Short and Long-Term Outcomes from a Multisession Diabetes Education Program Targeting Low-Income Minority Patients: A Six-Month Follow Up

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ABSTRACT

Background: A diabetes self-management education (DSME) program was offered to patients at a primary care clinic serving low-income people.

Objectives: The purpose of the analyses presented here was to understand the feasibility of the program and effectiveness of the intervention.

Methods: The program was facilitated by a nurse and licensed dietician. Data were collected at baseline, after each class, and after 6 months. Patients were interviewed to identify diabetes self-care behaviors before the first class, after the fourth class, and at 6 months. Knowledge related to content areas was measured before and after each class. Glycosylated hemoglobin (HbA1c), blood pressure, weight, and body mass index (BMI) were collected at baseline and after 6 months. Medical records were reviewed for LDL levels, co-morbidity, and diabetes management. Frequencies, $\chi^2$ and $t$ tests, and repeated measures $t$ tests were used to analyze data.

Results: Patients were mostly non-Hispanic black or Hispanic (93.1%); mean BMI was 34.89 kg/m². About one-half (41.95%) completed the program. Significant improvements were observed for knowledge related to each of the 4 content areas: diet ($P < 0.001$), diabetes management ($P = 0.003$), monitoring blood glucose ($P < 0.001$), and preventing complications ($P = 0.001$). Among long-term outcomes, mean HbA1c was significantly reduced (0.82%), from 8.60% to 7.78% ($P = 0.007$), with 26.67% of patients reducing HbA1c from $\geq 7.0$% at baseline to $< 7.0$% at follow up ($P < 0.001$). Patients demonstrated a significant improvement in readiness to improve dietary behaviors ($P = 0.016$).

Conclusions: Outcomes suggested that minority patients with a high risk for poor diabetes outcomes might be retained in a multisession DSME program and benefit from increasing knowledge of diabetes content. Further evaluation is necessary to determine the cost-effectiveness of this intervention. (Clin Ther. 2013;35:A43–A53) © 2013 Elsevier HS Journals, Inc. All rights reserved.

Key words: Diabetes, public health, self-efficacy, education, African American

INTRODUCTION

Minorities in the United States experience disproportionately worse diabetes outcomes than non-Hispanic whites; however, African Americans have a greater risk for diabetes, are more likely than other groups to have worse diabetes outcomes, and are more likely to have poor measures of diabetes control. An important consideration for managing diabetes and preventing complications is that $\geq 95\%$ of diabetes care is accomplished by the patient.

Research on African Americans with type 2 diabetes suggested that internal factors, including lack of self-control and memory failure, represented barriers preventing them from engaging in diabetes self-management. Poor memory and other cognitive challenges have been associated with low health literacy. These intrinsic characteristics, which increase the risk for poor diabetes outcomes among low-income African Americans, suggest that this population has a unique need for interventions that have limited demands on cognitive skills and that are designed to increase intrinsic factors for effectively engaging in diabetes self-management, contributing to improved

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diabetes outcomes, such as knowledge, understanding, and self-efficacy.

Diabetes self-management education (DSME) is recommended by the American Diabetes Association (ADA) for all people with diabetes. The ADA recommends 9 content areas for DSME curricula, including diabetes treatment outcomes, nutritional management, physical activity, medication, self-management, acute and chronic problems, and personal strategies to address psychosocial issues and behavioral change. Self-management education teaches problem solving through enhancing self-efficacy. DSME produces positive long-term outcomes, including reduced morbidity and improved quality of life. Nevertheless, DSME is frequently not accessible to patients with the highest risk for poor diabetes outcomes, which includes low-income, African American, and other minority patients with diabetes and no health insurance or Medicaid. There is little available evidence to provide guidance with regard to whether such an intense program is feasible, given the barriers that are present among this population.

In an effort to increase DSME access to patients in our target population, characterized as low-income African Americans and Latinos who were followed in a community-based primary care clinic affiliated with a tertiary care hospital in an urban environment, we introduced an intensive yet cognitively and culturally appropriate DSME curriculum. The program was aligned with ADA recommendations and facilitated by health care providers in conjunction with other diabetes-centric, patient-centered activities. We report on the feasibility of implementing such a program as well as program outcomes.

