

Health Behaviors and Quality of Care Among Latinos With Diabetes in Managed Care

Arleen F. Brown, MD, PhD, Robert B. Gerzoff, MS, Andrew J. Karter, PhD, Edward Gregg, PhD, Monika Safford, MD, Beth Waitzfelder, MA, Gloria L. A. Beckles, MD, MSc, Rebecca Brusuelas, and Carol M. Mangione, MD, MSPH, for the TRIAD Study Group

Latinos are the most rapidly growing ethnic group in the United States¹ and have high rates of type 2 diabetes mellitus.² Among persons with diabetes, Latinos have more diabetic retinopathy and renal disease and higher age-adjusted death rates from diabetes than do Whites.²⁻⁵ These disparate outcomes by ethnicity are multifactorial, and a proportion of the observed differences may be attributable to poorer access to health care and the receipt of lower-quality care.⁶

Some epidemiological studies suggest that health disparities for Latinos with diabetes can be attenuated in managed care settings, where racial and ethnic minorities may experience greater equality of access.^{7,8} However, few studies have evaluated racial/ethnic differences in individual health behaviors⁹ or quality of care⁷ among persons with diabetes in managed care settings, and very little of this work has focused on Latinos. Enrollment in managed care organizations may improve health care access for Latinos, but having health insurance does not completely eliminate barriers to care.¹⁰

In managed care settings, Latinos may face obstacles associated with the administrative complexity of health plans, cultural differences between patients and health care professionals, and language barriers, placing them at increased risk for underuse of services, poor-quality care, and worse outcomes compared with Whites.^{6,11,12} Prior research suggests that language barriers may be a particularly important influence on health behaviors among Latinos,¹³ but the influence of language on diabetes-related health behaviors and quality of care remains poorly understood. Some studies have shown no decrement in quality of care for Latinos with limited English proficiency,^{14,15} although others have suggested that language barriers are associated with reduced rates of self-monitoring of blood glucose (SMBG).¹⁶

Objectives. We evaluated whether ethnicity and language are associated with diabetes care for Latinos in managed care.

Methods. Using data from 4685 individuals in the Translating Research Into Action for Diabetes (TRIAD) Study, a multicenter study of diabetes care in managed care, we constructed multivariate regression models to compare health behaviors, processes of care, and intermediate outcomes for Whites and English- and Spanish-speaking Latinos.

Results. Latinos had lower rates of self-monitoring of blood glucose and worse glycemic control than did Whites, higher rates of foot self-care and dilated-eye examinations, and comparable rates of other processes and intermediate outcomes of care.

Conclusions. Although self-management and quality of care are comparable for Latinos and Whites with diabetes, important ethnic disparities persist in the managed care settings studied. (*Am J Public Health*. 2003;93:1694-1698)

We used data from the Translating Research Into Action for Diabetes (TRIAD) Study, a multicenter study of persons with diabetes in managed care, to evaluate differences in participation in diabetes-related self-care behaviors, processes of care, and intermediate outcomes of care among Whites, English-speaking Latinos, and Spanish-speaking Latinos with diabetes. We hypothesized that Latinos with diabetes would be at higher risk for poor health behaviors and quality of care because of educational obstacles and organizational and cultural barriers to receipt of care. We also anticipated that language barriers would place Spanish speakers at higher risk than English speakers for low participation in self-care behaviors and for poor processes and intermediate outcomes of care.

METHODS

The TRIAD Study is a prospective cohort study of diabetes care in managed care, the design of which has been presented elsewhere.¹⁷ Persons were eligible for TRIAD if they had diabetes, were 18 years of age or older, had been continuously enrolled in a participating health plan for a minimum of 18 months, had at least 1 claim for health care filed in the prior 18 months, reported receiving the majority of their diabetes care

through the health plan, and spoke English or Spanish. The TRIAD Study excluded nursing home residents, pregnant women, and those who had a severe illness or impairment that precluded providing informed consent or participating in a 30- to 45-minute telephone or written interview.

The TRIAD Study surveyed 11 922 respondents in 6 translational research centers that partnered with the Centers for Disease Control and Prevention (CDC) to study diabetes care in managed care settings. These centers collaborated with 10 health plans and 65 provider groups. Surveys were conducted between July 2000 and August 2001. Medical record reviews of the primary health care provider charts covered the 18 months prior to the interview date. For these analyses, we included the 4 centers (comprising 8 health plans and 52 provider groups) with substantial numbers of Latinos enrolled in TRIAD. Of the 8921 study participants in these 4 centers, 4685 identified themselves as either Latino or White and were eligible for inclusion in the analyses.

