

## FRAGILE HEALTH STATUS OF LATINO PATIENTS WITH DIABETES SEEN IN THE EMERGENCY DEPARTMENT OF AN URBAN, SAFETY-NET HOSPITAL

**Objective:** Patients with diabetes presenting to safety-net emergency departments (ED) represent an at-risk population with limited resources and significant medical and social needs. We conducted a needs assessment of this group evaluating its demographic composition, health status, attitudes and beliefs about diabetes self-care and utilization of health maintenance services. We hypothesized that decreased self-efficacy and primary care use would correlate with higher glycosylated hemoglobin (HbA1C).

**Research Design and Methods:** Consecutive patients with a known history of diabetes seen in an urban, safety-net ED completed a 102-item questionnaire and had HbA1C measured. The questionnaire was developed using elements of the transtheoretical model of behavior change and self-efficacy theory.

**Results:** In 230 patients enrolled, mean age was 53 years and HbA1C was 8.8%. The overwhelming majority were Hispanic, low-income, and Spanish-speaking. Major depression was common (34% prevalence). By the transtheoretical model, 81.8% demonstrated advanced readiness to change (preparation/action stages). HbA1C varied with self-efficacy as the least empowered quartile had the highest HbA1C (9.3%) while progressively higher quartiles had lower HbA1C (9.2%, 8.3%, 8.5%,  $P=.03$  for trend). Only 69% reported having a primary care provider (PCP) and only 3% received all ADA recommended health maintenance services. Patients with a PCP had lower HbA1C than those without a PCP (7.6% vs. 9.5%,  $P<.01$ ).

**Conclusions:** In this study of largely Latino patients seen in an urban county ED, we observed extremely poor glycemic control, low

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diabetes-specific knowledge, high rates of major and severe major depression, low self-efficacy and unacceptably low rates of primary care and preventive health service utilization. (*Ethn Dis.* 2013;23[1]:49–55)

**Key Words:** Latinos, Diabetes, Emergency Medicine, Transtheoretical Model

### INTRODUCTION

The prevalence of diabetes and its complications including death, amputations, blindness and renal failure has been steadily increasing.<sup>1,2</sup> Data from the 2011 National Diabetes Fact Sheet states that 8.3% of the population (25.8 million people) in the United States currently has diabetes with Latinos being disproportionately affected.<sup>3</sup> Concurrently, there has been a 5.6% relative annual increase in the proportion of emergency department (ED) visits that were diabetes-related. This translates to over 2 million diabetes-related ED visits annually.<sup>4</sup> These ED patients with diabetes represent a unique patient population deserving special attention as their knowledge, resources and glycemic control may be worse than patients seen in other settings.<sup>5–7</sup>

The ED provides a unique location from which to establish brief interventions to improve diabetes management in underserved patients. We conducted a needs assessment to more deeply understand patients with diabetes in safety-net EDs. In this study, we describe these patients': 1) demographics, health status and diabetes-specific knowledge; 2) attitudes, and beliefs about diabetes self-care; and 3) utilization of health maintenance services. Further, we evaluated the relationships between these

variables and glycemic control hypothesizing that patients without regular access to primary care would have higher HbA1C values.

### METHODS

This prospective, cross-sectional study was conducted in the ED at Los Angeles County Hospital at the University of Southern California (LAC+USC) between January and April 2010. The LAC+USC is a large, urban, county ED with over 170,000 annual visits. The population served is predominantly low-income and Latino. The local institutional review board approved this study.

### Selection of Study Participants

Patients were eligible for participation if they had diabetes (type 1 or 2), were over >18 years and could provide informed consent. Individuals were excluded if they were: 1) critically ill, 2) in custody of police, 3) suffering from acute psychosis, 4) otherwise unable to give informed consent, or 5) had diabetes for less than 6 months. We excluded patients who had diabetes for

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less than six months as we were most interested in understanding the characteristics and beliefs of patients with diabetes who have had sufficient time and opportunity to explore local resources, learn about their illness and achieve a steady state.

