Practice-Based Interventions to Improve Health Care for Latinos with Diabetes

G. Dean Cleghorn, EdD; Meeta Nguyen, MD, MPH;
Blair Roberts, MD, MPH; Gilda Duran, MS;
Trinidad Tellez, MD; Migna Alecon

This study examined diabetes-related health disparities in a Latino population in terms of prevalence of the disease, and the extent to which practice-based interventions improve health care and health for the Latinos who have diabetes. Previous research has shown that Latinos, overall, are at greater risk for diabetes, but less is known for those of Puerto Rican and Dominican origin.

Two interventions were implemented in a large primary care practice: an ADA-recognized Diabetes Self Management Education program, and clinical information feedback loops to providers regarding adherence to the Massachusetts Guidelines for the Care of Diabetes.

The study identified the prevalence of diabetes to be 13.7% among Puerto Ricans, and 9.1% among Dominicans, rates 2-to-3 times that for the general population. Latino patients (N=567) who participated in a Diabetes Self Management Education Program maintained lower Hb A_{1c} values than did a comparison group (N=432). For a random sample of Latinos with diabetes (N=98) in this study, 6 measures of health care improved significantly from 2001 to 2003. Areas of improvement among healthcare providers were: ordering a microalbumin level measurement when appropriate, prescribing ACE inhibitors as needed, providing pneumococcal and influenza vaccines, reviewing activity status and exercise, identifying smoking status, and prescribing lipid-lowering agents, as appropriate. Body mass index (BMI) for the 98 patients remained the same for both measurement periods at 32.8.

Although this initial study spanned only 2 years, improvements in health care and health indices for the population are encouraging. Further study is underway to expand on these gains. (*Ethn Dis.* 2004;14[suppl 1]:S1-119–S1-123)

Key Words: Community-Based Interventions, Diabetes, Disparities, Latinos

Introduction

This study examined diabetes-related health disparities in a Latino population in terms of prevalence of the disease, and the extent to which practice-based interventions improve health care and health for Latinos with diabetes.

Using a variety of parameters, previous data demonstrate that Latinos have disproportionately adverse health outcomes, compared to non-Latino White populations.[1] It is clear that Latinos are more likely to have diabetes.[2–5] In the statewide reference group for this study, the prevalence of diabetes among Latinos was 5.4%, while the prevalence for non-Latino Whites was 3.8%.[6] A similar gap existed nationwide among Latinos, with a 9.0% prevalence, vs 7.2% in non-Hispanic Whites.[7,8] One study found the prevalence of type 2 diabetes among Puerto Rican and Dominican elders to be 38.3% and 34.5%, respectively, vs 23% in their non-Hispanic White counterparts.[4]

Latinos may have a biological or cultural predisposition toward diabetes. Recent data analysis from the NHANES III, however, indicates that 91% of incidence of type 2 diabetes is preventable with lifestyle modification; clearly, genetics is only a small part of the story.[2] The modifiable risk factors that seem to be most important are an individual's weight, exercise level, and diet.[9–11]

Although more research in this area has been conducted among the Mexican-American population than with Caribbean Latinos, early data indicate an unfavorable disparity for all Latino groups. Nationally, Latinos have a 23.7% prevalence of obesity, compared to 19.6% for Whites.[7] Latinos reportedly obtained the greatest percentage of their calories from carbohydrates, and were less likely to be active than Whites and Blacks.[8]

If diabetes is preventable with lifestyle modification, then what barriers are preventing Caribbean Latinos from changing their behaviors? According to the 1990 US Census,[12] 45.8% of Latinos were living below the poverty level, vs 18.5% of Whites. Only 37% of Latinos under the age of 25 years had attained a high school degree. Lower levels of income and education tend to result in poorer health care and health outcomes.[13] More specifically, lower health literacy independently leads to higher mortality and morbidity from type 2 diabetes.[14]

Cultural factors are also important in a patient's experiences in receiving health care.[15] Latinos who speak Spanish are significantly less satisfied with communication with their healthcare providers.[16] For diabetics, poor communication is associated with less patient interaction with a medical provider, and is an independent predictor of poor self-management.[17] A lack of bilingual/bicultural doctors and other medical professionals is, therefore, another area that may contribute to health disparities.[15] In short, Latinos often do not have the necessary tools or support for maintaining good health.