Data collection included a telephone or written survey and a medical record review. The survey contained questions about socio-demographic characteristics including age, sex, race/ethnicity, preferred language for the interview, education, and income; clinical characteristics; processes of care; diabetes-

related comorbid conditions according to self-report of hyperlipidemia, myocardial infarction, stroke, and amputation; and health status according to the Physical Component Summary (PCS-12) and Mental Component Summary (MCS-12) scores of the Medical Outcomes Study 12-Item Short Form.¹⁸ The medical record review provided information on processes of care and intermediate outcomes of care.

The main predictors in these analyses were ethnicity and language, and the main outcomes were diabetes-related health behaviors, processes of care, and intermediate outcomes. We compared 3 groups: Whites, Latinos who completed the survey in English (English-speaking Latinos), and Latinos who completed the survey in Spanish (Spanish-speaking Latinos). We evaluated the following health behaviors: SMBG in 3 groups (persons using insulin, persons only using oral antidiabetic medications, persons not using diabetes medications) and foot self-care. We also evaluated the following processes of care: dilated-eye examination in the past year, foot examinations at most or all visits in the past year, advice on smoking cessation (percentage of smokers), advice on taking or the use of aspirin, receipt of influenza vaccine in the past year, measurement of hemoglobin A_{1c} (HbA1C) and lipid panel levels, and screening for nephropathy in the past year. Whereas influenza vaccination was self-reported, information on dilated-eye examinations, foot examinations, smoking cessation counseling, and aspirin use or advice was obtained from both the survey and the medical record. Predetermined algorithms were followed for cases in which discordance was found between the survey and the medical record; in these cases, if there was a positive response from either source, the indicator was classified as having been performed. Intermediate diabetes-related outcomes were the percentage of participants with blood pressure greater than 130/85 and the most recent HbA1C (mean %) and lipid panel levels (mg/dl) recorded in the medical record during the review period.

In analyses adjusted only for clustering of health plans, we used bivariate tests of association, including analysis of variance for continuous variables and χ^2 tests for categorical variables, to compare patient sociodemographic

and clinical characteristics, health behaviors, processes of care, and intermediate outcomes of care by ethnicity and language. Following Rothman, we made no adjustments to *P* values for multiple comparisons but have presented all comparisons that were evaluated.¹⁹ For the adjusted analyses, we used hierarchical regression models to adjust for the clustering of patients within provider groups and of provider groups within health plans. All analyses were performed with the SAS PROC MIXED procedure and the SAS GLIMMIX macro.²⁰ For continuous variables, we present the least squares mean estimates for Whites, English-speaking Latinos, and Spanish-speaking Latinos. For dichotomous outcomes, because odds ratios are poor estimates of relative risk when outcomes are common, we report the estimated conditional probabilities for each patient group. We refer to these conditional means and probabilities as “adjusted predicted means” and “adjusted predicted percentages.” Models were evaluated with and without adjustment for several potential confounders, including age, sex, education, income, duration of diabetes, any visit to a diabetes specialist in the past year, diabetes-related comorbidity score, PCS-12 score, and MCS-12 score. Because the results did not differ significantly, we report here the findings from the adjusted models. As an additional sensitivity analysis, we also constructed multivariate models using only survey data for dependent variables obtained from more than 1 source. Again, the results did not differ significantly, and we report results from the models that used both survey and medical record data when both were available.

Missing values for covariates other than ethnicity and language were imputed using single imputation. Each covariate was predicted as a function of all other covariates in the model, including age, sex, income, education, specialty of primary care provider, PCS-12 and MCA-12 scores, diabetes-related comorbidity score, and health plan. Single imputations were generated with the *transcan*²¹ function in S-PLUS.²² Each covariate is predicted as a function of all other covariates. Single imputation was used instead of multiple imputation because only adjusters were imputed, and the proportion of missing data ranged from 0.06% (for age) to 11.1% (for specialty of pri-

mary care provider and diabetes-related comorbidity score). *Transcan* imputes missing values while solving for transformations. Restricted cubic splines are used to model continuous variables, dummy variables are used for categorical variables, and imputed values are constrained to be in the same range as nonimputed values. No imputation was performed for the dependent variables.

RESULTS

The sample for this analysis comprised 2941 Whites, 1453 Latinos who completed the survey in English, and 289 Latinos who completed the survey in Spanish (Table 1). The survey response rate was 65%. Medical record data were available for 2041 Whites, 1070 English-speaking Latinos, and 213 Spanish-speaking Latinos. Compared with Whites, the Latino respondents were more often female, reported lower incomes and less education, had fewer comorbid conditions, and were less likely to use insulin or to have a specialist as the primary care provider. Additionally, Spanish-speaking Latinos were twice as likely to smoke and had lower body mass index and higher MCS-12 scores (indicating higher self-reported emotional well-being) compared with either Whites or English-speaking Latinos.