### Study Procedure

Participants were enrolled on 41 individual days during this study period based on research assistant (RA) availability. The RAs screened all patients on the ED electronic tracking board to identify patients with diabetes documented in the past medical history section. The RAs approached consecutive patients in the ED with diabetes regardless of reason for visit. Individuals who provided informed consent had biometric data including height weight, blood pressure and HbA1C measured, and then were given a 14-page, 102 item questionnaire. All RA's spoke English and conversational Spanish though the majority were not Latino. Participant HbA1C was assessed using the Afinion™ AS 100.<sup>8</sup> We validated the accuracy of our screening method prior to study initiation by approaching 80 patients with and 200 patients without diabetes documented on the electronic tracking system verbally confirming that the documentation on the electronic tracking system was correct. In this validation sample, we found the history of diabetes was correctly designated in all 280 cases.

### Questionnaire Structure and Development

The questionnaire was designed to elicit information for the following broad categories: 1) demographics, health status and diabetes-specific knowledge; 2) attitudes, self-efficacy, perceived barriers to care; and 3) health care utilization.

#### *Demographics, Health Status and Diabetes-specific Knowledge*

This 44-item section solicited demographic information including age,

sex and income. Health status was assessed using the short form health survey version 2 (SF-12v2). The SF-12v2 yields a physical component score (PCS) and mental component score (MCS). Mean MCS and PCS are 50 (SD 10) for the adult US population.<sup>9,10</sup> Depressive symptoms were determined using the patient health questionnaire-9 (PHQ-9); PHQ-9 scores  $\geq 15$  were categorized as major depression and scores  $\geq 20$  as severe major depression.<sup>11</sup> Diabetes specific knowledge was determined using the previously validated diabetes knowledge questionnaire (DKQ).<sup>12</sup> The SF12v2, PHQ-9 and DKQ have each been used and validated in Spanish-speaking and Latino groups.<sup>12-14</sup> Additional items concerning participants' understanding of goal HbA1C were developed by the authors.

#### *Attitudes, Self-efficacy, and Perceived Barriers to Care*

Using a 6-item questionnaire we categorized patients according to Prochaska and DiClemente's Stage of change model (SCM) as precontemplation, contemplation, preparation, action, and maintenance with respect to diabetes self-management.<sup>15,16</sup> Self-efficacy was assessed using the 8-item diabetes empowerment scale (DES-SF).<sup>17</sup> Participants identified up to 3 top barriers they faced in achieving optimal diabetes control from a list of commonly cited barriers. The barrier list was derived from the theoretical framework of Glasgow and recently adapted by Daly et al.<sup>18,19</sup> The DES-SF and items used to determine subjects' stage of change have been previously validated in Spanish-speaking and Latino groups.<sup>20</sup>

#### *Health Care Utilization*

Patients were asked if they had a primary care physician (PCP) or regular clinic in which they received care and whether or not they had received care there within the preceding year.

Self-reports of the number of ED visits and hospital admissions within the preceding year were also collected. Finally, participants indicated when they last received preventive care services recommended by the ADA in the Standards of Medical Care in Diabetes statement of 2011 including: ophthalmologic exam, foot exam, dental exam, blood pressure check, cholesterol check and HbA1C measurement.<sup>21</sup>

Questionnaires were available in English and Spanish.

### Sample Size Considerations

Though this study was largely exploratory in nature we calculated a sample size based on the hypothesis that patients with diabetes in the ED who did not have a PCP would have higher HbA1C values than those who did. We estimated the HbA1C among participants with a PCP to be 7.5% (based on test sample) with SD=2.5 and considered an increase to 8.5% in subjects without a PCP to be clinically meaningful. This yielded a conservative sample size of 222 to achieve 80% power to detect a 1% difference in HbA1C across groups.

### Statistical Analysis

Data were analyzed using STATA version 10.0 (StataCorp LP, College Station, TX). Mann-Whitney-U and Student's *t* test were used to determine statistical significance of continuous variables as appropriate. Chi-square test and chi-square test for linear trend were applied for categorical variables.

## RESULTS

Of the 383 ED patients with diabetes approached during the study period, 298 were eligible for enrollment (44 were critically ill, 11 altered mental status and 41 could not see or read), and 230 (78%) of these were enrolled; 68 declined to participate.