This study involved a clinic where the healthcare providers are predominantly bilingual, and many are Latino. Two strategies were employed to improve care. First, the clinic developed an education program that was implemented and received recognition from the American Diabetes Association as a Diabetes Self Management Education

Table 1. Data and information elements extracted from medical records

A clinician diagnosis of diabetes (excluding impaired fasting glucose and impaired glucose tolerance)	Hyperlipidemia
Gender	History of coronary artery disease
Ethnicity	Hospitalization for angina in the past year
Date of birth	History of congestive heart failure
Amputation	History of cardiovascular accident
Retinpathy	Documentation of a blood pressure and weight at each primary care provider visit in the past year
Nephropathy	A dilated eye exam or ophthalmology referral in the past year
Neuropathy	A fasting lipid profile ordered every year
History of diabetic ketoacidosis	A blood urea nitrogen (BUN) and creatinine (Cr) level drawn every year
History of hyperosmolar hyperglycemic nonketotic coma	Urinalysis (UA)
The type of therapy the patient is on (including diet, insulin, or oral medication)	Microalbumin level if the UA is negative in the past year
Frequency of measurement of Hb A_{1c}	Documentation of prescription of an ACE inhibitor if appropriate for proteinuria or hypertension
Laboratory values of the hemoglobin A_{1c} level	Documentation of an updated pneumococcal vaccine and influenza vaccine
Frequency of clinician foot exam	Documentation of an electrocardiogram from the past 2 years
Diagnosis of hypertension	Nutrition counseling or referral in the past year
Blood pressure values and dates	Activity status or exercise plan reviewed in past year
Weight and date	Smoking status reviewed in the past year and if applicable a referral or intervention prescribed
Height	Aspirin prescribed
BMI	Prescription of a lipid lowering agent if appropriate

(DSME) program. Further, feedback was regularly given to physicians regarding the care of their diabetic patients so they could improve their adherence to accepted practice guidelines. We hypothesized that the prevalence of diabetes among Latinos in Lawrence, Mass. would be 10%, consistent with previous research, and that the DSME program and clinical information feedback loops would lead to improved adherence to the Massachusetts Guidelines for Care of Diabetes.

METHODS

Study Design

This community-based, participatory research study was conducted in Lawrence, Mass., with a population of almost 73,000. There are approximately 43,000 people of Latino origin in this city, with a disproportionate number of families living below the poverty level; 46% of Latinos were at 200% or more below the poverty level, compared to 21% of the population state wide living at a similar poverty level.

The project was coordinated through a Section 330 Community Health Center (CHC) that also sponsors a Family Practice Residency program and a wide array of clinical and support programs for the community. The CHC employs 35 family physicians, 6 pediatricians, 3 general internists, 24 family medicine residents, 10 nurse practitioners, and more than 300 additional personnel. The CHC provides primary care for more than 80% of the Latinos in the city.

This longitudinal, descriptive study tracked indicators of health status among Latinos with diabetes in the target community, and adherence to guidelines by providers of care for individuals with diabetes. It was part of a larger project funded by the Centers for Disease Control and Prevention: Racial and Ethnic Approaches to Community Health (REACH) 2010. The protocol was approved by the Institutional Review Board (IRB) of an affiliated university. Participation in the study was voluntary, and informed consent was obtained from a random sample of patients, and a group of participating phy-

sicians. Federal Wide Assurance documents were completed and approved for the community performance sites.

Intervention 1: DSME

The DSME program was designed according to the guidelines determined by the American Diabetes Association. The target population was predominantly Latino residents of Lawrence and the Merrimack Valley who have diabetes, or are pre-diabetic. Those with diabetes include individuals with type 1, type 2, or gestational diabetes, of any age, race, or ethnic background.

Curriculum content areas of the DSME program include the following: 1) learning the diabetes disease process and treatment options; 2) appropriate nutritional management; 3) employing physical activity into lifestyle; 4) using medications (if applicable) for therapeutic effectiveness; 5) monitoring blood glucose, urine ketones (when appropriate), and using the results to improve control; 6) preventing, detecting, and treating acute complications; 7) preventing (through risk reduction behavior), detecting, and treating chronic

Table 2. Comparative prevalence of diabetes among Latinos, 1999 vs 2003

	1997–1999	Percent	1999–2003	Percent
Total adult Puerto Rican (PR) patients	3248	—	5828	—
with diabetes	445	13.7	835	14.3
Total adult Dominican (DO) patients	4373	—	8860	—
with diabetes	398	9.1	902	10.1
TOTAL PR and DO	7,621	—	14,688	—
with diabetes	843	11.1	1,737	11.8

complications; 8) goal setting to promote health, and problem solving for daily living; 9) integrating psychosocial adjustment to daily life; and 10) promoting preconception care, management during pregnancy, and gestational diabetes management (if applicable).

