

Identification of Linguistic Barriers to Diabetes Knowledge and Glycemic Control in Chinese Americans With Diabetes

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The Asian-American population, a fast-growing minority group in America (1), is more likely to have type 2 diabetes compared with non-Hispanic whites despite having lower body weight (2–6). Among the diverse Asian immigrants, Chinese Americans make up the largest subgroup (1), of whom 50% live in linguistic isolation (7). Communication problems with health care providers (8) and the lack of culturally appropriate diabetes education (9), among other factors (10,11), may be important contributors to disparities in health (12–15) and diabetes control (16) in Chinese Americans.

In this study, we identified linguistic barriers to diabetes education and care in Chinese Americans and explored the appropriate venues to deliver diabetes information to Chinese-American communities.

RESEARCH DESIGN AND METHODS

Subjects were ethnic Chinese residing in the U.S. Participants (aged 18–70 years) had diabetes for at least 1 year and were taking oral agents and/or insulin. All volunteers can read, write, and speak at least English, Mandarin, or Cantonese. We recruited participants from local Asian community health centers in Boston, New York, New Jersey, and San Francisco, using fliers posted in the clinics, advertisements in local Chinese newspapers, mailings to patients from these clinics, and announcements during community outreach. Volunteers received monetary compensation and a

bilingual (English/Chinese) diabetes guide for participation.

The institutional review board at Joslin Diabetes Center and the community health centers approved the study. Interested participants received a mailing of an invitation letter and an informed consent form. Having answered the questions and after signing the informed consent form, subjects selected a language preference and completed the presurvey and diabetes knowledge test in their preferred language. Afterward, subjects completed reading a bilingual diabetes guide within 4 weeks, repeated the diabetes knowledge test, and returned the postsurvey. The subjects obtained their HbA_{1c} (A1C) levels from their primary care physicians at the time of the participation.

Two bilingual Chinese-American endocrinologists and a dietitian developed the knowledge test about the risk factors for diabetes and influences of diet and exercise. It included 12 questions, written at a 6th grade reading level, and was translated into Chinese of comparable level to the English version. The knowledge test has face validity and showed good internal reliability (Cronbach $\alpha = 0.81$). The same endocrinologists also developed specifically for Chinese Americans the diabetes guide that includes the juxtaposition of English with Chinese content and ethnic-specific foods.

The subjects completed pre- and postsurveys through self-report that assessed demographics, health information, self-care behaviors, history of medical

care, and frequency of medical visits. Thirty-eight of 40 physicians working in the participating community health centers are of Asian descents, averaging 6.6 years of providing service to the study population.

We compared each of the characteristics between language preference groups, English (EPG) or Chinese (CPG), using Student's *t* tests and evaluated within-group pre- and postknowledge test score differences with paired *t* tests. Fisher's exact test and χ^2 were used to analyze categorical and frequency data.

RESULTS— We analyzed data from 52 subjects (40% women, 91% with type 2 diabetes, 22 in the EPG and 30 in the CPG). Compared with the CPG, the EPG was younger (aged 50 ± 14 vs. 63 ± 8 years, $P = 0.002$), lived in the U.S. longer (35 ± 18 vs. 16 ± 10 years, $P < 0.0001$), and was more educated (16 ± 2 vs. 10 ± 4 years, $P < 0.0001$) but had similar duration of diabetes (9 ± 7 vs. 8 ± 5 years, $P = 0.62$). Despite having comparable diabetes care and self-management behaviors (checking blood glucose, checking feet daily, having an annual eye exam, and attending doctor visits regularly, except for more physical activities in the CPG [$P = 0.02$]), the CPG scored lower on the pretest of diabetes knowledge ($62.5 \pm 22.5\%$ vs. $84.5 \pm 15.5\%$, $P < 0.0003$) and showed a trend toward higher A1C levels compared with the EPG ($7.6 \pm 1.4\%$ vs. $6.9 \pm 1.0\%$, $P = 0.09$). Only the CPG improved in diabetes knowledge after reading the diabetes guide (prescore 62.5%, postscore 70.8%, $P = 0.02$). No sex differences were found in the measures mentioned above.

The EPG required translation from family or translational services provided by the community health centers less frequently during doctor visits compared with the CPG (4.5% vs. 34.5%, $P = 0.01$). Those who required translation ($n = 11$) scored lower on the pretest of diabetes knowledge than those who did not need translation ($n = 40$) ($58.3 \pm 21.7\%$ vs. $76 \pm 21.4\%$, $P = 0.02$). Overall, both groups obtained diabetes information mostly from the newspaper and their doctors; however, the EPG

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Abbreviations: CPG, Chinese preference group; EPG, English preference group.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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Table 1—Major sources of diabetes information

	CPG	EPG	P
Medical sources			
Doctors	60.0	86.4	0.06
Hospitals	36.7	45.5	0.58
Clinics	26.7	68.2	0.005
Dieticians	20.0	36.4	0.22
Nurses	10.0	31.8	0.08
Diabetes educators	3.3	36.4	0.003
Pharmacists	3.3	18.2	0.15
Case manager/social workers	0.0	13.6	0.07
Mental health counselors	0.0	4.6	0.42
Exercise physiologists	0.0	9.1	0.17
Written material sources			
Books	30.0	50.0	0.16
Magazines	23.3	54.6	0.04
Pamphlets	20.0	54.6	0.02
Media sources			
Newspaper	66.7	68.2	1.0
Television	32.4	64.7	0.04
Internet	6.7	36.7	0.01
Radio	6.7	22.7	0.12
Health fairs	3.3	27.3	0.03

Data are percent.

had significantly more exposure to diabetes educators (Table 1).

