DIABETES CARE AND LANGUAGE DISCORDANCE AMONG CHINESE AND LATINO PRIMARY CARE PATIENTS

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Objectives: To assess differences in diabetes processes of care among Chinese and Latino patients across medical interpreting methods.

Design and Setting: This is a nested cohort study of patients with diabetes, comparing interpreting methods and their impact on medical outcomes at the primary care clinic of a New York City municipal hospital.

Participants: 54 Spanish and Chinese-speaking language discordant diabetic patients were enrolled and followed for one year.

Intervention: Language discordant patients received either Remote Simultaneous Medical Interpreting (RSMI), or usual and customary (U&C) interpreting.

Main Outcome Measures: Composite medical care scores were calculated for physician ordering and patient completion of diabetes care measures.

Results: RSMI patients, compared with U&C patients, had trends towards higher mean patient completion (.29 vs .25) and physician ordering (.41 vs .37) scores. Overall rates of completion of diabetes care measures in both groups were very low.

Conclusions: Overall rates of physician ordering and patient completion of diabetes care measures were distressingly low in our study. Further studies are needed to explore the potential role of RSMI in addressing the language barrier and improving diabetes care for Chinese- and Spanish-speaking patients. (*Ethn Dis.* 2011;21(4):473–479)

Key Words: Chinese, Latino, Diabetes, Processes of Care, Interpreting

INTRODUCTION

Diabetes and its complications are a major cause of morbidity and mortality in the United States. An estimated 20.6 million people, 9.6% of all persons aged ≥20, have diabetes.[1] It is the fifth leading cause of death by disease in the United States; the resulting economic costs are enormous.[2] In 2007, total costs of diagnosed diabetes in the United States were $174 billion; $116 billion for direct medical costs and $58 billion for indirect costs including work loss, disability, and premature mortality.[3]

Latinos and Asians, the two fastest-growing populations in the United States,[4] suffer disproportionately from diabetes compared to White populations.[5] Data from a 2004–2006 national survey indicate that among Hispanics, the age-adjusted prevalence of diabetes was 10.4%, significantly higher than the 6.6% prevalence among non-Hispanic Whites.[3] Among Asian Americans, although prevalence rates are similar to those among non-Hispanic Whites, after adjusting for age, sex, and body mass index, the prevalence is 60% higher in Asian Americans.[6]

A growing body of research has documented ethnic disparities in mortality, end-stage complications, and quality of care among patients with diabetes.[7] Latinos and Asians with diabetes have been shown to have higher rates of poor glycemic control and diabetic complications compared with Whites.[7–12]

As the US foreign born-population has rapidly increased, the number of limited-English-proficient (LEP) persons has grown, from 14 million in 1990 to 21.4 million in 2000.[13] Language discordance between patients and medical providers is a significant barrier in the effective delivery of health care.[14–22] No studies, however, have evaluated the impact of interpreting method on diabetes care processes. Medical interpreting is most commonly performed in a consecutive (ie, sequential) manner where the interpretation is conducted after the patient finishes speaking.[23] The newer system of Remote Simultaneous (United Nations style) Medical Interpreting (RSMI) has only recently become commercially available. The system uses remotely-located trained medical interpreters who provide simultaneous interpretation via wireless headsets with microphones worn by both patient and provider. The simultaneous system is more efficient,[24] more private,[25] is associated with improved patient satisfaction,[25] and simulates a natural discourse between language-discordant participants.

Determining and implementing the most effective modality of language interpretation for LEP populations may be a key component of a multi-dimen-

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sional approach to reducing disparities in diabetes care. A trial of RSMI vs usual and customary interpreting methods and their impact on medical outcomes was conducted at the primary care clinic of a New York City municipal hospital. This is a nested cohort study of recruited patients with diabetes. We explored the hypothesis that RSMI will lead to improved diabetes care processes among LEP primary care patients.

METHODS

This is a nested cohort study of Spanish- and Chinese-speaking language discordant diabetic patients participating in a larger trial conducted at the primary care clinic of a New York City municipal hospital. Over half of the hospital's patients do not speak English as their primary language. Spanish, Mandarin, and Cantonese are the most common languages. Approval for this study was obtained from both the New York University School of Medicine Institutional Review Board and the Hospital Center Research Protocol Group.