METHODS

A curriculum in English and Spanish was developed from the 9 ADA-recommended topics. Other tools included data collection tools adapted with permission from a best practices clinic, Gateway Community Health Center, in Laredo, Texas, and patient education materials in English and Spanish obtained from Healthy-Interactions. A 4-week, 4-class, 12-hour program was designed with 1 class each week, with each class representing a content theme: diet, diabetes management, blood glucose monitoring, and complications. Diabetes support activities were also developed and made available, representing a longitudinal diabetes support program framed by social learning theory. The same staff, fluent in English and Spanish, facilitated both English and Spanish classes, thereby enhancing fidelity to the curriculum. Patient learning was encouraged through a collaborative approach, including use of educational materials and provocative questioning. Referrals for participation in the intervention were received from 4 sources: primary care physicians, an advanced registered nurse practitioner (ARNP), a licensed dietician (LD), and an exercise physiologist. Processes regarding referrals, recruitment, presentation as scheduled, and program completion were tracked to support our inquiry regarding feasibility.

Patient demographic characteristics, clinical measures, self-reported behaviors, and availability of support to manage stress were collected at baseline. Demographic characteristics included birth date, gender, race/ethnicity, preferred language, home language, education, and income. Short-term outcomes included changes in knowledge related to each of the 4 content areas covered: nutrition, diabetes management, monitoring blood glucose levels, and avoiding diabetes complications. Change in knowledge was measured with class-specific tests administered before and after each of the classes. Knowledge scores were calculated as the number of correct responses divided by the number of responses. Changes in knowledge were calculated as post-score minus pre-score for patients who took both pre- and post-tests for a given session.

Long-term outcomes included changes in clinical, physical, and patient-reported outcomes. Clinical and physical measures collected at baseline and 6-month follow up included glycosylated hemoglobin (HbA1c), blood pressure, fasting or random blood sugar levels, and weight and height. Body mass index (BMI) was calculated. LDL cholesterol levels, type of diabetes, comorbidity, and manner in which diabetes was managed was obtained from patient medical records. Patient-reported measures collected at baseline and follow up included changes in general health, medication adherence, readiness to change eating habits, and readiness to change exercise habits. Patient-reported measures were collected with a tool used at Gateway Community Health Center, which was adapted for health literacy. Medication adherence was measured using the 4-item Morisky Medication Adherence Measure. Self-assessed readiness-to-change and general health measures used 5-point Likert scales.
Data from patients for the 32-month period from March 2009, when the program was initiated, through October 2011, were used in these analyses. Statistical analyses were completed with SPSS (version 15.0; SPSS Inc., Chicago, Illinois). Continuous variables were expressed as the mean (SD) and range. Continuous variables were compared using repeated measures \( t \) test. Discrete variables were expressed as counts and percentages, and the \( \chi^2 \) statistic was used to compare proportions. Predictors of intervention completion status were examined using logistic regression. All statistics were 2-tailed, and \( P \) values < 0.05 were considered statistically significant.

Program costs were compared with patient care costs due to diabetes complications, to evaluate potential costs to the health care system for this educational and public health intervention. Program costs were incurred from compensating clinical staff to facilitate classes and administrative staff to support the program. Clinical staff included an ARNP (0.012 FTE [full time equivalent]), LD (0.16 FTE), and LPN (0.125 FTE). Support staff included a research assistant (0.50 FTE), patient access representative (0.19 FTE), and program manager (0.05 FTE). Costs from diabetes complications were based on 2005 estimates from Towers Watson HR Consulting.\(^20\) These estimates were based on potential cost savings, given annual incidence and cost of event, of achieving the ADA quality indicators of HbA\(_{1c}\) <7%, LDL cholesterol <130 mg/dL and <100 mg/dL, and blood pressure <140/90 mm Hg and <130/80 mm Hg. Program costs were derived from estimating the efforts contributed by course facilitators and program staff, and calculating totals of associated salaries and benefits. These evaluations did not include a cost-effectiveness approach.

