DOI: 10.1111/dme.12374

Short Report: Care Delivery

Does a 2.5-year self-management education and support intervention change patterns of healthcare use in African-American adults with Type 2 diabetes?

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Accepted 17 November 2013

Abstract

Aims To investigate the impact of a 2.5-year diabetes self-management education and support intervention on healthcare use and to examine factors associated with patterns of healthcare use.

Methods We recruited 60 African-American adults with Type 2 diabetes who completed a 2.5-year empowerment-based diabetes self-management education and support intervention. Primary healthcare use outcomes included acute care visits, non-acute care visits and days lost to disability. Acute care was a composite score calculated from the frequency of urgent care visits, emergency department visits and hospitalizations. Non-acute care measured the frequency of scheduled outpatient visits. To examine change in patterns of healthcare use, we compared the frequency of healthcare visits over the 6-month period preceding the intervention with that in the last 6 months of the intervention.

Results No significant changes in patterns of healthcare use were found for acute care, non-acute care or days lost to disability. Multiple regression models found higher levels of depression ($P = 0.001$) to be associated with a greater number of non-acute healthcare visits, and found longer duration of diabetes ($P = 0.019$) and lower levels of diastolic blood pressure ($P = 0.025$) to be associated with fewer days lost to disability.

Conclusions Participation in a long-term diabetes self-management education and support intervention had no impact on healthcare use in our sample of African-American subjects.

Diabet. Med. 31, 472–476 (2014)

Introduction

Not only are racial disparities evident in diabetes-related morbidity and mortality, but also in use of healthcare services. Compared with their white counterparts, African-American people with diabetes are more likely to make emergency department visits [1,2], seek emergency care inappropriately [3] and have preventable hospitalizations [3–5], and are less likely to make ambulatory care visits [6], have a usual source of care [1] and order prescription refills [6]. African-American people also report higher rates of diabetes-related work disability [7].

While numerous systematic reviews and meta-analyses have found diabetes self-management interventions to be associated with improved clinical, behavioural and psychosocial outcomes [8–15], only a small number of investigations targeting the African-American population have examined healthcare use as an endpoint of interest [16–19]. These studies have found self-management interventions to be associated with fewer emergency department visits [16–19], fewer and shorter hospitalizations [16,18,19] and fewer missed workdays [19]. Only one has examined the impact of a long-term (vs short-term) diabetes self-management intervention on healthcare use outcomes, with patients recruited through a managed care organization [9]. To our knowledge, there are no studies that address this same question with African-American patients recruited directly through the community.

For this reason, the primary objective of the present study was to compare healthcare use outcomes in the 6-month period preceding the 2.5-year diabetes self-management education and support intervention with those in the last 6 months of the intervention. The secondary objective was to identify any demographic and clinical predictors of patterns of healthcare use.

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What's new?

- This is one of only two studies examining healthcare use as an outcome of a long-term self-management education and a support intervention targeting African-American adults with Type 2 diabetes.
- Participation in a 2.5-year diabetes self-management education and support intervention has no impact on acute care visits, non-acute care visits or days lost to disability.
- Depressive symptomatology is a significant predictor of non-acute healthcare use.
- Duration of diabetes and diastolic blood pressure are significant predictors of days lost to diabetes-related disability.

Patients and methods

The present study was approved by the institutional review boards at the University of Michigan and the University of British Columbia and is part of a larger study examining the health impact of the Lifelong Management programme (i.e. a 2.5-year-long diabetes self-management education and support intervention) on clinical, self-care and psychosocial outcomes [20]. Briefly, the present study was a single-cohort, time-series design that prospectively followed 60 African-American participants with Type 2 diabetes (who completed the intervention) in Ypsilanti, MI, USA from 2005 to 2009.