Participants

Patients were recruited between November 2003 and June 2005. Eligible patients included all Spanish-, Mandarin-, and Cantonese-speaking adults, aged >18 years, who were new patients visiting the clinic for the first time.

We explored the hypothesis that RSMI (remote, simultaneous medical interpreting) will lead to improved diabetes care processes among primary care patients with limited English proficiency.

Trained bilingual research assistants obtained consent from eligible patients to voluntary, uncompensated participation before their provider visits. Research assistants identified patients as Spanish or Chinese language-discordant with their providers by asking if they preferred an interpreter for their visit. They then received either RSMI or usual and customary (U&C) interpreting services.

Data Collection and Measures

An intake questionnaire including demographics, and health status and history, was administered to all participants. The questionnaire included an 8-item acculturation scale adapted from an existing instrument.[26]

Interviews were conducted in patients' preferred languages by bilingual interviewers. After completing the questionnaire, participants proceeded to their medical visits. Subsequently, electronic medical records were reviewed in entirety (including outpatient and inpatient visits), and data were abstracted, including physician diagnoses of diabetes and physician ordering and patient completion of diabetes process of care measures.

As this study was part of a larger study assessing medical outcomes among different interpreting methods, a diagnoses of diabetes was not part of the eligibility criteria, but was determined after study enrollment. Diagnoses of diabetes were determined by at least one of the following: 1) physician diagnosis, 2) diabetes medication prescription, 3) elevated glucose (>200; criteria to diagnose diabetes include elevated glucose as well as symptoms of hyperglycemia, however, it was not possible to determine such symptoms as a diagnosis of diabetes was not required for enrollment in the larger study),[27–28] or 4) elevated HbA1C (>7.0%; at the time of this study, HbA1C was not included in the criteria for the diagnosis of diabetes [most recent guidelines recommend a value of ≥6.5% to diagnose diabetes],[28] but a value of <7% was the recommended glycemic goal and thus patients with values above this cutoff were considered likely diabetic).[27] A comorbidity score was calculated for each patient by summing the number of diagnoses (other than diabetes) included in the patient medical record's problem list during the first visit, (ie, hypertension, cardiovascular disease, hypercholesterolemia, depression).

Participants were followed for one year. At each visit research assistants facilitated patient receipt of their assigned method of interpretation.

Intervention

This study investigated the impact of RSMI compared with U&C interpreting on diabetes processes of care. Usual and customary methods included trained interpreters from the hospital interpreter services, ad hoc interpreters (ie, family, friends, untrained staff, volunteers), and commercial over-the-telephone consecutive interpreting service.

Patients categorized as language-discordant were assigned to either RSMI or U&C interpreting. Providers were informed of patient participation and interpreting method, and their consent obtained.

Analysis

Analyses were performed using the interpreting mode to which the patient was exposed using the SAS System, Version 8, SAS Institute, Inc., Cary, NC.

To compare sociodemographic differences between groups and associations with outcomes, we used the chi square test, or Fisher's exact test for categorical variables.

The primary outcomes were physician ordering and patient completion of recommended diabetes processes of care during the study period. Two composite medical care scores were created to test the impact of RSMI vs U&C: 1) physician ordering score, and 2) patient completion score. The American Diabetes Association standards of diabetes care were used as a guideline.[28]

Physician Ordering Score

The score included: A1C testing ordered at initial visit; A1C testing ordered 3 months later; blood pressure (BP) recorded; prescribed BP medication if BP elevated more than once; low-density lipoprotein (LDL) ordered; prescribed statin if LDL>100 or history of cardiovascular disease; prescription of aspirin (for those with cardiovascular disease, >40 years old, or with additional risk factors); referral for smoking cessation counseling (for smokers); nephropathy screening (ordered urinalysis with microalbumin, ordered measurement of serum creatinine); ophthalmology referral; podiatry referral; diabetic nutrition counseling referral; influenza vaccination referral if eligible; pneumococcal vaccination referral if eligible.

