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ORIGINAL ARTICLE

Diabetes Empowerment, Medication Adherence and Self-Care Behaviors in Adults with Type 2 Diabetes

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Abstract

Background: Evidence suggests that empowerment is an important factor to address everyday aspects of dealing with a chronic disease. This study evaluated the effect of diabetes empowerment on medication adherence and self-care behaviors in adults with type 2 diabetes.

Subjects and Methods: Data on 378 subjects with type 2 diabetes recruited from two primary care clinics in the southeastern United States were examined. Previously validated scales were used to measure diabetes empowerment, medication adherence, diabetes knowledge, and diabetes self-care behaviors (including diet, physical activity, blood sugar testing, and foot care). Multiple linear regression was used to assess the independent effect of diabetes empowerment on medication adherence and self-care behaviors controlling for relevant covariates.

Results: Eighty-three percent were non-Hispanic blacks, 69% were women, 22% were 65 years or older, 68% were not married, 26% had less than high school education, 60% were unemployed, 39% were uninsured, and 47% had a yearly income <$10,000. Empowerment had significant correlations with medication adherence ($r = 0.17$, $P < 0.003$), diabetes knowledge ($r = 0.16$, $P = 0.007$), diet ($r = 0.24$, $P < 0.001$), exercise ($r = 0.25$, $P < 0.001$), blood sugar testing ($r = 0.12$, $P = 0.043$), and foot care ($r = 0.18$, $P = 0.002$). In the regression model, diabetes empowerment was significantly associated with medication adherence ($\beta = -0.04$, $P = 0.001$), diabetes knowledge ($\beta = 0.09$, $P = 0.012$), diet ($\beta = 0.09$, $P < 0.001$), exercise ($\beta = 0.10$, $P < 0.001$), blood sugar testing ($\beta = 0.07$, $P = 0.016$), and foot care ($\beta = 0.08$, $P = 0.001$).

Conclusions: In this sample, diabetes empowerment was related to better diabetes knowledge, medication adherence and improved self-care behaviors. Emphasis on empowerment and self-efficacy is relevant to improve outcomes in the management of diabetes.

Introduction

According to the 2011 statistics of the Centers for Disease Control and Prevention, type 2 diabetes affects 25.8 million people or 8.3% of the U.S. population.[1] Diabetes is a chronic condition that requires both lifestyle and knowledge modification in order to acquire and apply skills that will enable effective self-care activities on a long-term basis. The increasing prevalence of diabetes and the concomitant disparities affecting outcomes for some groups necessitate developing a collaborative, daily self-management plan between physician and patient.[2–4] Traditional methods of diabetes management place responsibility for outcomes in the physician's hands, with a focus on adherence to treatment goals and plans. This traditional approach often overlooks the patient's goals, priorities, and cultural factors that may affect adherence to these treatment goals, leading to poor outcomes.[4–6] Evidence suggests that the use of empowerment as a treatment approach in patients with diabetes not only allows for the establishment of effective self-management, but also leads to more optimal outcomes.

Empowerment can be seen as a process that refers to perceived and real control of, and responsibility for, one's own quality of life. Empowering patients involves creation of relationships or collaborations where the patient and community take ownership of and control over change processes.[7] As described by Funnel and Anderson,[4] implementation of empowerment in clinical settings for diabetes management

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can potentially serve as a method to close the existing gap between the promise and the reality of diabetes care. A recent study evaluating the efficacy of an empowerment-based self-management consultant intervention suggests that treatments that focus on empowerment through self-management lead to improvements in diabetes-related quality of life.[8] Self-management education programs that emphasize empowerment indicate that motivation is much higher among patients who address their own concerns and actively set goals with their healthcare provider. Furthermore, this approach allows patients to be independent and problem focused, thereby enabling for the development of effective self-care behaviors.[9] Healthcare facilities that incorporate empowerment-based diabetes management while emphasizing the importance of culturally appropriate health education experience greater reduction in hemoglobin A1c, blood pressure, and cholesterol while also showing an increase in self-efficacy.[5]

However, few studies have examined the effect of diabetes empowerment on medication adherence and diabetes knowledge in conjunction with diabetes self-care behaviors, especially in lower-income populations. The current study adds to the breadth of literature on diabetes empowerment by evaluating the effect of empowerment on medication adherence and self-care behaviors in a low-income sample of patients with type 2 diabetes. We hypothesized that diabetes empowerment would be associated with increased medication adherence and better self-care behaviors in adults with type 2 diabetes.