Among Spanish-speaking Latinos, 23% reported a language barrier with their primary care provider, and 32% reported that they needed a translator at most visits, but only 52% of these reported that a translator was always provided if needed. Approximately half of the Spanish speakers reported receiving educational materials from their health plan appropriate for their culture and language.

Health Behaviors

In the adjusted analyses, diabetes-related health behaviors differed by ethnicity and language (Table 2). Among both insulin users and those treated only with oral antidiabetic medications, SMBG was less common among Latinos than among Whites. There were no differences in the adjusted predicted rates of SMBG among persons who did not use medications to control their diabetes. In contrast, Latinos were more likely than Whites to report checking their feet for sores every day.

TABLE 1—Comparison of Sociodemographic and Clinical Characteristics of Whites, English-Speaking Latinos, and Spanish-Speaking Latinos

	White (Referent; n = 2941)	English-Speaking Latino (n = 1453)	Spanish-Speaking Latino (n = 289)	P
Sociodemographic characteristics				
Age, y, mean (SD)	62.4 (±13)	60.8 (±13)	66.6 (±12)	.001
Female, %	46.3	53.8	61.2	<.0001
Did not graduate high school, %	11.8	38.9	80.6	<.0001
Annual income under \$20 000, %	20.5	41.7	66.7	<.001
Clinical characteristics				
Years with diabetes, mean (SD)	12 (±11)	13 (±10)	13 (±11)	.18
Diabetes-related comorbidity score, mean (SD)	1.01 (±0.94)	0.98 (±1.01)	0.70 (±0.80)	<.0001
Body mass index in kg/m ² , mean (SD)	30.8 (±6.9)	30.8 (±6.6)	29.3 (±6.2)	<.0013
Smoker, %	14.4	15.0	29.0	<.0001
Any insulin use, %	29.4	24.2	20.8	<.0001
PCS-12 score, mean (SD)	43.6 (±7.1)	43.1 (±7.0)	43.4 (±7.0)	.38
MCS-12 score, mean (SD)	45.0 (±6.2)	46.5 (±6.7)	44.9 (±6.9)	.0008
Diabetes specialist as primary care provider, %	12.4	7.0	6.6	<.0001
Language barriers, %				
Language barrier with provider	...	...	23	...
Translator needed	...	...	32	...
Translator provided at every visit when needed	...	...	48	...
Health plan provided educational materials appropriate for culture/language	...	...	51	...

Note. Analysis of variance was used for continuous variables, and χ^2 was used for categorical variables. SD=standard deviation; PCS-12=Physical Component Summary of the Medical Outcomes Study 12-Item Short Form; MCS-12=Mental Component Summary of the Medical Outcomes Study 12-Item Short Form.

Processes of Care

In multivariate analyses, only 1 of the 8 process indicators differed by ethnicity: adjusted predicted rates of dilated-eye examinations in the past year were slightly higher among both English- and Spanish-speaking Latinos than among Whites (Table 2). Adjusted predicted rates of foot examination by a health care professional, smoking cessation counseling, aspirin use or advice, influenza vaccination, and measurement of the intermediate outcomes (HbA1C level, lipid panel level, proteinuria) in the past year did not differ by ethnicity or language.

Intermediate Outcomes

The adjusted predicted proportion of persons with blood pressure above 130/85 was slightly lower in Latinos than in Whites. In contrast, both English- and Spanish-speaking Latinos had higher adjusted mean HbA1C levels than did Whites. We performed addi-

tional analyses to evaluate whether the relationship between HbA1C levels and ethnicity and language differed within the 3 mutually exclusive treatment categories (persons using insulin, persons using oral antidiabetic medications, persons not using medications for diabetes). There were no ethnicity/language differences in HbA1C levels among persons who were not on medications for diabetes. However, among persons on oral antidiabetic agents and those on insulin, Latinos had higher adjusted predicted mean HbA1C levels than did Whites. There were no differences in adjusted predicted mean lipid panel levels by ethnicity or language.

DISCUSSION

This study of managed care enrollees with diabetes found a complex relationship between Latino ethnicity, Spanish language, and diabetes-related care. Latinos reported higher

participation in foot self-care, but were less likely to perform SMBG. Processes of care were similar or better for Latinos compared with Whites, and Latinos had slightly better blood pressure control and comparable lipid panel levels. However, Latinos had poorer glycemic control than did Whites.