Patient Completion Score

The score included: completion of A1C testing at first visit; completion of A1C testing 3 months later; LDL testing completed; attended smoking cessation; completed urinalysis with microalbumin; completed serum creatinine measurement; attended ophthalmology appointment; attended podiatry appointment; completed nutrition counseling; received influenza vaccination; received pneumococcal vaccination.

To calculate the physician ordering and patient completion scores, a denominator was created for each patient by adding one point for each measure for which the patient was eligible; a numerator was created by adding one point for each completed measure. Scores were expressed as ratios.

Student's *t*-test was used to assess the association between interpreting method and diabetes care process scores. The chi-square test was used to assess the association between ordering and completion of individual measures of diabetes care and interpretation method.

All tests were two-sided and the conventional $P<.05$ was considered statistically significant. The Fisher's exact test was used for cell sizes less than 5.

Table 1. Sociodemographics, self-reported health status, and comorbidity scores of enrolled patients, *n* (%)

	RSMI (*n*=21)	U&C (*n*=33)	*P**
Age			
18–24	2 (10)	3 (9)	.98
25–39	4 (19)	7 (21)	
40–49	6 (29)	7 (21)	
50–65	6 (29)	11 (33)	
>65	3 (14)	5 (15)	
Sex			
Male	9 (43)	16 (48)	.69
Female	12 (57)	17 (52)	
Education			
≤ 5th	12 (57)	17 (52)	.93
Grade 8-some HS	4 (19)	6 (18)	
HS grad/Some college-post college	5 (24)	10 (30)	
Years in US			
0–2 years	1 (5)	6 (18)	.56
3–5 years	5 (24)	6 (18)	
6–9 years	3 (14)	5 (15)	
>10 years	12 (57)	16 (48)	
Primary language			
Spanish	17 (81)	25 (76)	.75
Chinese	4 (19)	8 (24)	
Speak English?			
Well	1 (5)	1 (3)	.51
Not well	10 (48)	13 (39)	
Not at all	8 (38)	18 (55)	
Missing	2 (10)	1 (3)	
Acculturation score (quartiles)			
1 (least, 7–10)	7 (33)	10 (30)	.43
2 (11–12)	3 (14)	3 (9)	
3 (13–15)	3 (14)	8 (24)	
4 (most, 16–27)	3 (14)	1 (3)	
Missing	5 (24)	11 (33)	
Self-reported health status			
Good-excellent	3 (14)	3 (9)	.57
Fair-poor	12 (57)	20 (61)	
Missing	6 (29)	10 (30)	
Comorbidity score (quartiles)			
1 (least, 0–4)	4 (19)	5 (15)	.27
2 (5–8)	8 (38)	8 (24)	
3 (9–15)	6 (29)	7 (21)	
4 (16–39)	3 (14)	13 (39)	

RSMI, Remote Simultaneous Medical Interpreting; U&C, usual and customary interpreting
* *P* calculated excluding missing values

RESULTS

Seven hundred eighty-two patients were enrolled in the larger trial; 54 patients were diabetic and language discordant, and included in the nested cohort described in this study. Most of the 54 patients in the cohort (56%) were aged 40–65, 54% had less than a 6th grade education, and 52% had resided in the United States for more than 10 years. Seventy-eight percent were primarily Spanish-speaking, and 22% spoke primarily Chinese. Nearly all (91%) spoke English not well or not at all. Fifty-nine percent reported fair or

poor health status. There were no significant differences in sociodemographic characteristics between the interpreting groups at a level of $P<.05$ (Table 1). There were also no significant differences between groups in the number of physician visits or in patients having a regular source of medical care.

Table 2. Patient completion and physician ordering scores, *n*=54

	RSMI (*n*=21)	U&C (*n*=33)	*P*
Patient completion score*			
Mean (SD)	.29 (.16)	.25 (.13)	.28
Physician ordering score†			
Mean (SD)	.41 (.18)	.37 (.18)	.49

* The patient completion score combined 11 diabetes process of care measures included in ADA recommendations[27–28]

† The physician ordering score combined 15 diabetes process of care measures included in ADA recommendations[27–28]

Primary Outcomes

The mean patient completion score was higher for RSMI patients (.29) than for U&C patients (.25), although this difference was a trend, not statistically significant. The mean physician ordering score was higher in RSMI patients compared with U&C patients (.41 vs .37), but was also a trend (Table 2).

