Improved outcomes in diabetes care for rural patients of African descent

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Abstract

Introduction: Patients of African descent with rural low-income diabetes have traditionally worse clinical outcomes and limited access to state-of-the-art diabetes care.

Objective: to evaluate the effects of an intervention in diabetic patients.

Methods: The study evaluated the effects of the intervention on intermediate and long-term changes in glycosylated hemoglobin levels (hemoglobin A1c), blood pressure and lipid levels.

Results: intervention patients had a significantly greater reduction in mean hemoglobin A1c levels at the intermediate level.

Conclusion: Redesigning care strategies in rural fee-for-service primary care practices for patients of African descent with established diabetes results in significant values.

Keywords: diabetes mellitus, intervention, African descent, source glycosylated hemoglobin: DeCS

Resumen

Introducción: Los pacientes afrodescendientes con diabetes de bajos ingresos rurales tienen resultados clínicos tradicionalmente peores y acceso limitado a atención diabética de última generación.

Objetivo: evaluar los efectos de una intervención en pacientes diabéticos.

Métodos: evaluamos los efectos de la intervención en los cambios intermedios y a largo plazo en los niveles de hemoglobina glucosilada (hemoglobina A1c),la presión arterial y los niveles de lípidos .

Resultados: los pacientes de intervención tuvieron una reducción significativamente mayor en los niveles medios de hemoglobina A1c en el nivel intermedio

Conclusión: El rediseño de las estrategias de atención en las prácticas rurales de atención primaria de pago por servicio para pacientes afrodescendientes con diabetes establecida da como resultado valores significativos.

Palabras clave: diabetes mellitus, intervención, afrodescendientes, hemoglobina glucosilada fuente: DeCS

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Introduction

Improving blood glucose and blood pressure control in patients with diabetes significantly reduces morbidity and mortality; however, many patients, particularly rural minority patients, do not achieve these recommended levels of care(1). Some authors found that rural beneficiaries of programs with diabetes mellitus reported fewer physician visits than urban patients, while others have shown that low-income rural patients with diabetes are more likely to receive care from a primary care physician than from a specialist(2,3).

In studies in the United States and Canada, diabetes care in rural areas is inadequate relative to the standards described by the American Diabetes Association (ADA) and is often of lower quality than in urban settings(1,3–9). In studies of rural populations, hyperglycemia was also less well-controlled; furthermore, in rural diabetic patients, control of blood glucose and blood pressure in patients with diabetes results in significant reductions in morbidity and mortality(10,11). However, many patients, particularly rural minority patients, do not achieve these recommended levels of care.

In a Cochrane Collaboration systematic review of 41 studies with 48,000 patients, the authors describe the effectiveness of health professional-led, organizational change, and patient-centered interventions. Patient's hemoglobin A1c levels decreased significantly with a redesigned practice, but not in usual care settings. Most studies, however, have been conducted in urban prepaid or managed care settings involving primarily white patients(12).

The system redesign techniques recommended in the Chronic Care Model for adoption in primary care have limited evaluation in rural, fee-for-service primary care practices with substantial minority and low-income populations(13).

Finally, most studies have examined only brief long-term outcomes, and more research is needed on long-term outcomes(10, 11,13–17). Therefore, a redesigned care model was implemented in fee-for-service primary care practices to offer interprofessional care management for patients of African descent with type 2 diabetes to determine its effectiveness on their mid- and long-term glycemia, blood pressure, and lipid levels compared with patients receiving usual care in similar management practices(18).

Method

A quasi-experimental study was conducted to evaluate the effectiveness of a primary care practice redesign that included an investigator-led care management intervention similar to the health coaching requirements described for patient-centered medical homes. There are 6 key elements to the intervention design: education with behavioral counseling, treatment intensification, point-of-care management, expanded clinical staff roles to facilitate the management, a team approach to care, and physician leadership. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

All study practices were located in rural counties. In the intervention group, we purposively selected 3 rural primary care practices in Esmeraldas province, where people of African descent traditionally have a poor clinical outcomes, as described above. All adult patients of African descent with type 2 diabetes received point-of-care diabetes care management that included education, self-management training, and medication adjustment by a team consisting of a nurse case manager, pharmacist, and dietitian.