### Demographics, Health Status and Diabetes-specific Knowledge

The mean age was 53 years (SD 12.0) and 52% were female. Most patients (59.2%) had type 2 DM, 10.2% type 1 and 30% were unsure. Although many patients were unsure, only 14% were taking insulin as part of their glucose management. The overwhelming majority (87.1%) was Latino, 62.6% were Spanish-speaking and 70.3% were born outside of the United States (44.8% born in Mexico). Over four-fifths (82.4%) reported (of those who answered) an annual household income less than \$20,000. The majority of patients (51.3%) were obese as defined by a BMI >30 and an additional 32.9% were overweight (BMI 25–29.9). Mean HbA1C in our sample was 8.8% (95% CI 8.5–9.2%) and 56.7% of all patients had HbA1C >8% indicating extremely poor long-term control for the group as a whole. When asked about their HbA1C, 85% did not know what their goal HbA1C should be, and, 51.3% indicated they had never heard of this test. Co-morbid hypertension (66.5%) and hypercholesterolemia were common (52.6%), as was depression. Over one-third of patients screened positive for major depression (16.6%) or severe major depression (17.9%) on the PHQ-9. Patients' HbA1c varied significantly by depression category; mean HbA1C was 8.5% in the non depressed group but 8.9% and 9.8% in the major depression and severe major depression groups, respectively. Self-reported physical and mental health, as measured by the SF-12v2 was poor. Mean PCS was 36.6 (95% CI 35.0–38.3) and mean MCS was 42.1 (95% CI 40.3–43.8). Diabetes-specific knowledge as assessed by the DKQ was low with a mean score of 12.7 (95% CI 12.1–13.3) out of a possible 24 (Table 1).

### Attitudes, Self-efficacy, and Perceived Barriers to Care

Diabetes self-efficacy was found to be low in this population as median

**Table 1. Characteristics of the study sample**

Characteristic	n (%)*
HbA1C, mean	8.8% (SD 2.6)
Demographics	
Age, mean	53 (range 18–89)
Female	118 (52.2)
Diabetes type	
Type 1	21 (10.1)
Type 2	122 (59.2)
Unsure	62 (30.1)
Race / Ethnicity	
Hispanic	175 (87.1)
Non-Hispanic White	11 (4.8)
Non-Hispanic Black	0 (0)
Non-Hispanic Asian	11 (4.8)
Spanish language preference	144 (62.6)
Education	
Less than high school	105 (45.6)
High school graduate	73 (31.8)
Some college or higher	38 (16.5)
Income	
<\$20,000	108 (47.0)
>\$20,000	23 (10.0)
Refused to Answer	99 (43.0)
Insurance	
Any private	25 (66)
Medicaid and/or Medicare	10 (26)
Medicare only	1 (3)
None	2 (5)
Has a primary care provider or regular clinic	35 (92)
Health status	
SF-12 Score	
Mental Component Score (MCS), mean	42.1 (SD 10.7)
Physical Component Score (PCS), mean	36.7 (10.1)
Depression	
Non-depressed (PHQ-9 <15)	125 (65.8)
Major depression (PHQ-9 15–20)	31 (16.3)
Severe major depression (PHQ-9 >20)	34 (17.9)
Body mass index	
BMI < 25	38 (16.7)
BMI 25–29.9	75 (32.9)
BMI ≥ 30	117 (51.3)
Hypertension	152 (66.5)
Hypercholesterolemia	121 (52.6)
Diabetes specific knowledge	
Diabetes Knowledge Questionnaire score, mean	12.7 (SD 4.3)
Attitudes and self efficacy	
Current stage of change	
Precontemplation	14 (11.6)
Contemplation	8 (3.7)
Preparation	58 (26.5)
Action	121 (55.3)
Maintenance	18 (8.2)
Diabetes Empowerment Score	3.69 (SD .74)

\* Unless otherwise indicated.

**Table 2. Perceived barriers to care<sup>a</sup>**

Perceived Barrier	n (%)
I forget	85 (44.5)
I'm not sure how to do it	81 (42.4)
It's too expensive	65 (34.0)
No transportation	62 (32.5)
My other health problems interfere	50 (26.2)
It hurts	28 (14.7)
It takes too much time	22 (11.5)
Other things are more important	22 (11.5)
I don't think it will improve my health	7 (3.7)
No barrier identified	11 (5.8)

<sup>a</sup> Each participant was allowed to choose up to three perceived barriers to care.

DES score was 3.69 (95% CI 3.5–3.7). Patients' HbA1C varied significantly by DES score with the least empowered quartile having the highest HbA1C (9.3%) while progressively higher quartiles (improved DES scores) had lower HbA1C measurements (9.2%, 8.3%, 8.5%,  $P=.03$  for trend). On applying the stage of change model to our sample, we found that the large majority of patients were either in the preparation (26.5%) or action (55.3%) stages. Only 6.4% were in pre-contemplation, 3.7% contemplation and 8.2% in maintenance stages. Finally, forgetfulness, lack of knowledge about self-care and cost were the most commonly cited barriers to care (Table 2).