In the analysis of associations between the patient completion score and sociodemographic variables (including primary language, results of the acculturation scale, self-reported health status, and comorbidity score), there were significant differences only between comorbidity scores. Patients who had a comorbidity score in the highest quartile had a mean patient completion score that was higher than those who had a comorbidity score in the first three quartiles (.32 in the fourth quartile, .24 in the third quartile, .27 in the second quartile, .18 in the first quartile, $P=.03$). There were similar significant differences between the physician ordering score and comorbidity quartiles (.46 in the fourth comorbidity quartile, .39 in the third quartile, .35 in the second quartile, .25 in the first quartile, $P<.01$).

Individual Measures of Diabetes Medical Care

There were no significant differences between the groups in patient completion of individual care measures. Rates of completion in the two groups combined were generally low: 20 patients (37% of the total 54) completed HbA1c testing at their initial visit; only 2 patients completed HbA1c testing 3 months after their initial visit; 11 (20%) completed urinalysis with microalbumin; and there were very low rates of attendance at subspecialty referrals (15% attended ophthalmology consultations, 6% attended podiatry appointments, and no patients attended nutrition counseling) (Table 3). For ordering of individual care measures, physicians for RSMI patients were significantly more likely to order influenza vaccinations compared with U&C patients (31% vs 6%, $P=.04$) (Table 4).

DISCUSSION

As the US LEP population continues to grow, concomitant with the increase in diabetes, the study of the impact of interpreting strategies on diabetes care is of great importance.

Our findings showed trends suggesting RSMI may have an advantage over U&C in addressing disparities in diabetes care among LEP patients, although differences in overall patient completion and physician ordering scores were not significant and studies with larger sample sizes are needed. Notably, rates of physician ordering and patient completion of diabetes care measures were distressingly low in our study, and much worse than that described in national studies.[29] While language barriers can adversely impact the effective provision of care,[14–22] other variables including cultural factors, poor health literacy, dissatisfaction with the patient-physician interaction, a lack of linguistically- and culturally-appropriate diabetes educational materials, and time constraints are also likely to be related to receipt of appropriate care.[10,30–34] For example, Ngo-Metzer et al described cultural barriers to care in Asian populations, where patients were reluctant to tell providers of their use of Asian medicine or traditional practices as providers did not understand these treatments and often had negative reactions.[32] Schillinger et al reported worse glycemic control and higher rates of retinopathy among primary care type 2 diabetic patients with inadequate health literacy.[33] Hsu et al described that even in a culturally competent setting with translation services, Chinese speaking patients, compared to those who preferred English, had less baseline diabetes knowledge and a trend toward higher A1c levels, while reading a bilingual diabetes guide partly compensated for the disparity in diabetes knowledge. [10]

Preferred language, a proxy for acculturation,[35–36] may have implications beyond patient-provider communication.[11] For example, in a Spanish-speaking diabetic population, Fernandez et al described that professional interpreters did not enable non-Spanish speaking physicians to elicit patient problems and concerns as effectively as bilingual physicians, but more technical aspects of care such as explanations of process of care and self-care were not associated with physicians' language abilities.[34] Because of its simultaneous

Table 3. Patient completion of individual measures of diabetes medical care, *n* (%)

	RSMI (*n*=21)	U&C (*n*=33)	*P*
A1C 1st visit			
Yes	11 (52)	9 (27)	.12
No	10 (48)	24 (73)	
A1C 3 months later			
Yes	0	2 (6)	.68
No	21 (100)	31 (94)	
LDL testing			
Yes	16 (76)	18 (55)	.19
No	5 (24)	15 (45)	
Urinalysis with microalbumin			
Yes	5 (24)	6 (18)	.88
No	16 (76)	27 (82)	
Serum creatinine			
Yes	19 (91)	28 (85)	.85
No	2 (10)	5 (15)	
Ophthalmology consult			
Yes	2 (10)	6 (18)	.63
No	19 (90)	27 (82)	
Podiatry consult			
Yes	0	3 (9)	.42
No	21 (100)	30 (91)	
Nutrition counseling			
Yes	0	0	>.99
No	21 (100)	33 (100)	
n for those eligible for smoking cessation	0	1	
Smoking cessation			
Yes		0	n/a
No		1 (100)	
n for those eligible for flu shot	16	31	
Received flu shot			
Yes	3 (19)	2 (6)	.32
No	13 (81)	29 (94)	
n for those eligible for pneumovax	21	32	
Received pneumovax			
Yes	4 (19)	8 (25)	.74
No	17 (81)	24 (75)	

