Impact of a Multi-Site Community Pharmacist-Provided Blood Glucose Monitoring Training on Patients’ Self-Monitoring Behaviors

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BACKGROUND

The American Association of Diabetes Educators (AADE) has defined diabetes education as a “collaborative process” in which patients with diabetes or at risk for diabetes gain the knowledge necessary to successfully self-manage the disease with healthcare professionals. Self-monitoring of blood glucose (SMBG) is one of the necessary self-management behaviors the AADE identifies to ensure proper control of diabetes and is an integral part of a diabetes care plan to allow intensification of medications and implement self-care interventions. The Diabetes Control and Complications Trial (DCCT) and the United Kingdom Prospective Diabetes Study (UKPDS) suggest that SMBG along with intensive management can reduce the likelihood of microvascular and macrovascular complications.

The blood glucose monitoring training (BGMT) is a thirty minute consult provided by SUPERVALU community pharmacists across the country. The session teaches participants how to operate the meter and lancing device, appropriate times to test (fasting, pre/post-prandial), ADA defined fasting and post-prandial blood glucose goals, definition and treatment of hypoglycemia and hyperglycemia, testing on sick days, importance of sharing testing results with healthcare providers, and setting two goals to improve diabetes self-care. Pharmacists follow up with patients in 2-4 weeks to address patients’ questions regarding SMBG and perform meter downloads for meters with available software. Pharmacist reimbursement is provided by manufacturers of certain meter types, making the consult no cost to the patient. Patients can also pay out of pocket for a consult if they use a meter for which the consult is not covered. Regardless if patients with diabetes are insulin dependent or taking oral antihyperglycemics, the success of SMBG as a tool for diabetes self-care is dependent on teaching patients how to react to the SMBG results, with an ultimate goal of improving metabolic control. Treatment of diabetes requires patients to take an active role in controlling their disease state. A review of randomized controlled trials concluded that knowledge, self-monitoring of blood glucose (SMBG) and self-reported dietary habits improve short term (<6 months). There is a potential need for future studies to evaluate the effectiveness of self-management training on self-efficacy. This study was designed to provide insight about the self-monitoring behaviors and diabetes management in patients that received an educational session from community pharmacists.

OBJECTIVES

The primary objective of this research was to gain insight into the testing frequency of adults with diabetes who were 6-12 months post-BGMT consult with a community pharmacist. Secondary objectives included identifying patient demographics that influenced the primary objective, SMBG testing behaviors (post-prandial testing; testing with symptoms of
hypoglycemia), assess how participants utilize their SMBG results to impact their diabetes self-care (sharing results with physician; treating hypoglycemia; modifying diet or exercise with hyperglycemia) and identify factors that can be a deterrent of self-monitoring frequency (cost of testing supplies; psychosocial stressors).

METHODS

This was a prospective, multi-site, non-parallel, survey-based study. Literature searches did not produce a validated questionnaire that was able to adequately measure the objectives specifically defined in the protocol. A new instrument was constructed during consultation with the study investigators and statistician. Although the tool is not validated, investigators modeled questions similar to questionnaires that were validated or also modeled off validated questionnaires. Multiple choice and Likert scale style questions were utilized for the majority of the survey, while free-response questions were elicited for some demographic-related data (current age; years with diabetes). The final instrument was two pages, front and back, totaling twenty questions. The statistician provided feedback on each question to ensure proper analysis of study objectives could occur. The questionnaire was pretested with four representatives of the study population from the surrounding Media, Pennsylvania area. These participants aged 45 to 90 years, equal number of males and females, completed all or some college, and reported having type 2 diabetes mellitus. Those who participated in the pretest completed the questionnaire and provided feedback on understandability, formatting, and wording of the questions. Participants took ten minutes or less to complete the questionnaire. Investigators used parallel forms of specific survey questions to increase the reliability of the survey.

Eligibility criteria included people that received the BGMT consult from a SUPERVALU community pharmacist, reported that they were told by a physician that they have diabetes, were six to twelve months post consult, >18 years of age, and currently controlling their diabetes with 1) diet and exercise, 2) insulin or other injectable diabetes medication, 3) oral anti-hyperglycemic medication(s), or 4) any combination of treatments. Participants were excluded that were <18 years of age, reported having only gestational diabetes, or reported having only pre-diabetes. To conduct a long term follow up defined in this study as > 6 months post-BGMT consult, 630 individuals were identified using billing information for the BGMT consult service between the dates of 11/01/2010 and 7/31/2011 using SUPERVALU’s central pharmacy database. Four individuals were excluded from the sample due to age <18 years and name duplication generated on the report. Data for analysis was collected via the mailed questionnaire to 626 participants in five different states in the United States, including Pennsylvania, Illinois, Indiana, New Jersey, and Minnesota who received the consult during the pre-specified dates. Upon receiving the mailed questionnaire, participants had the option to complete the survey online using SurveyMonkey™ or returning the survey using a prepaid envelope. Participants that returned the survey and met inclusion criteria were provided with a $5 gift card to SUPERVALU grocery stores. The study proposal allowed for up to 300 participants who had not responded to the initial mailing to be telephoned and given the option to complete the survey with an IRB approved research assistant. In addition to the multiple data collection sources, a second mailing was sent to non-responders to help overcome nonresponse bias.