Participants were recruited (2005–2006) from the community via newspaper advertisements, community flyers, health centres and invited presentations at churches with a large African-American membership. To be eligible for participation, subjects had to be ≥ 40 years of age, have a diagnosis of Type 2 diabetes for at least 1 year, have received structured diabetes education in the past 3 years, and be under the care of a physician. Individuals who were unable to attend the orientation or group sessions because of physical limitations (they were home-bound) or other comorbid conditions were excluded from participation.

Lifelong Management programme

Lifelong Management is a 2.5-year intervention that started with a 6-month low-intensity self-management education component, where participants and their self-identified diabetes care provider received clinical feedback and participants also received weekly educational newsletters [14]. The clinical feedback was sent in a diabetes risk profile and included results for HbA_{1c}, LDL, HDL, total cholesterol, systolic and diastolic blood pressure and BMI. Participants' laboratory values were highlighted if they fell outside the target range. Recommendations (e.g. exercising, eating less fat, eating more fibre) on how to reach the target range were also provided. The weekly educational newsletters addressed the nine core diabetes education topics (e.g. diabetes disease process, healthy eating, chronic complications) defined by the National Standards of Diabetes Self-Management Education [21].

The next 24 months continued with a high-intensity diabetes self-management support component consisting of weekly group-based 75 minute support sessions (75-min in length) co-facilitated by a certified diabetes educator and a clinical psychologist. The support component was designed based on patient empowerment principles which emphasize that: (1) patients (not providers) make the majority of daily self-management decisions; (2) behaviour change is more likely to be initiated and sustained if self-management goals are patient-selected (vs provider-selected); and (3) providers serve as consultants to patients who make the ultimate informed decisions [22]. Rather than being guided by a rigidly structured and provider-centered curriculum, therefore, discussion topics were driven entirely by patients' questions, concerns and priorities.

While the content of discussions was patient-directed, the sessions followed a general, yet fluid process where facilitators encouraged participants to: (1) discuss recent self-management experiences; (2) share thoughts and feelings associated with these experiences; (3) ask self-management questions; (4) engage in group-based problem-solving; and (5) set behavioural goals and develop action plans. For example, a group session might start with a participant telling the group that he/she woke with an unusually high blood sugar. The facilitators would then encourage the participant to share his/her feelings about this situation. Participants would be invited to ask relevant self-management questions such as how to treat high or low blood sugar. After the participant-initiated discussion on short-term complications, the facilitators would encourage the group to generate solutions (if appropriate) to the participant's problem. Finally, at the end of the session, facilitators would assist participants with identifying a self-management goal for the week. To accommodate differing schedules, sessions were offered in the morning and afternoon. Participants were encouraged to attend sessions as frequently as they felt they needed or were able to given their life circumstances.

Measures

Healthcare use was measured with self-report questionnaires administered via telephone interview every 3 months. It is important to note that healthcare use for the 6 months preceding the 2.5-year intervention were assessed retrospectively in the baseline questionnaire. We categorized healthcare use into three outcomes: acute care, non-acute care and days lost to disability. Because of the low frequency of

hospitalizations and/or emergency department visits over the 6-month periods being compared, acute care was calculated as a composite score of urgent care visits, emergency visits and hospitalizations and assessed using the following questions: 'During the past 3 months, how many times have you had urgent care visit(s)'; 'During the past 3 months, how many times have you had emergency room visit(s)?'; 'During the past 3 months, were you a patient in a hospital overnight?'; and 'If yes, how many times in the past 3 months did you stay in the hospital overnight?'

Non-acute care consisted of scheduled outpatient appointments and was assessed using the following question: 'During the past 3 months, how many times have you had regularly scheduled outpatient visits?' Days lost to disability was reported within a 4-week window and was assessed with the following question: 'During the past 4 weeks, how many days have you lost from school, work or household activities due to illness or injury?'