The CHC provided space in its multiple clinical settings and supported the training of educators. Through the program, the number of certified diabetes educators increased from one to 4, with others preparing for the certifying examination.

Intervention 2: Practice Improvement by Providers

Every 6 months a physician member of the research team presented a report of patient outcomes for the CHC, regarding guidelines of care[18] for their Latino diabetic patients. Individual providers were encouraged to compare their own diabetic patients to the total practice norms as revealed by the reported data compiled from chart reviews of a random sample of 98 to 137 patients. They were offered an opportunity to participate in a practice improvement process through consultation with members of the research team. Informed consent of physicians was obtained under the direction of the principal investigator.

Data Gathering and Analysis for Prevalence Calculation

In December 1999, adult Latino patients of the health center, and those with ICD-9 billing codes including a diagnosis of diabetes, were identified by a search of computerized patient records

for clinic visits from October 1997 to October 1999. The procedure was repeated in September 2003 for visits occurring in fiscal years 1999–2003. Data provided to the study by CHC personnel removed personal identifiers.

DSME Data Gathering and Analysis

In January 2004, a similar procedure was performed to compare "pre-/post-" HbA$_{1c}$ values for Latino patients who participated in the DSME program, vs those Latino patients who had not participated.

Manual Chart Review

Health center adult Latino patients with ICD-9 billing codes, including a diagnosis of diabetes and associated heart disease, were identified by a search of computerized patient records for visits from October 1997 to October 1999. This initial search yielded 967 names, from which 202 were randomly selected using a computer-generated list. Consent to participate in the study was obtained from 158 patients. A data extraction form was used, based on the updated Guidelines for Adult Diabetes Care.[18] Each review focused on care provided during the previous 12 months.

Indicators were chosen to characterize the health of the diabetic sample, and to determine the extent to which their care complied with the guidelines. Nine of the 158 patient records did not include data meeting requirements for a diagnosis of diabetes. Another 21 records were either unavailable, or contained no data for the review period. The remaining 128 were included in the

2002 review process, with 25 charts reviewed in 2001, and 102 charts reviewed between February 2002 and April 2002. Information extracted had been entered into the chart up to one year prior to the chart review date. The 2003 review process conducted in the first quarter of 2003 included 98 charts. Eight records were unavailable, and 22 contained no data for the review period. Table 1 identifies the specific information and data extracted.

RESULTS

The average age of the total sample was approximately 55 years, and there were more females than males (71% vs 29%, respectively). The sample was divided by national origin, with 51% being Dominican, 45% Puerto Rican, and 3% other Latino. These proportions are consistent with those of all adult Latino diabetics (chi square test, $P=.075$).

Prevalence Calculation Results

The computer patient record searches in 1999 and 2003 revealed a stable pattern of diabetes prevalence, and proportions of Puerto Rican and Dominican Latinos, even though the searches covered unequal time frames. In 1999 a sample of visits from the 2 years prior to this study (1997–1999) was used, while in 2003, a 4-year sample was used (1999–2003) which spanned the duration of the study. Table 2 shows the comparative results.

Initially, we also determined the prevalence of diabetes among other Latinos in the practice. Because the rate of

Table 3. DSME impact on HbA$_{1c}$, Latino patients (*t* test)

	Latinos with DM In DSME Program	Latinos with DM Not in DSME Program
Number	567	432
HgA$_{1c}$		
"Pre" Average, SD	8.23, 2.05	7.88, 1.88
"Post" Average, SD	8.23, 1.83	8.17, 1.80
Difference: "Post" – "Pre"		
Average difference, SD	.0007, 1.92	.2877, 1.67

t test on difference, *P*=.012.

6.3% (707 of 11,189) equaled that of the general population in Lawrence, the study focused on persons with diabetes of Puerto Rican and Dominican origin, the groups for whom the disparity was greatest.