**RESULTS**

A total of 543 patients were referred from March 2009 to October 2011; 542 were contacted; and 226 were recruited by scheduling them for the first class in the series (43.3% recruitment rate). One hundred seventy-four enrolled by presenting to the first class (77%). Eleven patients became ineligible during the course of the program, and 73 completed the program (41.95% completion rate). The Figure illustrates patient flow.

Most patients were non-Hispanic black (57.5%); 35.6% were Hispanic. The majority of patients were uninsured (35.6%). Physical measures at baseline were as follows: weight, 219.04 (48.41) lbs and BMI, 34.89 (8.03) kg/m\(^2\); 8.2% were in the normal BMI range, 17.8% were in the overweight BMI range, and 74.0% were in the obese BMI range. Mean waist circumference for men was 42.50 (5.5) inches (range, 31.50–55.00) and for women, 42.39 (6.49) inches (range, 27.00–62.00). Average clinical measures at baseline were HbA\(_{1c}\), 8.38% (2.27%), with 60.27% of patients at \( \geq 7.0\% \), indicating uncontrolled diabetes; mean LDL cholesterol was 102.29 (44.55) mg/dL; mean systolic and diastolic blood pressures were 138.42 (21.95) and 81.47 (11.58) mm Hg, respectively; 39.7% of patients had an LDL cholesterol level <100 mg/dL, 16.4% were in the range of 100 to 129 mg/dL, 8.2% were in the 130 to 159 mg/dL range, and 9.6% had LDL cholesterol level \( \geq 160 \) mg/dL. Most patients (82.2%) had high blood pressure at baseline: 60.3% had systolic blood pressure >130 mm Hg, and 45.2% had systolic blood pressure >140 mm Hg. There were no significant differences at baseline between program completers and noncompleters, with the exception of proportions of patients with LDL cholesterol \( \geq 100 \) mg/dL (\( \chi^2 \), 4.86; \( P = 0.027 \)), as illustrated in Table I.

Logistic regression was unable to predict completion status of patients using demographic characteristics and baseline health measures (\( P = 0.149 \)).

Table II shows a significant improvement in diabetes knowledge related to each of the 4 primary concepts. The mean nutrition knowledge score increased from 0.56 to 0.67 (\( t = -3.81; P < 0.001 \)); the mean diabetes management knowledge score increased from 0.58 to 0.69 (\( t = -3.17; P = 0.003 \)); the mean score for the session addressing monitoring blood glucose increased from 0.71 to 0.82 (\( t = -5.80; P < 0.001 \)); and the mean score for the session describing avoiding diabetes complications increased from 0.67 to 0.81 (\( t = -4.59; P < 0.001 \)).

Long-term outcomes are also illustrated in Table II. HbA\(_{1c}\) improved significantly, with a \(-0.82\% \) change, from 8.60% to 7.78% (\( t = 2.82; P = 0.007 \)). LDL cholesterol did not significantly differ comparing baseline with 6-month follow up (101.01 [45.90] mg/dL and 107.45 [39.52] mg/dL, respectively; \( t = -0.76; P = 0.454 \)). Similarly, there were no changes in blood pressure: mean systolic blood pressure was 136.68 mm Hg at baseline and 135.38 mm Hg at follow up (\( t = 1.36; P = 0.721 \)); mean diastolic blood pressure was 80.38 mm Hg at baseline and 81.54 mm Hg at follow-up (\( t = -0.69; P = 0.494 \)). There were no statistically signifi-
Figure. Flow of patient recruitment, engagement, and completion.
cant differences comparing baseline weight with the 6-month follow up ($t$, $-0.08$; $P = 0.933$).

