that they listened but did not ask any questions during the Diabetes Check (Figure 2). Overall, 55% of pharmacy students were encouraged by patients’ reactions and few were discouraged (2%); the remaining students were either unaffected (37%) or selected “other” as their response (5%). The majority of pharmacy students were confident in asking patients about the diabetes ABCs (14% extremely confident, 35% very confident, 34% confident, 13% mixed confidence, 3% not confident). Role beliefs were measured by asking pharmacy students separately if it was important for physicians, community pharmacists, and themselves as pharmacy students to monitor patients with diabetes. By
anchoring the role beliefs against others, pharmacy students’ responses were distributed over the range of the scale (Figure 3). Pharmacy students reported that it was more important for physicians than pharmacists to ask about clinical targets (Figure 3). About two thirds of pharmacy students reported that they were likely to perform the Diabetes Check in future practice (Figure 4).

Prior to performing the regression model to predict reported intention to perform a diabetes check, we verified that strong relationships between the independent variables, which may bias the regression analysis, were not present. A full regression model was performed. Student pharmacist perceptions of patients’ reaction and student pharmacist’s role beliefs regarding the importance of pharmacists’ asking about clinical targets significantly predicted their reported intention to use a diabetes check (r-squared = 0.515; Table 1). Ease of use was also marginally significant at $p = 0.049$. Model checking found that assumptions of normality, homoscedasticity, and independence of errors were not violated. Three data points that appeared as marked outliers in the graphical analysis of the regression model were removed from the final analysis. Removal of these 3 points did not change the significance of any independent variable, but increased the overall predictive capacity (r-squared) from 0.446 to 0.515.

In the post-assignment debriefing, 15 pharmacy students reported that patients’ responses shaped their impressions of the Diabetes Check assignment. Students reported paraphrasing and adapting the sample questions on the interview guide. The interview guide was used as a reference and to record patients’ responses. Overall, pharmacy students found the evaluation questions easy to answer. Some students had difficulty answering general questions about all interactions.

DISCUSSION

Using social cognitive theory and role theory, we designed and implemented an intervention for senior pharmacy students using role rehearsal and patients’ feedback to help pharmacy students gain experience performing Diabetes Checks. More than 75% of pharmacy students reported that the Diabetes Check increased their opportunity for dialogue with patients. Not all students completed the required 10 Diabetes Checks. Some

| Table 1. Regression Model for Predicting Pharmacy Students’ Intent to Ask about the Diabetes ABCs in the Future† |
|--------------------------------------------------------|--------|--------|
| Label                        | Estimate (SE) | $P$    |
| Constant                     | 1.680 (0.627) | 0.009* |
| Ease of use                  | −0.208 (0.104) | 0.049* |
| Effect of patient reaction   | 0.593 (0.118) | >0.001* |
| Self-efficacy                | 0.028 (0.064) | 0.667   |
| Role beliefs                 | 0.341 (0.062) | >0.001* |
| Role model                   | −0.132 (0.126) | 0.298   |
| Gender                       | −0.094 (0.132) | 0.476   |

SE = standard error
*Statistically significant
†R squared = 0.515; used 117 cases
pharmacy students reported that all patients with diabetes at their site had been approached. Other students may not have enjoyed the experience or saw the importance of completing the Diabetes Checks.

Over half of pharmacy students were encouraged by the patient reaction to the Diabetes Check assignment and very few were discouraged, which suggests that patients may help to positively shape the pharmacy students’ experience. It is not clear what about the patient reaction was encouraging as half of pharmacy students reported that the most common patient reaction was to listen and not ask questions, and only 7% of pharmacy students reported that the most common patient reaction was appreciation of the service.

The majority of pharmacy students were confident in asking patients with diabetes about their A1c, blood pressure, and cholesterol level. While most pharmacy students thought it was important for community pharmacists and pharmacy students to ask about the diabetes ABCs, they thought it was more important for physicians to do so.