DSME Analysis Results

In its first 18 month of operation, the DSME program provided education for 1011 patients at 2,686 visits with diabetes educators. Of these 1011 patients at the health center, 651 were Latino. According to ICD-9 codes for diabetes, 999 Latino patients had more than one HbA$_{1c}$ value taken during 2002–2003. The earliest dated value was compared to the latest dated value for 2 groups: those who participated in the DSME program (*N*=567), and those who did not (*N*=432). The difference between the earliest and latest

values was significantly lower for the DSME group (unequal variances *t* test, *P*=.012). The mean HbA$_{1c}$ values for the DSME group remained unchanged, while those for the comparison group increased (Table 3). For the DSME group, the average time between the earliest and latest values was 378 days, compared to 368 days for the other group. The 10-day difference was not statistically significant (*P*=.33), so the time between measures was not a factor.

Results of Manual Chart Review for Patient Health Outcomes

Patient health outcomes were compared for 98 patients from the random sample for whom 2002 and 2003 chart reviews were completed. Improvements in HbA$_{1c}$, blood pressure, and LDL measures were comparable in magnitude

to the DSME results, but did not reach statistical significance; BMI remained constant.

Results of Manual Chart Review for HealthCare Indicators

According to established guidelines for health care of diabetic patients, indicators for the elements in the manual medical records review (Table 1) were compared for 98 health center patients. The frequency of adherence to almost all elements of care improved from 2002 to 2003. The improvement was statistically significant (chi square test) for the indicators shown in Table 4. The elements of care that changed the most were reviewing smoking and annual activity status with patients, which showed increases of 133% and 63%, respectively. Prescription of lipid-lowering agents increased 44%, so that now approximately 70% of sample patients are using these agents. These changes in care reflect a heightened focus on significant issues for these patients, for whom HbA$_{1c}$, BMI, and blood pressure measurements improved over the same period, although not to a statistically significant level.

DISCUSSION

The results supported our hypothesis regarding prevalence of diabetes

Table 4. Key healthcare indicators and health chart reviews of random sample, 2002 and 2003

			2002	2003	N	P
Healthcare indicators (chi square)						
Microalbumin level obtained appropriately			41	62	98	.002
Prescription of ACE inhibitor as appropriate			56	75	98	.004
Updated pneumococcal vaccine			23	36	98	.04
Updated influenza vaccine			54	70	98	.02
Annual activity status			38	62	98	.0006
Smoking status reviewed			24	59	98	4.2E-07
Prescription of a lipid-lowering agent			48	69	98	.002
Health Indicators						
HbA$_{1c}$	Average	(*t* test)	8.7	8.5	93	.57
BMI	Average	(*t* test)	32.59	32.48	61	.32
Systolic BP	<130	(chi square)	53%	64%	53	.19
Diastolic BP	<80	(chi square)	72%	81%	53	.21

among Latinos of Puerto Rican and Dominican origin, but not for "other Hispanic" categories in the GLFHC medical records database. Whether this is an artifact of the specific locale, or is indicative of broader-scale realities, the results should be applied with caution when generalizing across countries of origin for Latinos in the United States.

Several indicators of health care improved as the result of the 2 interventions. While not conclusive, interventions apparently resulted in improved health outcomes for this population of Latino patients. We are heartened by the stable BMI in our random sample, and by the stability of HbA_{1c} measures in the patients who participated in the DSME education.

As a community-based research effort, this study has several limitations. The patient population under study is very transient. Medical practice in a medically underserved community is often complicated by variables not easily captured in either hard copy or electronic medical records. While the random sample produced data consistent with our knowledge of local Latino patients with diabetes, the number of cases for which there was complete data was a third smaller than the original sample. Use of ICD-9 billing codes was the best method available to obtain data for the population, and even with substantial data cleaning efforts, precision may be limited. Nevertheless, the results of the study show clear change in the desired direction. Future research will involve refinements for the interventions, as well as for data gathering in a community-based practice.

Knowledge gained from this study about health disparities for both groups, as well as differences between individuals of Puerto Rican or Dominican origin, will heighten awareness of the need to screen these patients for diabetes and related problems. The increase of HbA_{1c} values in less than 2 years for the comparison group highlights the rapid progression of diabetes in these Latino groups. Further investigation should lead to a better understanding of what practice interventions will be necessary to curb diabetes incidence, and slow its progression, in this community.

Next steps for the practice-based interventions include developing automated, monthly feedback to providers, improved point-of-contact information in the EMR about individual patients' needs in light of approved practice guidelines, and easy access to electronic summaries of the practice guidelines. These developments will augment the DSME program since the EMR is also used by the certified diabetes educators. These changes will be implemented within the next 6 months, and evaluated over the following 2 years.

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