Although participants reported that their general health declined somewhat during the 4-week program, changes were not significant, either at 4 weeks or 6 months ($t$, $-2.97$; $P = 0.007$; and $t$, $0.64$; $P = 0.531$, respectively), as shown in Table II. A similar 4-week trend was observed for medication adherence, from 2.00 at baseline to 2.88 ($t$, $-1.92$; $P = 0.074$). Similarly, there were no significant differences observed comparing baseline with the 6-month measure ($t$, $-0.26$; $P = 0.798$). There were, however, positive long-term differences observed among the 15 patients for whom baseline and follow-up scores were available to compare readiness to change eating behaviors ($t$, $-3.75$; $P = 0.0016$); however, with only 14 pairs available for analysis, there were no differences observed in patients’ self-reported readiness to change exercise behaviors ($t$, $-0.37$; $P = 0.716$).

Characteristics of the group of patients changed when ADA clinical quality indicators were considered at 6-month follow up. There was a statistically significant change in the proportion of patients whose HbA1c level was $\geq 7.0\%$ at baseline compared with follow up; 8 of 30 patients (26.67%) moved from the $\geq 7.0\%$ to $< 7\%$ category ($\chi^2$, 13.42; $P < 0.001$), and 2 patients moved from the $< 7\%$ to $\geq 7.0\%$ category. Similarly, there was a statistically significant change in the proportion of patients whose blood pressure was $\geq 130/80$ mm Hg at baseline compared with $< 130/80$ mm Hg at follow up; 10 of 24 patients (41.67%) moved to the lower category of $< 130/80$ mm Hg at follow up ($\chi^2$, 6.34; $P = 0.012$) compared with 2 of 13 (15.4%) patients who moved to the higher category of $\geq 130/80$ mm Hg at follow up ($\chi^2$, 6.34; $P = 0.012$). Five of 13 patients (38.46%) with LDL $\geq 100$ mg/dL at baseline decreased their levels to $< 100$ mg/dL at follow up; however, 8 of 16 (50%) patients with LDL $< 100$ mg/dL at baseline increased to $\geq 100$ mg/dL at follow up ($\chi^2$, 0.386; $P = 0.711$). Although not statistically significant, there was a clinically important difference from baseline to follow up in the proportion of patients who moved from the LDL cholesterol category of $\geq 130$ to $< 130$ mg/dL ($\chi^2$, 4.49; $P = 0.056$); 2 of 6 (33%) patients had a decrease in LDL cholesterol levels from $\geq 130$ to $< 130$ mg/dL, and 5 of 23 (22%) patients had an increase in LDL cholesterol from $< 130$ to $\geq 130$ mg/dL. Ten of 24 patients (41.67%) with blood pressure $\geq 130/80$ mm Hg at baseline lowered their blood pressure to $< 130/80$ mm Hg at follow up ($\chi^2$, 0.0016).

<table>
<thead>
<tr>
<th>Clinical Measure</th>
<th>Completers (n = 73)</th>
<th>Noncompleters (n = 101)</th>
<th>Test Statistic</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c, mean</td>
<td>8.38</td>
<td>8.81</td>
<td>1.09</td>
<td>0.277</td>
</tr>
<tr>
<td>HbA1c $\geq 7%$, %</td>
<td>44.0</td>
<td>55.0</td>
<td>0.284</td>
<td>0.594</td>
</tr>
<tr>
<td>LDL, mean</td>
<td>102.29</td>
<td>109.48</td>
<td>0.95</td>
<td>0.344</td>
</tr>
<tr>
<td>LDL $\geq 100$ mg/dL, %</td>
<td>25.0</td>
<td>45.0</td>
<td>4.86</td>
<td>0.027</td>
</tr>
<tr>
<td>LDL $\geq 130$ mg/dL, %</td>
<td>13.0</td>
<td>22.0</td>
<td>1.01</td>
<td>0.315</td>
</tr>
<tr>
<td>Systolic BP, mm Hg (mean)</td>
<td>138.42</td>
<td>143.12</td>
<td>1.40</td>
<td>0.164</td>
</tr>
<tr>
<td>Systolic BP $\geq 130$ mm Hg (%)</td>
<td>44.0</td>
<td>69.0</td>
<td>2.17</td>
<td>0.140</td>
</tr>
<tr>
<td>Weight, lbs (mean)</td>
<td>219.04</td>
<td>208.88</td>
<td>-1.27</td>
<td>0.206</td>
</tr>
<tr>
<td>Waist circumference, men, inches (mean)</td>
<td>42.50</td>
<td>41.83</td>
<td>-0.44</td>
<td>0.665</td>
</tr>
<tr>
<td>Waist circumference, women, inches (mean)</td>
<td>42.39</td>
<td>42.70</td>
<td>0.216</td>
<td>0.829</td>
</tr>
<tr>
<td>BMI, kg/m$^2$ (mean)</td>
<td>34.89</td>
<td>34.73</td>
<td>-0.13</td>
<td>0.895</td>
</tr>
<tr>
<td>25.0–29.9, %</td>
<td>13.0</td>
<td>19.0</td>
<td>0.139</td>
<td>0.933</td>
</tr>
<tr>
<td>$\geq 30$, %</td>
<td>54.0</td>
<td>70.0</td>
<td>0.139</td>
<td>0.933</td>
</tr>
</tbody>
</table>

