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A Nurse Practitioner–led, Computer-based Diabetes Education Intervention Implemented for Quality Improvement in Primary Care

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ABSTRACT

As diabetes rates continue to rise and health care continues to change, nurse practitioners will be a key component in improving the care of patients with diabetes and related comorbidities. This quality improvement project determined if a nurse practitioner–led, computer-based diabetes education intervention would be feasible in an office practice setting and if it would enhance diabetes care. An improvement in hemoglobin A1C was observed, and study participants, practice staff, and office managers had an overall positive response to the intervention's use.

Keywords: computer-based education, diabetes education, nurse practitioner led, one-on-one-education, quality improvement

The prevalence of diabetes and prediabetes in the United States is alarming. More than 29.1 million Americans are currently diagnosed with diabetes, affecting 9.3% of the population.[1] The cost of diabetes is estimated at $245 billion a year and is the leading cause of new cases of blindness, kidney failure, and amputation.[1] Prediabetes, a condition in which the hemoglobin A1C level is $\geq$ 5.7% but $<$ 6.5%, affects nearly 86 million people.[1] Without weight loss and moderate physical activity, 15% to 30% of those with prediabetes will develop diabetes within 5 years.[1] Ongoing patient self-management education and support are critical to reducing the risk of long-term complications.[2]

The American Diabetes Association standards of care recommend empowering patients to maintain self-management skills and providing effective education to reduce the risk of long-term complications and lower costs.[2] However, patients with altered glucose control may not be receiving the education and building the skills they need to manage their disease appropriately.[3] This may be because of the limited time for formal teaching at a regular office visit, shortage of qualified diabetes educators, or inadequate resources to provide education.[4] Although group educational interventions have been found to be successful,[5,6] many primary care practices lack the space and resources to conduct a group intervention. Moreover, attempts to refer patients to hospital-based education interventions often are met with resistance because patients may lack an understanding of the importance of education or because of cost, transportation, or scheduling issues.[7] Therefore, continued efforts by nurse practitioners (NPs) to create innovative education interventions at their practice settings are essential, as part of practices' move toward the Accountable Care Organizations model of quality care and following national standards of diabetes care.[2,8-10]

The purpose of this quality improvement project was to pilot test the feasibility of providing patients with a formal NP-led, interactive computer-based diabetes education intervention during an educational visit in the adult primary care setting, with a goal of enhanced diabetes care and improved A1C

readings. Studies measuring average annual direct medical costs for patients with diabetes have found both short- and longer-term cost savings of 16% to 30% for those who are able to maintain A1C readings < 7% relative to patients with A1C readings ≥ 7%.[11]

METHODS

Institutional review board approval was obtained. The setting of the project was a primary care office in the Midwest. Inclusion criteria were patients ≥ 18 years of age with a diagnosis of diabetes or prediabetes who were seen in the office between 2010 and 2014, received the intervention, and had A1C levels in the electronic medical record before and 3 months after the intervention. As a standard of care, all patients were asked to get blood drawn for A1C measurement. Patients who did not speak English were excluded. The patients were asked by their provider to participate in the separate education intervention with the NP. The sample included 138 patients.

Before initiating the intervention, the NP gathered information from the patient including time since diagnosis, a history of past diabetes education, and a 24-hour dietary recall. The patient's readiness to change, motivating factors, and barriers also were assessed. This information was used to individually tailor the education content to the patient.

The intervention is a 30-45 minute, interactive, computer-based diabetes education program with 20 slides[12-18] based on the latest clinical guidelines and on the 5 A's model for behavior change (assess, advise, agree, assist, and arrange).[19] The intervention was conducted using a standard examination room desktop computer or a laptop computer at the end of the examination table. The patient and the NP sat side by side and reviewed the intervention slide by slide. The interactive discussion after each slide included the degree of understanding need-to-know material and specifically focusing on the individuals' diabetes-related self-management strategies (Table).

The patient was given a packet of written handouts that included all of the topics in the education intervention. The NP helped the patient establish short-term and long-term goals. Patients were referred to specialists if necessary (dietitian or endocrinologist).[17] At the completion of the intervention, a plan for follow-up was established. At 3 months after the intervention, the patient was seen by the NP or by his or her usual provider for a regular follow-up visit, and a repeat hemoglobin A1C was obtained. All data were deidentified. The demographic data were analyzed using descriptive statistics, and the A1C readings were analyzed using a paired *t* test.

Table. Content of the Diabetes Education Intervention

Topics	Printed Handouts
Overall introduction to diabetes	Basics of Diabetes
Incidence and relation to obesity Incidence	
Type 1 versus type 2	
Hypo-/hyperglycemia	
Laboratory values	
Complications	
Specific self-management strategies	
Meal planning	Meal Planning and Weight Loss
Carbohydrates	
Reading a food label	
Basic carbohydrate counting	1500 Calorie Low Carbohydrate Meal Plan
Eating for weight loss	Healthy Snack Ideas
	Physical Activity
Create your plate	Create Your Plate Method

FINDINGS

Patients ranged in age from 23 to 89 years (mean ± standard deviation, 63.6 ± 11.94; N = 138). Participants were largely white (57.4%) or black (37.6%), with about equal representation of men and women. We observed that A1C readings were lower ($P \leq .05$) 3 months after the NP-led, computer-based diabetes education intervention (mean A1C: 7.2 ± 1.35) versus before the intervention (mean A1C: 8.1 ± 2.04). Age was a significant predictor of change in A1C; older patients had a greater reduction in A1C. The change in A1C did not vary significantly by race or sex.