The lower adjusted predicted rates of SMBG among Latinos on insulin or oral antidiabetic medications may have important implications for glycemic control in this cohort. Prior literature suggests that Latino ethnicity^{23,24} and language barriers¹⁶ are associated with lower rates of SMBG. Although self-monitoring in persons on insulin is central to glycemic control,²⁵ far fewer data support the use of SMBG in persons treated with dietary therapy or oral antidiabetic agents.²⁶ Nonetheless, our findings suggest that increasing performance of SMBG among Latinos with diabetes may be a mechanism for enhancing glycemic control among persons on diabetes medications.

The higher adjusted predicted rates of dilated-eye examinations and foot self-care may be explained by culturally appropriate and/or Spanish-language outreach efforts to promote foot care or eye examinations in the TRIAD provider groups with larger numbers of Latino patients. Further work is needed to evaluate whether characteristics of the health plans or the provider groups in which Latinos were enrolled facilitated performance of dilated-eye examinations and enhanced foot self-care. Our findings may also reflect patient and provider awareness of the higher prevalence of retinopathy²⁷ and amputation^{28,29} in minority groups.

As in other studies, we found significant differences in glycemic control between Whites and Latinos.²⁴ We observed a 0.7% absolute difference in mean HbA1C levels between Latinos and Whites in the cohort overall, and among persons on insulin, the mean HbA1C level for Spanish-speaking Latinos was a full percentage point higher than that for Whites. Findings from the United Kingdom Prospective Diabetes Study suggest that over a 10-year period, a reduction of 1% in HbA1C is associated with a decrease of 37% in microvascular complications and a decrease of 21% in risk of any diabetes-related complication.³⁰ The difference we found in our study may thus have significant long-term clinical implications for diabetes-related morbidity among Latinos. This

TABLE 2—Adjusted Predicted Rates and Means of Health Behaviors and Quality Indicators for English-Speaking and Spanish-Speaking Latinos Compared With Whites in Managed Care^a

	White (Referent)	English-Speaking Latino	<i>p</i> ^b	Spanish-Speaking Latino	<i>p</i> ^b
Health behaviors, %					
Self-monitor blood glucose	49.1	38.5	<.0001	36.8	.0001
Insulin users	76.7	62.2	<.0001	62.7	.04
Oral antidiabetic agents only	40.0	31.0	.002	32.0	.04
No diabetes medications	33.0	33.3	.66	27.8	.97
Check feet for sores	63.4	69.8	.01	76.3	.009
Process of care during the past 12 months, %					
Dilated-eye exam conducted	76.3	80.8	.01	84.0	.02
Foot exam conducted at most or all visits	80.5	85.4	.14	83.0	.13
Received influenza vaccine	68.1	66.1	.28	66.3	.60
Advised to stop smoking	86.9	81.7	.12	81.3	.42
Advised to take or taking aspirin	50.7	50.0	.96	51.5	.20
Hemoglobin A _{1c} measured	86.4	88.4	.17	85.2	.69
Lipid profile assessed	70.2	71.5	.76	70.9	.74
Nephropathy assessment conducted	78.8	75.8	.37	77.1	.38
Intermediate outcomes					
Blood pressure greater than 130/85, %	16.7	12.9	.01	13.9	.37
Hemoglobin A _{1c} percentage (95% CI)	7.7 (7.4, 7.9)	8.2 (8.0, 8.5)	<.0001	8.4 (8.1, 8.7)	<.0001
Insulin used (95% CI)	8.1 (8.0, 8.3)	8.8 (8.6, 9.1)	.003	9.1 (8.5, 9.6)	<.0001
Oral antidiabetic agents only (95% CI)	7.5 (7.2, 7.9)	8.1 (7.7, 8.4)	<.0001	8.3 (7.8, 8.8)	<.0001
No diabetes medications (95% CI)	6.6 (6.1, 7.0)	6.9 (6.3, 7.4)	.16	6.4 (5.7, 7.2)	.74
Low-density lipoprotein level (mg/dL) (95% CI)	111.4 (108.7, 114.1)	112.3 (109.1, 115.5)	.56	114.6 (108.7, 120.5)	.27

Note. CI=confidence interval.

^aAdjusted for age, sex, income, education, specialty of primary care provider, scores on Physical Component Summary and Mental Component Summary of the Medical Outcomes Study 12-Item Short Form, diabetes-related comorbidity score, symptom score, and health plan and provider group clustering.