BMI = body mass index; BP = blood pressure; HbA1c = glycosylated hemoglobin.
6.34; P = 0.012), and 2 patients with blood pressure <130/80 mm Hg increased to ≥130/80 mm Hg at follow-up. Further, there was a potentially clinically important reduction in the proportion of patients with blood pressure ≥140/90 mm Hg at baseline, with more than half (10 of 16 patients, 62.5%) decreasing to <140/90 mm Hg at follow-up (χ², 3.48; P = 0.62), and 2 of 16 patients who experienced an increase from <140/90 mm Hg at baseline to ≥140/90 mm Hg at follow up. There were statistically significant changes in the proportions of patients in the obese and overweight BMI categories, with 3 of 36 patients (8.33%) moving from the obese category (BMI ≥30.0 kg/m²) to the overweight category (BMI 25.0–29.0 kg/m²) (χ², 68.87; P < 0.001). Two patients moved upward in BMI categories: 1 patient with a normal BMI at baseline moved to the overweight category at follow-up, and 1 patient with an overweight BMI at baseline moved to the obese category at follow-up. Table III illustrates the contingency tables for group changes.

The program was estimated to cost about $63,000. Given the estimated incidence of diabetes complications, including myocardial infarction, stroke, amputation, retinopathy and end-stage renal disease due to HbA₁c ≥7% and ≥9%, LDL cholesterol ≥100 and ≥130 mg/dL, and blood pressure ≥140/90 and ≥130/80 mm Hg, as shown in Table IV, cost savings among patients were estimated to range from $414 for the 6 patients who reduced LDL cholesterol to <130 mg/dL to $4940 for the 10 patients who reduced blood pressure to <130/80 mm Hg.

DISCUSSION
Nationally, only about half the population of people with diabetes receive DSME.²¹ The local situation is no better; the 2007 Behavioral Risk Factor Surveillance Study, the year before this program was introduced, suggested that 51.4% and 33.3% of the population with diabetes in the state of Florida and Miami-Dade County, respectively, ever had DSME.²² The clinic addressed in this report did not have formal diabetes or chronic disease educational programs available to patients. The program introduced here was part of a larger effort to provide educational, behavioral, and peer support to patients with diabetes in this facility.

We introduced a comprehensive diabetes education and support program, including the formalized approach to diabetes education that was evaluated here, peer education groups, behavioral support groups, and food preparation demonstrations. Patients were not randomized for examining intervention efficacy because evidence supported the contributions of DSME
to improved diabetes outcomes. Instead, this intervention and evaluation were approached from an effectiveness perspective, with the intention of understanding the feasibility and costs of referring, recruiting, enrolling, and retaining patients, considering the severely limited resources and capabilities of the target population, and effectiveness of the intervention by increasing patients’ participation in diabetes self-management.

Completion and attrition rates were 44.51% and 55.49%, respectively, which compared favorably to descriptions of diabetes educational interventions. For example, Gucciardi et al. identified a 75.2% attrition rate among patients with diabetes attending DSME at a diabetes center. The disadvantaged nature of our patient population, a high proportion of whom were unemployed, potentially contributed to a lower attrition rate than found among populations of employed patients. Only 1 patient who had been recruited did not enroll due to a work schedule conflict, and only 1 patient had enrolled but subsequently withdrew, citing a work schedule conflict.