Research Design and Methods

Sample

We recruited consecutive patients diagnosed with type 2 diabetes mellitus who had scheduled appointments at two adult primary care clinics in the southeastern United States. The institutional review board at our institution approved all procedures prior to study enrollment. Eligible patients were clinic patients, 18 years of age or older, with a diagnosis of type 2 diabetes mellitus in the medical record and a clinic appointment between June 2010 and August 2010. Patients were ineligible if they did not speak English or if the research assistants determined (by interaction or chart documentation) they were cognitively impaired or too ill to participate. We approached consecutive patients with a clinical diagnosis of type 2 diabetes mellitus over a 10-week period. The response rate was approximately 75%. We did not capture data on non-participants, so we are unable to describe differences between participants and non-participants.

Data and procedure

Research assistants reviewed the electronic clinic roster to identify eligible patients. Eligible patients were approached in the clinic waiting room and provided a description of the study. Those interested and eligible were consented and taken to a private area in the clinic to complete the study instruments. Participants completed the assessment before or after their scheduled clinic appointments, depending on clinic flow. Three hundred seventy-eight subjects were consented and completed the study. We collected data on self-reported age, sex, race/ethnicity, marital status, education, household income, and health insurance. Additional measures included validated surveys of diabetes knowledge, medication adherence, and diabetes self-care behavior.

Demographic variables

Age was categorized as 18–49 years, 50–64 years, and 65 years and older. Race/ethnicity was categorized as non-Hispanic white and non-Hispanic black because none of the participants was of Hispanic or other racial origin. Marital status was categorized as married or not married. Education was categorized as less than high school graduate, high school graduate, or greater than high school graduate. Employment was categorized as employed or unemployed. Annual personal income was categorized as <$10,000, <$25,000, and $25,000 or greater. Health insurance was categorized as insured or uninsured.

Empowerment scale

The short form (eight items) of the Diabetes Empowerment Scale was used to measure diabetes-related psychosocial self-efficacy.[10] The scale values are inversely scored in that lower scores indicate greater empowerment. The reliability of the Diabetes Empowerment Scale-Short Form was assessed using the original dataset and was 0.85.[10]

Diabetes knowledge

Diabetes knowledge was assessed with the Diabetes Knowledge Questionnaire.[11] The Diabetes Knowledge Questionnaire elicits information about the respondent's understanding of the cause of diabetes, types of diabetes, self-management skills, and complications of diabetes. Response options are "yes," "no," or "don't know." The final score was based on the percentage of correct scores, with a maximal possible score of 100.[11]

Medication adherence

The Morisky adherence score,[12] a commonly used self-report tool, was used to assess medication adherence. It has good reliability and validity.[12,13] This scale asks patients to respond to "yes" or "no" to a set of four questions. A positive response to any question indicates a problem with adherence with a total possible score of 4; higher values indicate poorer adherence.

Diabetes self-care behavior

Self-care behavior was assessed with the 11-item Summary of Diabetes Self-Care Activities scale.[14] The Summary of Diabetes Self-Care Activities scale measures frequency of self-care activity in the last 7 days for five aspects of the diabetes regimen: general diet (followed healthy diet), specific diet (ate fruits/low-fat diet), foot care, blood glucose testing, exercise, and cigarette smoking. For this analysis, general diet, foot care, blood glucose testing, and exercise were used.

Statistical analyses

We performed three sets of analyses. First, we calculated sample percentages for each demographic variable. Second, we used Spearman's correlation to test the association among diabetes empowerment, medication adherence, diabetes knowledge, and self-care behaviors (diet, physical activity,

blood sugar testing, and foot care). Third, we ran multiple linear regression models to assess the independent associations between diabetes empowerment and medication adherence, diabetes knowledge, and diabetes self-care behaviors (diet, physical activity, blood sugar testing, and foot care) controlling for covariates. For each regression model, medication adherence, diabetes knowledge, and self-care behaviors (diet, physical activity, blood sugar testing, and foot care) were the dependent variables, diabetes empowerment was the primary independent variable, and age, sex, race/ethnicity, education, income, and employment were included in the model as covariates. All analyses were performed with STATA version 10 (Stata Corp., College Station, TX), and a two-tailed α of 0.05 was used to assess for significance. Variables were selected for inclusion in the models based on clinical relevance.