CONCLUSIONS— In this pilot study, we have shown that despite following standard diabetes self-management recommendations to a comparable degree and receiving health care in a culturally competent setting, individuals who spoke Chinese as their preferred language, even with the use of translation services, had less baseline diabetes knowledge and showed a trend toward higher A1C levels than those who spoke English as their preferred language. Reasons for these findings may be severalfold. More recent immigrants tend to prioritize social adaptation and economic survival over health-related needs (17), contributing to health disparities as seen in the CPG. Because of the scarcity of diabetes information in the Chinese language in the U.S. (9), language barriers further limited the CPG's ability to access and comprehend diabetes information in English, leading to lower score in baseline diabetes knowledge. However, the disparity in diabetes knowledge was partly compensated by the reading of the diabetes guide, suggesting that education materials written in accordance to their culture, dietary habits, and language are important even when the CPG routinely receives diabetes care in a culturally and linguistically competent setting. In conclusion, Chinese immigrants who speak limited or no En-

glish may encounter more barriers to achieving optimal diabetes outcomes than English-speaking Chinese-American immigrants. Equally important to employing culturally competent health care providers or instituting interpreter services, health care institutions must utilize diabetes educational materials as an essential part of an overall approach to providing culturally oriented and linguistically appropriate diabetes care.

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References

1. Asian Pacific American Heritage Month: May 2005 [article online], 2005. U.S. Census Bureau, 2000 (CB05-FF.06-2). Available from http://www.census.gov/press-release/www/releases/archives/facts_for_features_special_editions/004522.html. Accessed 1 November 2005
2. National Institute of Diabetes and Digestive and Kidney Diseases: Diabetes in Asian and Pacific Islander Americans, 1999 (Publ. no. 01-4667)
3. Fujimoto WY: Diabetes in Asian and Pacific Islander Americans. In *National Diabetes Data Group, Diabetes in America*. 2nd ed. Bethesda, MD, National Institute of Diabetes and Digestive and Kidney Dis-

- eases, National Institutes of Health, 1995, p. 661–681 (NIH publ. no. 95-1468)
4. Sloan NR: Ethnic distribution of diabetes mellitus in Hawaii. *JAMA* 183:123–128, 1963
5. Carter JS, Pugh JA, Monterrosa A: Non-insulin-dependent diabetes mellitus in minorities in the United States. *Ann Intern Med* 125:221–232, 1996
6. McKneely MJ, Boyko E: Type 2 diabetes prevalence in Asian Americans: results of a national health survey. *Diabetes Care* 27: 66–69, 2004
7. Reeves T, Bennett CE: We the people: Asians in the United States [article online], 2004. U.S. Census Bureau 2000 Special Reports (CENSR-17). Available from <http://www.census.gov/prod/2004pubs/censr-17.pdf>. Accessed 1 November 2005
8. Ngo-Metzger Q, Massagli MP, Clarridge BR, Manocchia M, Davis RB, Iezzoni LI, Phillips RS: Linguistic and cultural barriers to care: perspectives of Chinese and Vietnamese immigrants. *J Gen Intern Med* 18:44–52, 2003
9. Wilson E, Wardle EV, Chandel P, Walford S: Diabetes education: an Asian perspective. *Diabet Med* 10:177–180, 1993
10. Schillinger D, Grumbach K, Piette J, Wang F, Osmond D, Daher C, Palacios J, Sullivan GD, Bindman AB: Association of health literacy with diabetes outcomes. *JAMA* 288:475–482, 2002
11. Rankin SH, Galbraith ME, Huang P: Quality of life and social environment as reported by Chinese immigrants with non-insulin-dependent diabetes mellitus. *Diabetes Educ* 23:171–177, 1997
12. Smedley B, Stith A, Nelson A: *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC, Institute of Medicine Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care, National Academy Press, 2002
13. Taira DA, Safran DG, Seto TB, Roberts WH, Tarlov AR: Asian-American patient ratings of physician primary care performance. *J Gen Intern Med* 12:237–242, 1997
14. Murray-Garcia JL, Selby JV, Schmittiel J, Grumbach K, Quesenberry CP Jr: Racial and ethnic differences in a patient survey: patients' values, ratings, and reports regarding physician primary care performance in a large health maintenance organization. *Med Care* 38:300–310, 2000
15. Ngo-Metzger Q, Legedza ATR, Philips RS: Asian Americans' reports of their health care experiences: results of a national survey. *J Gen Intern Med* 19:111–119, 2004
16. Karter A, Ferrara A, Lin JY, Moffet HH, Ackerson LM, Selby JV: Ethnic disparities in diabetic complications in an insured population. *JAMA* 287:2519–2527, 2002
17. Penn NE, Kar S, Kramer J, Skinner J, Zambrana RE: Ethnic minorities, health care systems, and behavior. *Health Psychol* 14: 641–646, 1995