Demographic variables were self-reported and included age, years since diagnosis, gender, marital status, education, household income, employment and insurance coverage. Clinical variables included HbA_{1c}, LDL, HDL, total cholesterol, blood pressure (systolic and diastolic), BMI and weight. HbA_{1c} and lipid panel were obtained via venous puncture. The HbA_{1c} method used over the course of the study was the Tosoh G7 analyser (normal range: 3.8 – 6.4%; Tosoh Bioscience Inc., San Francisco, CA, USA) and is certified by the National Glycohemoglobin Standardization Programme; therefore, the results are comparable with those from methods used in the Diabetes Control and Complications Trial. In addition, the laboratory used for the study remained the same over the study period. Blood pressure was measured using an Omron automatic blood pressure monitor (Commonhealthcare, Lake Forest, IL, USA). Depression, diabetes empowerment, and diabetes-related distress were also self-reported and assessed using the Patient Health Questionnaire-9 [23]. Diabetes Empowerment Scale-short form [24], and Diabetes Distress Scale [25], respectively.

Statistical analyses

Due to the skewed distribution of the variables, Wilcoxon signed-rank tests were used to compare healthcare use during the 6 months preceding the 2.5-year intervention with healthcare use in the last 6 months (i.e. the last 6 months of the 2.5-year intervention) of the Lifelong Management programme. Parametric and non-parametric correlational analyses were used to identify likely baseline demographic, clinical and psychosocial predictors in determining healthcare use. Variables that were significantly associated with patterns of healthcare use were then entered into three separate multiple regression analyses for acute care use, non-acute care use and days lost to disability.

Results

Characteristics of sample at baseline

At baseline, 89 participants were enrolled into the study and 60 participants completed the 2.5-year intervention yielding an attrition rate of 33%. The mean age of the sample ($n = 60$) was 62 years, the mean time since diagnosis was 12 years, 70% of the sample were women, 80% were retired,70% had post-high school education, and 36% reported a household income of ≤ $20,000. At baseline, the mean HbA_{1c} concentration was 64 mmol/mol (8.0%), the mean (SD) LDL concentration was 2.56 (0.86) mmol/L, the mean (SD) HDL concentration was 1.34 (7.3) mmol/L, the mean (SD) systolic blood pressure was 136.9 (17.5) mm/Hg, the mean diastolic blood pressure was 80.0 (10.6) mm/Hg, the mean (SD) BMI was 34.5 (7.3) kg/m^2; and the mean (SD) weight was 94.0 (20.0) kgs. In all, 27% of the subjects ($n = 16$) reported using insulin with a mean duration of insulin use of 12.5 years, and 77% ($n = 46$) reported taking oral agents with 13% ($n = 6$) of those participants also among the insulin users. A total of 75% ($n = 45$) of the subjects reported taking cholesterol medication and 85% ($n = 51$) reported taking blood pressure medication.

Healthcare use

No significant differences in acute care use, non-acute care use or days lost to disability were found between the 6 months preceding the intervention and the last 6 months of the intervention, although the difference in non-acute care use approached significance (Table 1).

Predictors of healthcare use

To identify which predictors to include in the regression models, we first conducted bivariate correlations between potential predictors (clinical, demographic, psychosocial variables) and healthcare use outcomes (acute care, non-acute care, days lost to disability). Variables found to be significantly associated with healthcare use outcomes would then be entered as predictors into separate regression models for acute care, non-acute care and days lost to disability.

No clinical, demographic or psychosocial variables were associated with acute care use. A significant regression model emerged (adjusted $R^2 = 0.250$) for non-acute care (Table 2). The only significant predictor for non-acute care was depression. Participants with higher levels of depression reported a greater number of non-acute healthcare visits. A significant model emerged (adjusted $R^2 = 0.212$) for days lost to disability. Significant predictors included the duration of diabetes and diastolic blood pressure (Table 2). Participants who had been diagnosed with diabetes for a longer duration

Table 1 Measures of healthcare use before and at the end of the Lifelong Management programme