Each endpoint was analyzed using descriptive statistics and determining frequencies and percentages for survey responses. Cross-tabulations based on sample demographics and the primary and secondary outcomes were analyzed. Influence of test period and demographics on
the primary outcome was analyzed using generalized estimating equations (GEE), Wilcoxon rank sums test and ANOVA on change scores.

The research protocol for this project received expedited approval from the Institutional Review Board at Temple University.

RESULTS
There were 283 respondents accounting for a 45.2% response rate. Of the 283 respondents, 240 met inclusion criteria. The majority of participants had type 2 diabetes, age 65 years or older, and Caucasian. Data analysis revealed that survey data was collected from individuals six to fourteen months instead of six to twelve months post BGMT consult, and though this did not appear to affect the analysis of the study objectives.

According to survey responses, there was a statistically significant increase in the pattern of daily testing over 2 years; there were less participants who reported testing zero times daily and more participants who reported testing one, two, or three times daily, p<0.001. Notably, there was a 12.2% increase in those who reported testing once daily and a 16.5% decrease in those who reported testing less than once daily or not at all. Most patients reported testing the same number of days per week 1 year ago versus the past 7 days.

Demographic data was analyzed to determine if there was an influence on the primary objective of reported testing frequency. Demographic data did not influence the primary endpoint regarding the number of days participants tested each week. Regarding daily frequency of testing, the less years that participants reported having diabetes, the more times per day testing was reported, p=0.0034. Participants that were younger reported testing more frequently per day, p=0.0315. Lastly, participants that reported taking both injectable and oral medications (n=52) reported a higher daily testing frequency versus those who reported not taking both types of medications (n=168), p=0.0299.

There was a higher quantity of participants that agreed or strongly agreed to test their blood glucose when symptoms of hypoglycemia are experienced regardless of medication regimen. In addition, the number of respondents who agreed or strongly agreed to testing with symptoms of hypoglycemia was significantly different for those <65 years (68%) versus ≥65 years (50%), p=0.0081 and for females (66%) versus males (49.5%), p=0.018. Age < 65 years and ≥65 years, gender, type of medication regimen and education did not significantly influence how participants utilized their SMBG results to impact their self-care.

Table 1 depicts the reported self-care behaviors of participants that were analyzed. The majority of respondents agreed or strongly agreed with a statement regarding always sharing their SMBG results with their physician and stated that they knew how to treat hypoglycemia, defined as blood glucose <70 mg/dl on the questionnaire. Only 24.5% reported testing their blood glucose more often when they have a bacterial or viral infection. There were 85.9% of participants who stated to always or sometimes change their diet with hyperglycemia and 53.3% who increase exercise.

Psychosocial factors associated with SMBG were reported by participants who claimed to agree or strong agree to feeling unhappy (61%, n=139), frustrated (58.8%, n=134), and guilty (49.5%, n=113) when their blood glucose was outside the ADA goal ranges for fasting and post-prandial testing. Only 58 participants, or 25.1%, reported that the cost of testing supplies caused them to test their blood glucose less often than a physician or pharmacist recommends.
CONCLUSION

The study results have provided useful information regarding patient SMBG behaviors and self-management for pharmacists and other health care professionals involved in diabetes education. Many of the SMBG and self-care behaviors addressed in the BGMT consult with the community pharmacist showed positive results. There was a reported increase in daily pattern of testing in this population that was 6 to 14 months post-BGMT consult. Education should be reiterated regarding SMBG while having a bacterial or viral infection, as unsafe levels of blood glucose can be a concern in patients with acute illnesses. This patient population may be more motivated to modify their diet versus exercise to self-manage diabetes.

A model of ongoing support and education about self-monitoring utilization provided by community pharmacists may benefit patients. Since community pharmacists are very accessible, ongoing education with patients upon refilling their testing supplies may provide patients with ongoing motivation and support, although this was not a defined component of this study’s intervention. This type of intervention may be worth exploring in future studies.

REFERENCES