**Health Care Utilization**

Overall, 69.7% of participants reported having a PCP or regular clinic where they receive medical care. Those who did not have a PCP had significantly higher HbA1C than those who had a PCP (median 9.5% vs. 7.6% [ $P<.01$ ]).

Patients reported a median of 3 (IQR 1–5.5) PCP visits, 1 (IQR 1–3) ED visit, and 1 (IQR 1–2) hospitalization over the last year. Participants reported receiving far fewer preventive care services than are recommended by the ADA. Only 8 patients (3.6%) in our sample reported receiving all assessed health maintenance services as recommended by the ADA in the preceding year and many of them had never received critical services such as foot and dental exams (Table 3).

**DISCUSSION**

Ethnic populations, particularly Latinos, suffer disproportionately from diabetes.<sup>3</sup> Latinos are twice as likely as non-Latino Whites to develop diabetes and are 50% more likely than non-Latino Whites to die from it.<sup>2</sup> Current estimates suggest one in two Latino children born in the year 2000 will develop diabetes during his/her lifetime.<sup>22</sup> In regions with a high

proportion of Latino residents, such as Los Angeles county (50% of residents are Latino), these statistics have profound public health consequences.<sup>23,24</sup>

In our study, patients with diabetes seen in the ED of an urban county hospital were largely Hispanic, middle-aged and had type 2 diabetes. More than half were Spanish speaking (62.6%), 45.6% had less than a high school education and 82% reported a total annual income of less than \$20,000. Self-reported physical and mental health were low and glycemic control was extremely poor (mean HbA1C=8.8%). Diabetes-specific knowledge was also poor (mean DKQ score=12.7), and may be contributing to these dismal glycemic results. Previous studies have shown that knowledge of diabetes is an important part of a patient's self-management and improvement in overall health.<sup>12,25–29</sup>

Hypertension and hypercholesterolemia were the most common co-morbid physical conditions, but the burden of mental health in this cohort was particularly worrisome. Generally, the rate of depression in people with diabetes is double that in people without a chronic disease and patients with diabetes and co-morbid depression have worse glycemic control and increased mortality rates.<sup>30–32</sup> Bowser reported a mean PHQ-9 score of 6.72 and a severe depression rate of 4.9% in low-income, uninsured patients.<sup>33</sup> Alarming, in this study, 34.2% of patients were currently suffering from major depression (PHQ-9  $\geq 15$ ), over half of which were classified as severe major depression (PHQ-9  $\geq 20$ ). Glycemic control was substantially worse in the depressed group compared with the non-depressed group (HbA1C=8.5% in the non-depressed, HbA1C 8.9% in the major depression group and HbA1C= 9.8% in the severe major depression group,  $P=.03$  for trend). These findings suggest that strategies aimed at improving glycemic control may require concurrent mental health interventions.

**Table 3. Self-reported timing of most recent ADA recommended health maintenance services, (%)**

Service	<1 Year	1–3 Years	3–5 Years	>5 Years	Never Received Service
Ophthalmologic exam	41.9	25.2	8.1	4.6	20.3
Foot exam	42.5	13.2	3.7	4.6	36.0
Dental exam	30.8	22.6	14.0	10.9	21.7
Blood pressure check	81.7	5.2	6.1	1.4	5.6
Cholesterol check	55.9	15.0	5.0	25.0	19.1
HbA1C measurement	33.3	2.8	N/A	3.5	60.3

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Interestingly, despite poor diabetes-specific knowledge and high burden of physical and mental co-morbidities, we found this group of patients exhibits a high level of readiness to change. The Stages of Change Model (SCM) posits that a successful change in behavior occurs gradually, with the patient moving from being uninterested, unaware or unwilling to make a change (precontemplation), to acknowledging there is a problem and considering a change (contemplation), to deciding and preparing to make a change (preparation) to making the change (action), to maintaining the behavior change (maintenance).<sup>15,16,34,35</sup> An intervention may work for some patients and not for others based on their current SCM stage.<sup>16,35-38</sup> In our sample the overwhelming majority of patients (81.8%) were categorized as being in the preparation or action stages. Thus, our ED patients with diabetes represent a group who need help, see diabetes as a problem, and are eager to or have recently made a change to increase control over their condition.