Intervention clinics were purposely selected because of local funding requirements and staff willing to participate in diabetes quality improvement training and because senior leadership dedicated time and resources to improve clinical outcomes.

Patients with recent-onset type 2 diabetes mellitus or who had a hemoglobin A1c level greater than 7.5% were scheduled to be seen by one of the care managers. Clinical targets in the intervention practices included reducing elevated hemoglobin A1c levels to 7.5%, blood pressure to less than 140/90mmHg, and low-density lipoprotein (LDL) cholesterol levels to less than 100mg/dL. These pragmatic targets were selected because many of these patients were older, had multiple comorbidities and long-standing diabetes, and because data have shown that patients of African descent have higher hemoglobinA1c values than white or Native American-descended populations.

The redesigned model encouraged diabetic patients in interventional practices to be scheduled on specific days when the additional care manager was in practice. As a result, each patient was seen on average four times over a 12-month period by the nurse, pharmacist, or dietitian care manager for 30 to 60 minutes as part of and in addition to the traditional physician (i.e., point-of-care) visit. Subsequently, the care manager saw the patient every 3 to 6 months as part of the physician visit for an additional two years.

During these visits, care managers used a behaviorally focused coaching strategy to overcome psychosocial and environmental barriers to behavior change through a strong, culturally relevant focus on emotional, cultural, and social factors related to eating, activity, and medications. For example, when a patient's hemoglobin A1c level was above 7.5%, the pharmacist and nurse caregiver, in collaboration with the primary care physician, increased the patient's medication regimen, including the dosage of current medications and the initiation of new oral medications or insulin.

A comparison group of patients consisted of Adults of African descent with type 2 diabetes receiving usual care from their regular physicians in 5 rural control practices. Practices were selected by stratified randomization from a sampling frame of similar regional practices and patient characteristics (e.g., race and age). The usual care provided in the control clinics was a billable clinic visit to a physician, nurse practitioner, or physician assistant, but these physicians did not provide point-of-care self-care training or a health coach-educator.

Routine care visits lasted an average of 15 minutes and included standard measurements of hemoglobin A1c levels, blood pressure, and lipid levels. Medications, including insulin, were prescribed and adjusted according to the physician's sole clinical judgment. In addition, educational pamphlets on diabetes were frequently provided.

To assess the impact of an intervention or usual care in each of the 8 practices, a biostatistician, using a review of billing and electronic health records, assigned a unique numeric identifier to patients of African descent with type 2 diabetes and a sample of patients was obtained using a computer-based random number generator. Then, unblinded staff collected the following patient data at baseline,18 months (intermediate), and 36months (long-term): demographic characteristics (age, sex, duration of diabetes); height, weight, and blood pressure using standard procedures; and blood samples obtained by venipuncture and measured in the hospital laboratory using standard laboratory procedures for total cholesterol, LDL and high-density lipoprotein (HDL), and glycemic control (hemoglobinA1c).

Descriptive statistics (means and t-tests for continuous variables) were used to characterize the demographic characteristics of study patients and diabetes-specific outcomes at baseline. The study design used an intention-to-treat analysis; for patients who did not complete the study in both arms, the investigators carried forward the last observation for data analysis.

Hemoglobin A1c level data were further analyzed using a linear mixed modeling strategy to examine the overall impact of the composite intervention on the change in hemoglobin A1c levels in patients in the intervention practice relative to patients in the control practice using baseline values as a covariate. The mean change in hemoglobin A1c levels; systolic blood pressure; and total, LDL, and HDL cholesterol levels were calculated. The means of intervention and control outcomes were compared in univariate analyses using t-tests for independent samples. The number and percentage of patients who achieved the goals (defined above) were also calculated at baseline and at the interim and final assessments, each of which was compared.