Results

Demographic characteristics for this sample of 378 adults with type 2 diabetes are shown in Table 1. The majority of participants were female (69%), non-Hispanic blacks (83%), between the ages of 50 and 64 years (54%), unemployed (60%), and insured (61%) and had an income of < $10,000 (47%).

Table 2 shows the correlation results for diabetes empowerment. Empowerment was significantly associated (recall that lower scores on the Morisky scale correspond to higher levels of compliance) with adherence to medication ($r = -0.17$, $P = 0.003$), diabetes knowledge ($r = 0.16$, $P = 0.007$), diet ($r = 0.24$, $P < 0.001$), exercise ($r = 0.25$, $P < 0.001$), blood sugar testing ($r = 0.12$, $P = 0.043$), and foot care ($r = 0.18$, $P = 0.002$).

Results from the regression model, as shown in Table 3, indicate that diabetes empowerment was significantly related (recall that lower scores on the Morisky scale correspond to higher levels of compliance) to medication adherence even after controlling for demographics such as age, gender, ethnicity, marital status, educational level, employment status, annual income level, and health insurance ($\beta = -0.03$; 95% confidence interval -0.05, -0.014). Moreover, diabetes empowerment was significantly associated with diabetes knowledge ($\beta = 0.09$; 95% confidence interval 0.019, 0.16), diet ($\beta = 0.09$; 95% confidence interval 0.05, 0.13), exercise ($\beta = 0.10$; 95% confidence interval 0.06, 0.15), blood sugar testing ($\beta = 0.07$; 95% confidence interval 0.01, 0.12), and foot care ($\beta = 0.08$; 95% confidence interval 0.03, 0.13).

Table 1. Sample Demographic Characteristics ($N = 378$)

	%
Age	
18–49 years	24.0
50–64 years	53.6
65+ years	22.4
Gender	
Women	69.1
Race/ethnicity	
Non-Hispanic black	83.2
Marital status	
Married	31.6
Educational level	
Less than HS graduate	25.8
HS graduate	43.8
Greater than HS graduate	30.3
Employment status	
Employed	39.5
Annual income level	
< $10,000	46.5
< $25,000	33.8
$25,000+	19.6
Health insurance	60.9

HS, high school.

Table 2. Correlations Among Diabetes Empowerment, Medication Adherence, and Diabetes Self-Care

	r	P *value*[a]
Medication adherence	−0.170	0.003
Diabetes Knowledge Test	0.155	0.007
General diet	0.235	< 0.001
Exercise	0.247	< 0.001
Blood sugar testing	0.115	0.043
Foot care	0.178	0.002

[a]Statistically significant, $P < 0.05$.

Discussion

Results indicated that diabetes empowerment was associated with increased medication adherence, increased knowledge, and effective self-care behaviors (including diet, physical activity, blood sugar testing, and foot care). These results are particularly encouraging because, as stated above, type 2 diabetes is a chronic disease best managed when patients assume control over their own treatment in terms of better adherence to provider recommendations, office visits, and lifestyle change. As Anderson and Funnel[15] have noted, patients with diabetes are actually responsible for the overwhelming majority of their own care, while the healthcare team operates in the background, providing expertise, education, and hopefully psychosocial support to help patients with healthcare decision-making. Considering that effective treatment of diabetes resides with the patient, it is not surprising that psychological factors such as empowerment have been the focus of study.