Healthcare utilization	6 months pre-intervention Mean (SD)	Last 6 months of intervention Mean (SD)	*P*
Number of non-acute care visits	3.02 (2.66)	3.88 (2.88)	0.051*
Number of acute care visits	0.93 (2.69)	0.98 (2.65)	0.833
Number of urgent care visits	0.17 (0.53)	0.03 (0.18)	0.070
Number of emergency room visits	0.48 (1.30)	0.47 (1.39)	0.811
Number of hospitalizations	0.28 (1.12)	0.48 (1.31)	0.223
Number of days lost to disability in past month	1.64 (5.181)	1.35 (3.26)	0.550

*The difference in non-acute care visits approached significance.

Table 2 Predictors of non–acute care use and days lost to disability

Outcome variable	Predictor variable	Mean	SD	β	*P*
Non–acute care utilization	Age	63.2	9.74	0.002	0.988
	Education (categorical)	–	–	−0.0288 to 0.107	0.290 to 0.982
	Depression score*	5.64	5.54	0.463	0.001
Days lost to disability	Years since diagnosis at baseline	12.1	11.7	−0.317	0.019
	Diastolic blood pressure	80.0	10.9	0.301	0.025
	Depression score	5.30	5.33	−0.208	0.116
	Diabetes empowerment score	3.92	0.85	−0.044	0.737

*Higher scores indicate greater symptom severity.

and had lower diastolic blood pressure reported fewer days lost to disability.

Discussion

Although the Lifelong Management programme was associated with initial and sustained clinical and self-care improvements [20], the present study shows that this intervention had no impact on patterns of healthcare use. These results contradict the study by Gary *et al.* [16], which found a significant decline in emergency room visits after a 2-year nurse case manager and community health worker team intervention (conducted within a managed care organization system) compared with a control group. Unlike the Lifelong Management intervention, that study involved nurse case managers who provided one-on-one clinical support and community health workers who made home visits over a period of 2 years. It is likely that an intervention deployed within a healthcare system and designed with a peer support component offers greater treatment intensity and thereby exerts a greater influence on healthcare use outcomes; however, in the present study, no significant associations were found between attendance rate (i.e. treatment intensity) and healthcare use outcomes.

While the present study identified depression as a significant predictor of non-acute care use, Husaini *et al.* [26] found depressive symptoms to be correlated with a threefold increase in acute care use (emergency room visits and inpatient hospitalizations) among African-American patients with Type 2 diabetes. Although these findings are inconsistent, both studies support the larger body of research highlighting the negative impact of diabetes and depression on health and healthcare-related outcomes, including treatment adherence [27], cost [28] and mortality [29].

Several limitations of the present study should be noted. Because this community-based study recruited patients from different healthcare systems, rather than using administrative data we relied on self-report data, which is subject to recall bias and inaccuracy. To reduce potential inaccuracies, we asked participants to report healthcare use behaviour over a period of 6 months rather than over an entire year. It is possible that 6 months does not provide enough time to capture differences in behaviours such as emergency visits, hospitalizations and scheduled outpatient appointments. In fact, our results found non-acute care visits to increase in the last 6 months of the intervention; however, this difference only approached significance ($P = 0.051$). Possibly, with a larger sample size and a longer evaluation interval, we would be able to detect significant differences it they existed.

Healthcare use is an important outcome to evaluate as it has clear implications for the cost-effectiveness of interventions. To identify the specific intervention components or mechanisms that influence patterns of use, subsequent studies targeting the African-American population need to include measures of healthcare use as a requisite endpoint.

Funding sources

The study was supported by a K23 patient-oriented career development award from National Institutes of Health, K23DK068375, National Institutes of Diabetes and Digestive and Kidney Disease (NIDDK) and by a grant NIH P60

DK20472 from the NIDDK. The British Columbia Endocrine Research Foundation provided financial support for the analyses in this study.

Competing interests

None declared.

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