Our findings showed trends suggesting Remote Simultaneous Medical Interpreting may have an advantage over usual and customary care in addressing disparities in diabetes care among patients with limited English proficiency…

nature and enhanced privacy, RSMI may have an advantage over U&C in improving interpersonal interactions when there is a language and cultural barrier.[25] Additionally, for technical aspects of care including processes of care that may be less affected by whether the physician is bilingual,[34] RSMI may be a more efficient alternative to U&C methods.[24]

Our study has limitations. Our sample size may be too small to detect significant differences. Because of the small sample size, both trained and ad hoc interpreters were included in the U&C interpreting group. The quality of interpretation may have varied significantly in these methods, which may have affected the outcomes. We did not collect data on providers in this study (the clinic has over 40 providers); differences in providers could potentially have impacted the results. Our diagnosis of diabetes was made after enrollment in the larger study, and was based on chart review only. We therefore may have under or overestimated the number of participants with diabetes.

This study describes a nested cohort of language-discordant diabetic patients participating in a larger study comparing the impact of interpreting methods on diabetes processes of care among LEP patients. Our results demonstrated very low rates of completion of diabetes care measures. A multi-faceted approach is needed to improve the quality of diabetes care in the interpreted medical encounter; this study suggests RSMI may be a key component in such an approach. All physicians and interpreters should receive training in providing culturally competent care (such training is currently available, but not required), and working most effectively in language-discordant encounters. Further, larger studies, and in other languages and health care settings, need to be conducted, and should explore additional patient and physician-related factors influencing diabetes care. Qualitative data are also needed, to understand more about how and why LEP immigrant patients are less likely to receive appropriate care, in order to develop targeted interventions to improve diabetes care.

Table 4. Physician ordering of individual measures of diabetes medical care, *n* (%)

	RSMI (*n*=21)	U&C (*n*=33)	*P*
A1C 1st visit ordered			
Yes	12 (57)	11 (33)	.10
No	9 (43)	22 (67)	
A1C 3 months later ordered			
Yes	1 (5)	9 (27)	.07
No	20 (95)	24 (73)	
LDL ordered			
Yes	16 (76)	18 (55)	.15
No	5 (24)	15 (45)	
n for those eligible for statin prescription	12	10	
Statin prescribed			
Yes	2 (17)	1 (10)	.99
No	10 (83)	9 (90)	
Urinalysis with microalbumin ordered			
Yes	7 (33)	10 (30)	.99
No	14 (67)	23 (70)	
Serum creatinine ordered			
Yes	20 (95)	30 (91)	.99
No	1 (5)	3 (9)	
Ophthalmology referral			
Yes	6 (29)	9 (27)	.99
No	15 (71)	24 (73)	
Podiatry referral			
Yes	3 (14)	6 (18)	.99
No	18 (86)	27 (82)	
Nutrition referral			
Yes	1 (5)	1 (3)	.99
No	20 (95)	32 (97)	
n for those eligible for smoking cessation	0	1	
Smoking cessation referral			
Yes		1 (100)	n/a
No		0	
n for those eligible for flu shot	16	31	
Flu shot referral			
Yes	5 (31)	2 (6)	.04
No	11 (69)	29 (94)	
n for those eligible for pneumovax	21	32	
Pneumovax referral			
Yes	6 (29)	8 (25)	.99
No	15 (71)	24 (75)	
BP recorded			
Yes	17 (81)	30 (91)	.41
No	4 (19)	3 (9)	
n for those eligible for BP med	14	23	
BP med prescribed			
Yes	5 (36)	8 (35)	.99
No	9 (64)	15 (65)	
n for those eligible for aspirin therapy	17	21	
Prescribed aspirin			
Yes	0	5 (24)	.05
No	17 (100)	16 (76)	

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