Program data suggested that patients who completed the 4-week intervention demonstrated good short- and long-term outcomes. Short-term outcomes in this case were represented by knowledge changes

<table>
<thead>
<tr>
<th>Measures</th>
<th>Baseline (no.)</th>
<th>Follow Up (no.)</th>
<th>( \chi^2 )</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>within Category</td>
<td>above Category</td>
<td>within Category</td>
<td>above Category</td>
<td></td>
</tr>
<tr>
<td>Glycosylated hemoglobin ( \geq 7% )</td>
<td>14</td>
<td>30</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>LDL cholesterol ( \geq 130 \text{ mg/dL} )</td>
<td>23</td>
<td>6</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>LDL cholesterol ( \geq 100 \text{ mg/dL} )</td>
<td>16</td>
<td>13</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>Blood pressure ( \geq 140/90 \text{ mm Hg} )</td>
<td>7</td>
<td>30</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Blood pressure ( \geq 130/80 \text{ mm Hg} )</td>
<td>13</td>
<td>24</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>Obese from BMI ( \geq 30 \text{ kg/m}^2 )</td>
<td>15</td>
<td>36</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Overweight and obese from BMI ( \geq 25 \text{ kg/m}^2 )</td>
<td>5</td>
<td>46</td>
<td>4</td>
<td>47</td>
</tr>
</tbody>
</table>

\( BMI = \) body mass index.

Table IV. Potential individual patient cost savings from achieving American Diabetes Association (ADA) quality indicators (n = 73).

<table>
<thead>
<tr>
<th>Clinical Measure</th>
<th>ADA Quality Indicator</th>
<th>Savings per Patient if Indicator Achieved</th>
<th>Patients in Sample with Measures Above Criteria at Baseline (no.)</th>
<th>Patients in Sample with Measures Below Criteria at Follow-up (no, %)</th>
<th>Potential Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
<td>&lt;9%</td>
<td>$279</td>
<td>17</td>
<td>8 (47.06)</td>
<td>$2232</td>
</tr>
<tr>
<td></td>
<td>&lt;7%</td>
<td>$248</td>
<td>30</td>
<td>8 (26.67)</td>
<td>$1984</td>
</tr>
<tr>
<td>LDL</td>
<td>&lt;130 mg/dL</td>
<td>$207</td>
<td>6</td>
<td>2 (33.33)</td>
<td>$414</td>
</tr>
<tr>
<td></td>
<td>&lt;100 mg/dL</td>
<td>$369</td>
<td>13</td>
<td>5 (38.43)</td>
<td>$1845</td>
</tr>
<tr>
<td>BP</td>
<td>&lt;140/90 mm Hg</td>
<td>$331</td>
<td>16</td>
<td>10 (62.50)</td>
<td>$3310</td>
</tr>
<tr>
<td></td>
<td>&lt;130/80 mm Hg</td>
<td>$494</td>
<td>24</td>
<td>10 (41.67)</td>
<td>$4940</td>
</tr>
</tbody>
</table>

BP = blood pressure; HbA1c = glycosylated hemoglobin.
based on exposure to the educational intervention. Patients’ knowledge related to the 4 educational concepts improved. With regard to long-term outcomes, program completers demonstrated significant reductions in HbA1c levels, from 8.60% to 7.78%, an 0.82% reduction, nearly twice the 0.43% reduction (P = 0.003; n = 2720 participants) found in a meta-analysis of pooled data that used glycated hemoglobin, HbA1c, or HbA1c measures extracted from 63 randomized educational and behavioral interventions and >3 times the 0.26% reduction at ≥4 months after the intervention (95% confidence interval, 0.05–0.48, n = 1893 participants) found by Norris et al in a 2002 meta-analysis of outcomes from self-management education on glycemic control after ≥4 months. In analyses by Gary et al, programs facilitated by nurses had a 0.71% reduction (P = 0.220), programs facilitated by dieticians had a 0.88% reduction (P = 0.043), and group programs had a 0.70% reduction (P = 0.015). In the analyses by Norris et al, HbA1c was reduced by 0.04% for each hour of contact time, suggesting that 20.5 hours of contact would have been required to achieve the same 0.82% HbA1c reduction that this program achieved in nearly half the time.