About two thirds of pharmacy students intended to use the Diabetes Check technique in the future. Students who (1) found the interview guide easy to use, (2) were encouraged by the patient reaction, and (3) thought it was more important for pharmacy students to monitor the diabetes ABCs had a greater intent to use the Diabetes Check in the future. The association among ease of use, patient reaction, role beliefs, and intended behavior was strong (r squared = 0.52). Still, there is a need for longitudinal research to examine how intentions ultimately relate to actual behavior.

These findings support only part of the conceptual model (Figure 1). The presence of a past or present role model and self-efficacy did not predict pharmacy students’ monitoring behavior. This may be due to the use of single item measures, the nature of APPE experiences, the relationships with other predictors, or lack of a true relationship. Further research is needed before ruling out the impact of role models and self-efficacy in this conceptual model.

Pharmacy students were encouraged by their perception of the patient reaction. Not only was patient reaction perceived as positive by about 56% of pharmacy students, it helped to predict which pharmacy students reported they were likely to use the Diabetes Check in the future. Perceptions of patient reactions may ultimately predict pharmacy students’ intention to monitor patients with diabetes. Helping pharmacy students gain positive experiences through multiple patient interactions as opposed to selecting favorable patients helped to demonstrate the “real world” application of the Diabetes Check. We hope the ease of use of the Diabetes Check will also encourage future “real world” use.

The second factor that impacted pharmacy students reported intention to use the Diabetes Check in the future was their role beliefs. Our study design does not allow causal inference. However, consistent with prior research, the association between role belief and intended pharmacy students’ behaviors was strong and should be considered in future research.16,17 There is a need to explore the extent to which pharmacy students’ personality differences affect both role beliefs and intended behaviors regarding patient counseling. It may be that the intervention reinforced a tendency to counsel that was already present. Future research is needed to explore this possibility. This research also reinforces the importance of understanding how role beliefs and patient reactions are related. The dynamics of how both these variables may impact pharmacy students’ future intentions and behaviors are important to study further.

Finally, the focus on the pharmacists’ beliefs should not take away from the importance of the environment. In post-assignment debriefing with pharmacy students, some of the most enthusiastic pharmacy students commented on how the possibility of private environments for conversations facilitated doing the Diabetes Check, both for the student pharmacist and patients. Further research is needed to establish how the pharmacy workplace impacts the use of diabetes checks and possibly how the use of Diabetes Checks influences the workplace.

Strengths and Limitations

This research has several limitations. First, the study lacked a randomized design with a control group and pre-test measure needed to establish causality. This program was fully implemented as an assignment in the Ambulatory Pharmaceutical Care Clerkship and we were unable to randomly assign a proportion of pharmacy students to a different assignment. Second, pharmacy students were aware that this assignment was being evaluated and may have altered their behavior, resulting in the Hawthorne effect. A third limitation is the reliance on self-report measures, which are likely to correlate with each other. However, the use of self-report allowed us to gather anonymous data and hopefully decreased the possibility of social desirability influencing the results. Fourth, it would strengthen the mastery modeling by providing a practice session in controlled conditions with feedback prior to the APPE experience. Due to lack of time, this was not possible. Finally, the current design does not assess patients’ health outcomes, attitudes toward diabetes ABCs, perception of the patient-pharmacist relationship, or satisfaction with and expectations of pharmacy services.
This study also has several strengths. First, it used a well-recognized theory to help conceptualize and evaluate the intervention. Second, learning took place in a “real world” setting, hopefully increasing the transferability of the behaviors. Third, much of the intervention was self-directed and did not require additional resources. Thus, this model has a greater potential to be effectively implemented outside of a research project.

CONCLUSIONS
Perceived patient reactions and pharmacy students’ role beliefs were robust predictors of pharmacy students’ reported intention to ask about the diabetes ABCs in the future. Role rehearsal with “real” patients may prepare and motivate pharmacy students to assume expanded roles. These results will serve as a foundation for further study using role modeling, role rehearsal, and patient reinforcement to enhance pharmacy practice.

REFERENCES
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