Framed in the self-efficacy model, empowerment refers to fostering an active role for the patient, helping him or her to work in partnership with care professionals while taking responsibility for needed care. Empowerment typically

Table 3. Adjusted Model for the Relationship Between Empowerment and Medication Adherence and Self-Care

	β	*CI*	P *value*
Medication adherence	−0.037	−0.059, −0.014	0.001
Diabetes Knowledge Test	0.089	0.019, 0.159	0.012
General diet	0.093	0.053, 0.133	< 0.001
Exercise	0.104	0.059, 0.149	< 0.001
Blood sugar testing	0.067	0.012, 0.122	0.016
Foot care	0.082	0.033, 0.131	0.001

The linear regression model was adjusted for age, race/ethnicity, gender, education, income, and employment.
CI, confidence interval.

involves efforts aimed at improving self-esteem and autonomy and facilitating personal responsibility, which, ultimately, combine to improve self-care.[16] When applied to diabetes, empowerment refers to the ability to make decisions about the control of one's disease, defined by having both the knowledge required to make informed decisions as well as resources to implement these decisions.[17] The results obtained in the present study reinforce this concept by suggesting that empowerment is an important factor when addressing everyday aspects of dealing with a chronic disease, while also supporting the idea that diabetes empowerment used as an integral part of diabetes treatment plans can influence positive self-care behaviors, as seen through the relationship found among diabetes empowerment, medication adherence, and diabetes knowledge.

Keers et al.[18] have indicated that empowerment must be included in diabetes education interventions because knowledge alone does not produce self-care changes.

One of the most important aspects of diabetes treatment involves medication regimens and self-care behaviors, and often adherence is very difficult for patients in these areas.[19] Rhee et al.[20] reported reduced hemoglobin A1c in patients with high medication adherence and adequate self-care behaviors, and Sokol et al.[21] found that diabetes patients with high medication adherence had lower disease-related medical costs. Thus, while medication adherence is an obvious requirement of good clinical care, it may also have more general positive impact on patients' lives in terms of economic and quality of life outcomes.

These findings support the idea that both expecting and empowering patients to play a centrally active role in the care and planning of their own health will enhance treatment outcome. Considering healthcare system-wide issues in which there is an increasing restriction of both time and money allocated to each treatment session, the vision of patient empowerment as a means to enhance treatment outcome becomes even more relevant and important. Our results and those of Funnel and Anderson[4] suggest changing the typical patient orientation from "the doctor is responsible for my health" to "I am responsible for my own health" will be useful in management of diabetes.

Letting patients know that they must take a leading role in their treatment has been strongly emphasized over the past decade.[22] Pooley et al.[22] found that although patients know they bear the responsibility for their diabetes care, they often find themselves reluctant to accept this responsibility. This abdication is sometimes a by-product of structures and constraints within the healthcare system in which experts, not patients, are sometimes empowered. McDuffie et al.[23] also emphasized that the path to better diabetes management is by not only supporting patients, but allowing them to take control of their own healthcare decisions. For example, in a randomized control trial focusing on empowerment training for type 2 diabetes patients, Anderson et al.[24] found partial support for this empowerment intervention in terms of better glycemic control. Thus, psychosocial factors such as empowerment should be addressed in order to increase diabetes self-management. Simply increasing knowledge through diabetes education is not enough to increase adherence and self-care behaviors.[25] Rather, including empowerment as a part of the self-management process will allow individuals to take responsibility for and control of their healthcare behaviors.

This study has some limitations that are worth mentioning. First, this was a cross-sectional study, so we are not able to speak to causality or direction of the associations. Second, this study was conducted at two locations, both in the southeastern United States, and it is possible that our findings may not be representative of other populations across the nation. Third, there are additional confounding factors that could influence the relationship between diabetes empowerment and self-care behaviors, such as duration of disease, comorbidities, severity of illness, and health literacy, which need to be assessed in future studies. Fourth, we did not collect information on non-participants given the cross-sectional nature of the data, and we did not collect some key variables such as access to care and facility characteristics that may influence the relationship between empowerment and health behaviors. Future studies need to include these variables to better understand how empowerment influences health behaviors when those variables are controlled for.

In conclusion, results of this study indicate that diabetes empowerment was associated with increased medication adherence, increased knowledge, and effective self-care behaviors (including diet, physical activity, blood sugar testing, and foot care). Additional emphasis on empowerment and self-efficacy as a part of the treatment process will be essential to improve outcomes in the management of diabetes.

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Author Disclosure Statement

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