The 0.82% reduction in HbA1c level observed here might also be placed into context by examining the HbA1c reduction among individuals participating in the Look Action for Health in Diabetes (AHEAD) trial, a study of 5145 people to examine the long-term effects of an intensive lifestyle intervention (ILI) on weight loss and diabetes outcomes. In Look AHEAD, patients with type 2 diabetes mellitus, aged 45 to 74 years, BMI >25 kg/m², or >27 kg/m² if taking insulin, were randomized into either the ILI or control groups. Participants in the control group received diabetes support and education (DSE), consisting of 3 annual sessions that covered diet, exercise, and emotional support. At 1 year after randomization, participants in the DSE group reduced HbA1c by 0.10%, from 7.3% to 7.2%. The mean HbA1c reduction for participants in the ILI group was 0.70%, from 7.3% to 6.6% (P < 0.001). The HbA1c reduction increased for participants in the DSE group by the fourth year, to 6.94%, for a 0.36% reduction. After 4 years, participants in the ILI group had a mean HbA1c of 7.21%, reflecting a 0.09% reduction. Among the lifestyle behaviors that we measured, patients demonstrated an increased readiness to eat more healthfully—a dimension of living with diabetes that we observed was most prominent among our patients. Limited changes in behaviors related to physical activity might be due to the large proportion of patients who expressed frequent exercise at baseline. Furthermore, only a few patients reported using cigarettes and alcohol at baseline (23.29% and 21.92%, respectively).
At the individual level, maintenance was defined as the long-term effects of a program on outcomes after ≥6 months. The evaluations presented here only included follow-up data at 6 months. Although we continued to accrue outcomes data up to the 12-month anniversary of each patient’s program initiation, our data set was insufficient to allow for meaningful analyses of 12-month follow-up measures, representing 1 important limitation of these analyses. Another limitation regarding the long-term effects of this program was the missing data at 6 months and implications regarding validity. Therefore, conclusions drawn from these data must be considered carefully.