However, this advanced readiness to change is undermined in this population by poor self-efficacy. Self-efficacy theory considers that an individual's belief in their control over behavior determines how self-regulatory functions operate.<sup>39,40</sup> Studies have shown that increasing patient self-efficacy improves their adherence to diabetes treatment and management and leads

to better self-control.<sup>41,42</sup> The DES-SF is a validated tool by which to measure overall diabetes related psychosocial self-efficacy.<sup>17</sup> The DES-SF scores are generally lower in underserved populations. Anderson described a median DES-SF score of 3.89 in an urban African American sample, and Bowser recently reported a median DES-SF score of 3.8 in a low-income uninsured population.<sup>33,43</sup> Participants in our sample demonstrated similarly weak diabetes self-efficacy scores (mean DES-SF=3.61). Importantly, we observed a significant association between poor self-efficacy and higher HbA1C; participants within the lowest quartile of self-efficacy scores had the highest HbA1C (9.3%) compared with those with progressively higher scores (9.2%, 8.3%, 8.5%,  $P=.03$  for trend). This correlation between DES-SF score and HbA1C supports the self-efficacy theory and its importance in diabetes management.

Prior research has shown that Latinos generally face even more barriers to effective diabetes management including: lack of insurance (33% uninsured), poor access to healthy foods, low literacy rates, marginal English language skills, and inadequate knowledge of available local resources.<sup>44</sup> In a retrospective study, Lasater et al showed that Spanish-only-speaking patients were less likely to understand their medication instructions than English-speaking patients (22% vs 3%).<sup>45</sup> More indistinct cultural and personal impediments are also at play.<sup>46</sup> Goepf et al recently showed that many Latinos choose not to receive regular health care due to a combination of fear and suspicion of the medical system, contradictory definitions of health and healthy behaviors, difficulty understanding and navigating complex safety-net systems and a sense that they are negatively judged by health care providers because of the priorities they value.<sup>47,48</sup> We queried this sample about nine major barriers to successful diabetes self-management based on the

works of Glasgow.<sup>18,19</sup> The top three reported barriers were: forgetfulness, lack of knowledge about self-care, and cost.

Perhaps the most notable findings in our study are this population's lack of established primary care provider and the detrimental impact this has on glycemic control and receipt of health maintenance services. Fully one-third of patients with established diabetes had no primary care provider or regular clinic where they received care. This group demonstrated very poor glycemic control and very high risk for complications. Patients who had no PCP or regular clinic had mean HbA1C=9.5% compared to those with a primary care MD in whom the mean HbA1C was 7.5%. Some of the more important preventive and maintenance health services recommended by the ADA include annual ophthalmologic exam, foot exam, dental exam, blood pressure measurement, cholesterol measurement and bi-annual HbA1C measurement. Receipt of these services has been shown to have a significant impact on decreasing health care costs and improving patient quality of life.<sup>49-55</sup> In our sample of county ED patients, only 42.5% received annual foot exams and 41.9% received annual dilated retinal exams. By comparison, in two different health care systems in the Pacific Northwest 73% and 71% percent of patients with diabetes received annual foot exams and 81% and 79% received annual dilated retinal exams.<sup>56</sup>

This study has several important limitations. Foremost is that it was conducted at a single institution potentially limiting its generalizability. Further, the study relied heavily on self-report. Some variables such as self-efficacy (via the DES), depression (by PHQ-9) and physical and mental health functioning (via SF-12) have been validated through self-reporting strategies. However, the health care utilization estimates (eg, how many PCP visits have you had in the past one

## HEALTH OF LATINO ED PATIENTS WITH DIABETES - Menchine et al

year, when was your last eye exam) are subject to recall bias and we did not independently verify the veracity of patient responses.

In conclusion, in this study of largely Latino patients seen in an urban safety-net ED, we observed extremely poor glycemic control, low diabetes-specific knowledge, high rates of major and severe major depression, low diabetes self-efficacy and unacceptably low rates of primary care and preventive health service utilization. All of these were found to correlate negatively with glycemic control. However, these patients did express readiness to change and gain control over their disease process leading us to believe that the ED may be an excellent location from which to implement diabetes-specific outreach programs aimed at increasing self-efficacy, glycemic control and providing links to more suitable medical homes.

### ACKNOWLEDGMENTS

This study was supported by a grant from the CAL/ACEP Emergency Medicine Research and Education Foundation (EM-REF).

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