The database and statistical processing of the data were performed and analyzed in the statistical program SPSS 26 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

Seven hundred twenty-seven randomly selected patients of African descent with established type 2 diabetes mellitus signed an informed consent statement and were enrolled in this study, including 368 intervention practice patients and 359 control practice patients.

Approximately 5% of the patients approached refused to participate in the study. A total of 25 patients in the intervention practices and 26 in the control practices did not complete the study. The dropouts were primarily due to patients moving out of the area.

There were no statistically significant differences between patients in the intervention and control practices in demographic characteristics or mean clinical parameters at baseline. The mean age was 59.5 years (SD=12.0years) for intervention and 60.6 years (SD=12.4 years) for control patients; 66% of intervention patients and 63% of control patients were female, and the mean duration of diabetes for intervention patients was 13 years (SD=6.4 years), and for control, patients were 11 years (SD=7.2 years).

Baseline characteristics and mean changes in hemoglobin A1c, blood pressure and lipid values from baseline to interim (median 18 months) and long-term follow-up (median 3, 3 years) are given in Table 1.

Table 1 compares baseline values and mid- and long-term changes in clinical outcome measures of intervention and control practice patients.

Clinical parameters	Control practice (n=359 patients)					
	Base	18 months	36 months	Base	18 months	36 months
Hb A1c	7,9	7,7	7,8	7,9	7,4	7,4
More than 7.5	134	170	165	164	189	146
Less than 7.5	106	114	117	132	135	69
Mean arterial pressure	138	139	140	135	140	135
LDL cholesterol mg/dl	101	99	97	105	95	99
HDL cholesterol mg/dl	50	51	50	50	50	52
Total cholesterol mg/dl	176	177	170	182	171	176

Source: statistical analysis, $p \leq 0.05$

The mean values for hemoglobin A1c in each group were similar at baseline and above the target values recommended by the American Diabetes Association.

Discussion

In a study of primary care practices based in rural communities with high rates of poverty and with high-risk African descendants with well-established type 2 diabetes and traditionally poor outcomes, it was found that redesigning diabetes care to incorporate interprofessional care management results in significant outcomes. In addition, it significantly improves medium- and long-term glycemic control. These findings are consistent with other researchers[19,21].

The reductions in hemoglobin A1c levels were modest but are close to those observed in other studies and suggest the potential for improved long-term microvascular and macrovascular outcomes[20].

Modest improvements were also observed in the proportion of patients with a systolic blood pressure of less than 140 mmHg and small but significant changes in mean LDL and HDL cholesterol levels. These results are similar to those of the multifactorial intervention in the Steno-2 study, which was associated with significant reductions in mortality and microvascular and macrovascular outcomes. Furthermore, because visit frequency was not a significant independent predictor, the improvement in clinical outcomes may be related to improvements in visit intensity and quality, specifically at the point of care, which has important implications for healthcare reform[22].

This study involved only rural African descendants, a group previously shown to have significant challenges in access to care and poor clinical outcomes. Practices serving these large patient populations represent fragile care settings, as they are often the only sources of care and have limited clinical staff[5]. However, the redesign study shows that diabetes care can be effectively managed even in resource-limited settings.

The strategy suggests that a portion of chronic diabetes management can be achieved with an interprofessional team, which may make physicians more available for acute problems. The findings should be viewed as preliminary evidence suggesting the efficacy of an interprofessional setting similar to a patient-centered medical home[11, 13,14].

In conventional care, diabetic patients are referred. However, this study has several limitations. Some improved outcomes may have resulted from the intentional selection of intervention sites that required quality improvement training and a commitment to leadership. These elements, however, may be a prerequisite for successful team-based care management initiatives. In addition, control sites were randomly selected from practices with similar patient and practice characteristics and from the same regional setting, which included systemic efforts driven by national and state initiatives to improve diabetes care among federally funded centers and clinics[1,9].

Conclusions

In the study, a complex, multicomponent intervention was incorporated, and the study was not designed, powered, or funded to separate the relative contributions of various components. Still, the findings were similar to those of other investigators using interventions focused on care management, suggesting that the redesign strategy is beneficial.

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