FROM AN INSTITUTIONAL ASSESSMENT, MAINTENANCE WAS RELIANT LARGELY ON AVAILABILITY OF FUNDING AND COMMITMENT TO SUPPORT A CHRONIC DISEASE SECONDARY PREVENTION PROGRAM—RECOGNITION THAT SECONDARY PREVENTION WAS LIKELY TO OFFSET THE COSTS OF MANAGING COMPLICATIONS OF DIABETES. USING PUBLISHED COST DATA, WE ESTIMATED A THEORETICAL SAVINGS OF $414 TO $4940 TO THE HEALTH CARE SYSTEM PER PATIENT FOR MOVING PATIENTS TO AT LEAST 1 LOWER CATEGORY OF THE 7 ADA QUALITY CRITERIA. IT WAS NOT FEASIBLE TO DISCERN THE TOTAL COST SAVINGS FROM THIS PROGRAM USING THESE COMPARATOR DATA; THEREFORE, CALCULATING COST EFFECTIVENESS AND A FULL COST-EFFECTIVENESS STUDY WERE BEYOND THE SCOPE OF THIS PROGRAM EVALUATION. THIS LIMITATION WAS AN IMPORTANT CONSIDERATION THAT PREVENTED MEANINGFUL CONCLUSIONS TO BE DRAWN WITH REGARD TO THE COST–BENEFIT RATIO. NEVERTHELESS, MAJOR LANDMARK TRIALS, INCLUDING THE DCCT AND THE UNITED KINGDOM PROSPECTIVE DIABETES STUDY, DEMONSTRATED THAT A 1% REDUCTION IN ABSOLUTE GYRATED HEMOGLOBIN LEVELS AMONG PATIENTS WITH TYPE 1 DIABETES REDUCED MICROVASCULAR COMPLICATIONS BY 30% TO 35%. OUTCOMES FROM THE ANALYSES PRESENTED HERE DEMONSTRATED HbA1c REDUCTIONS THAT APPROACHED 1%, SUGGESTING IMPORTANT REDUCTIONS IN RISKS FOR MICROVASCULAR COMPLICATIONS. THOSE COMPLICATIONS WOULD POTENTIALLY TRIGGER SIGNIFICANT COSTS TO THE HEALTH CARE SYSTEM THAT IS RESPONSIBLE FOR THESE UNINSURED PATIENTS, FROM INCREASED UTILIZATION OF THE AMBULATORY CLINIC, EMERGENCY DEPARTMENT, PATIENT ADMISSIONS TO THE HOSPITAL, AND PHARMACY AND OTHER SERVICES. OTHER COSTS INCURRED BY THE COUNTY GOVERNMENT, WHICH MANAGES THIS HEALTH CARE SYSTEM AND IS RESPONSIBLE FOR THIS HEALTHCARE FACILITY, WOULD BE TRIGGERED BY SIGNIFICANT REDUCTIONS IN QUALITY OF LIFE, STRESSORS ON HOUSEHOLD MEMBERS, AND WIDER IMPLICATIONS FOR THE MICROCOMMUNITY IN WHICH THESE HEALTH CARE SYSTEM PATIENTS LIVE. FURTHERMORE, THERE ARE POTENTIAL PosITIVE PRIMARY PREVENTION CONTRIBUTIONS TO THE COMMUNITY, BY EMPOWERING DSME PATIENTS WHO ALSO MIGHT SERVE AS TEACHERS AND ROLE MODELS FOR HOUSEHOLD MEMBERS, FAMILY MEMBERS, CHURCH MEMBERS, AND OTHER COMMUNITY PEERS, AS A NUMBER OF PATIENTS HAVE GONE ON TO DO.

CONCLUSIONS

THE POPULATION OF PATIENTS WITH DIABETES AT THIS COMMUNITY-BASED CLINIC AFFILIATED WITH A TERTIARY CARE HOSPITAL IN AN URBAN ENVIRONMENT, WHICH SERVES A COMMUNITY THAT HAS A PREDOMINANTLY NON-HISPANIC BLACK POPULATION, HAD LIMITED ACCESS TO ADA STANDARDS OF CARE REGARDING DSME. THE CURRICULUM THAT WAS INTRODUCED, WHICH WAS ALIGNED WITH THE ADA RECOMMENDATIONS FOR DSME PROGRAMS, CONTRIBUTED TO SIGNIFICANT IMPROVED KNOWLEDGE ABOUT DIABETES, SIGNIFICANT IMPROVEMENTS IN HbA1c LEVELS, SOME IMPROVEMENTS IN WEIGHT BY MOVING SOME PATIENTS FROM THE BMI CATEGORIES OF OBSE to OVERWEIGHT, AND SOME IMPROVEMENTS IN BLOOD PRESSURE BY MOVING SOME PATIENTS FROM THE BLOOD PRESSURE CATEGORY OF ≥130/80 TO <130/80 mm Hg. NO PATIENT-REPORTED MEASURES SUGGESTED CHANGES AT THE 6-MONTH FOLLOW UP, WITH THE EXCEPTION OF READINESS TO CHANGE EATING BEHAVIORS. THE PROCESSES ASSOCIATED WITH ENROLLMENT AND RETENTION SUGGESTED THAT A PROGRAM OF THIS NATURE WAS FEASIBLE FOR THIS PATIENT POPULATION; WE ATTRIBUTED THE POSITIVE RATES TO THE PATIENT-CENTERED CHARACTERISTICS OF THE CURRICULUM, FORMAL PROTOCOLS FOR MANAGING THE PROGRAM, AND THE PERSONNEL WHO WERE WELL TRAINED AND ACUTELY SENSITIVE TO THE MULTIFACTORIAL NEEDS OF THIS HIGH-RISK PATIENT POPULATION.

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