^bCompared with Whites.

possibility is supported by evidence that suggests that even in managed care organizations, Latinos with diabetes have higher rates of end-stage renal disease than do Whites.¹⁶

We observed few differences in health behaviors, processes of care, and outcomes of care between English- and Spanish-speaking Latino patients, which is consistent with the findings of 2 prior studies that showed no difference in glycemic control between English and non-English speakers. In 1 of these stud-

ies, patients had established primary care providers, and there was consistent and widespread use of interpreters,¹⁴ whereas in the other, Spanish-speaking patients appeared to self-select Spanish-speaking providers.¹⁵ Thus, the impact of language barriers may be attenuated by either patient-provider language concordance or availability of translators in the setting of an established primary care relationship. The lack of differences between English- and Spanish-speaking Latinos in our study may

also reflect overlap in the categories of “English speakers” and “Spanish speakers.” Among the Latinos who completed the survey in English, there may have been some with unmeasured language difficulties, and among Spanish speakers, a proportion may have been able to negotiate some of the clinical encounter in English. Another explanation may be high rates of language concordance or use of interpreters in the provider groups with substantial numbers of Spanish-speaking Latinos. Additionally, although a substantial number of Spanish-speaking Latinos reported language barriers with their providers, the study had inadequate sample size to evaluate the effect of translator availability on these results.

Our findings are subject to some limitations. These analyses were cross-sectional, and we do not have information about change over time in performance of health behaviors, quality indicators, or the levels of the intermediate outcomes. It is possible that over the course of their enrollment in managed care, Latinos had higher rates of improvement in these measures than did Whites. However, because all participants had to have been enrolled in their health plan for a minimum of 18 months to be eligible for the study, our findings indicate that some clinically significant disparities persist in these managed care settings. We relied on patient self-report for several measures, including SMBG, foot care, exercise patterns, dietary patterns, and rates of influenza vaccination. If differential reporting of these behaviors occurred by language or ethnicity, the observed rates might be biased; however, as far as we know no other reports in the published literature predict a particular direction for the possible bias. However, when we used responses from the survey alone as the dependent variable in regression models, there were few differences compared with analyses that used combined survey and medical record data. As noted previously, we also had small numbers of Spanish-speaking respondents, which may limit generalizability to other settings.

Among the strengths of this study are its large, randomly sampled cohort, the inclusion of participants from 8 separate health plans, and the use of detailed sociodemographic, clinical, and behavioral data, all of which enhance the generalizability of the findings to insured patients with diabetes in the United States.

Among privately insured persons in the United States, Latinos have higher rates of enrollment in managed care organizations than do other racial and ethnic groups.³¹ However, they remain less likely than Whites to be insured, and among persons with diabetes, Mexican Americans are 23% more likely to lack health insurance than are Whites.³² The ethnic disparities observed in the managed care settings that we studied are likely to be even more profound outside of managed care, where many Latinos have poorer access to health care providers, glucometers, and medications. It is also important to note that Latinos had comparable or better rates of performance of some diabetes-related behaviors, processes of care, and intermediate outcomes. Further studies are needed to identify whether there are organizational characteristics of managed care plans that serve to enhance care and others that act as barriers to care for Latino patients with diabetes and other chronic conditions. ■

About the Authors

Arleen F. Brown, Rebecca Brusuelas, and Carol M. Mangione are with the David Geffen School of Medicine at the University of California, Los Angeles. Robert B. Gerzoff, Edward Gregg, and Gloria L. Beckles are with the Centers for Disease Control and Prevention, Atlanta, Ga. Andrew J. Karter is with the Division of Research, Kaiser Permanente, Oakland, Calif. Monika Safford is with the University of Medicine and Dentistry of New Jersey–New Jersey Medical School, Newark, NJ. Beth Waitzfelder is with the Pacific Health Research Institute, Honolulu, Hawaii.

Requests for reprints should be sent to Arleen F. Brown, MD, PhD, Division of General Internal Medicine and Health Services Research, David Geffen School of Medicine at UCLA, 911 Broxton Plaza, Campus Box 951736, Los Angeles, CA 90095-1736 (e-mail: abrown@mednet.ucla.edu). This article was accepted May 27, 2003.

Contributors

A.F. Brown conceived of the study and supervised all aspects of its implementation, synthesized analyses, and led the writing. R.B. Gerzoff assisted with the study and completed the analyses. A.J. Karter, E. Gregg, G.L. Beckles, and R. Brusuelas assisted with the study and the analyses. M. Safford assisted with conceptualization of the study and analyses. B. Waitzfelder assisted with conceptualization of the study. C.M. Mangione conceived of the study, assisted with synthesis of the analyses, and participated in the writing of the article. All authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

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Human Participant Protection

The TRIAD Study protocol was reviewed and approved by the institutional review boards of the CDC and all 6 translational research centers.

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