

ORIGINAL ARTICLE

Effects of Limited English Proficiency and Physician Language on Health Care Comprehension

Elisabeth Wilson, MD, MPH,¹ Alice Hm Chen, MD, MPH,^{2,3} Kevin Grumbach, MD,^{1,4} Frances Wang, MS,^{2,4} Alicia Fernandez, MD^{2,4}

¹Department of Family and Community Medicine, University of California, San Francisco, Calif, USA; ²Division of General Internal Medicine, University of California, San Francisco, Calif, USA; ³Asian & Pacific Islander American Health Forum, USA; ⁴Primary Care Research Center, San Francisco General Hospital, San Francisco, Calif, USA.

OBJECTIVE: To determine the effect of limited English proficiency on medical comprehension in the presence and absence of language-concordant physicians.

DESIGN, SETTING, AND PARTICIPANTS: A telephone survey of 1,200 Californians was conducted in 11 languages. The survey included 4 items on medical comprehension: problems understanding a medical situation, confusion about medication use, trouble understanding labels on medication, and bad reactions to medications. Respondents were also asked about English proficiency and whether their physicians spoke their native language.

MEASUREMENTS AND MAIN RESULTS: We analyzed the relationship between English proficiency and medical comprehension using multivariate logistic regression. We also performed a stratified analysis to explore the effect of physician language concordance on comprehension. Forty-nine percent of the 1,200 respondents were defined as limited English proficient (LEP). Limited English-proficient respondents were more likely than English-proficient respondents to report problems understanding a medical situation (adjusted odds ratio [AOR] 3.2/confidence interval [CI] 2.1, 4.8), trouble understanding labels (AOR 1.5/CI 1.0, 2.3), and bad reactions (AOR 2.3/CI 1.3, 4.4). Among respondents with language-concordant physicians, LEP respondents were more likely to have problems understanding a medical situation (AOR 2.2/CI 1.2, 3.9). Among those with language-discordant physicians, LEP respondents were more likely to report problems understanding a medical situation (AOR 9.4/CI 3.7, 23.8), trouble understanding labels (AOR 4.2/CI 1.7, 10.3), and bad medication reactions (AOR 4.1/CI 1.2, 14.7).

CONCLUSION: Limited English proficiency is a barrier to medical comprehension and increases the risk of adverse medication reactions. Access to language-concordant physicians substantially mitigates but does not eliminate language barriers.

KEY WORDS: language; comprehension; ethnic groups; access to health care; Latinos; immigrants; communication.

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Address correspondence and requests for reprints to Dr. Fernandez: Building 10, Ward 13, San Francisco General Hospital, 1001 Potrero Avenue, San Francisco, CA 94110 (e-mail: aliciaf@itsa.ucsf.edu).

According to the 2000 Census, nearly 18% of U.S. residents 5 years of age or older speak a language other than English at home. More than 21 million (8%) speak English less than "very well." In California, one of the most diverse states in the country, nearly 40% of residents speak a language other than English at home and 1 in 5 speaks English less than "very well."¹

A growing body of research suggests that language barriers encountered in health care settings may compromise the quality of care for limited English-proficient (LEP) patients. Language barriers appear to decrease access to primary and preventive care,²⁻¹¹ impair patient comprehension,^{12,13} decrease patient adherence,^{14,15} and diminish patient satisfaction.¹⁶⁻²⁰ While use of untrained, ad hoc interpreters can result in miscommunication,²¹⁻²⁵ use of trained medical interpreters and professional interpreter services can improve communication,^{26,27} satisfaction,²⁸ and adherence²⁹ among LEP patients. A few studies have also indicated that the use of language-concordant physicians is associated with improved patient understanding,¹² interpersonal processes of care,³⁰ self-reported health status,³¹ and patient recall.³²

The current literature, however, has been limited by recruitment in patient care settings, relatively small sample sizes, and inclusion of few languages other than Spanish. The broader impact of language barriers on patient comprehension and the associated effects of access to language-concordant physicians remain unexplored. The goal of this study was to investigate the effects of language barriers in a linguistically diverse population-based sample, determine the extent to which limited English proficiency contributes to difficulty with medical comprehension, and explore the effects of language-concordant physicians on comprehension.

METHODS

As part of an initiative to raise awareness of language barriers in health care settings, a statewide telephone survey was conducted in 11 languages, excluding English, to assess Californians' knowledge, attitudes, and experiences with the health care system. The survey was conducted by Bendixen & Associates on behalf of New California Media in June 2003, prior to the initiation of a media campaign to educate ethnic communities about language access issues.³³

Respondent phone numbers were initially chosen by ethnic encoding, a method developed for multilingual polling to

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identify an ethnicity-specific probability sample using the U.S. Census to determine geographic distribution. To be included in the survey, respondents had to be 18 years or older, had to identify themselves as members of 1 of the ethnic groups targeted by the survey, and indicate a preference for being interviewed in 1 of 11 non-English languages. The survey was concluded when 1,200 serial respondents fulfilling inclusion criteria had been interviewed in the following languages: 100 in Cambodian, 100 in Vietnamese, 100 Iranians in Farsi, 100 in Armenian, 100 Chinese in either Cantonese or Mandarin, 100 in Korean, 100 Filipinos in Tagalog, 100 Hmong in Mien, 100 in Russian, and 300 Latinos in Spanish. The response rate of 74% was calculated by dividing the number of interviews conducted by the number of people contacted who fulfilled the inclusion criteria (1,285/1,724).

Survey questions were developed through an iterative consensus process that included 2 members of the study team (E.W., A.C.) and the executive directors of New California Media and Bendixen & Associates. Translation of survey questions was performed using a 2-step process, with 2 sets of independent translators. The survey was pretested by telephone administration using a sample selected by ethnic encoding who fulfilled the study inclusion criteria. For each of the 11 languages, 10 pretest interviews were performed.

Survey Description

The final survey contained 48 questions addressing issues of health care access, satisfaction, understanding, and knowledge. Although there is no standardized definition for LEP, we used the widely accepted U.S. Census question “How well do you speak English?” (scored on a 4-point scale) to assess English proficiency. Respondents were defined as LEP if they responded “not well” or “not at all.” Respondents who answered “very well” and “well” were considered English proficient. This definition of LEP is consistent with U.S. Department of Justice guidance.³⁴

Medical comprehension was explored using 4 questions from the survey: “Have you ever had a problem understanding a medical situation because it was not explained in (respondent language)?”; “Do you agree or disagree with the following statement: I am often confused about how to use my prescription medicines?”; “Do you ever have trouble understanding the label on prescription medicines?”; and “Have you ever gotten sick or had a bad reaction to a prescription medicine because you did not understand the instructions?” Response categories included “yes,” “no” (or “agree,” “disagree”), and “don’t know/not applicable.” Respondents were considered to have a usual source of care if they responded “yes” to the question “Is there a particular doctor’s office, clinic or health center that you usually go to if you are sick or need advice about your health?” Respondents with a regular source of care were also asked “Does your doctor speak (respondent language)?” Those who responded “yes” were considered to have language-concordant physicians and those who responded “no” were considered to have language-discordant physicians. Respondents with language-discordant physicians were also asked: “Who helps you communicate with your doctor—a professional interpreter, a staff person at your doctor’s office, a family member, a friend or do you do the best that you can in English?” Those who responded that a “professional interpreter” or “staff

member” helped them communicate were considered to have used interpreters.

Statistical Analysis

We used odds ratios (ORs) and χ^2 analysis to compare responses between LEP and English-proficient individuals to the 4 questions on medical comprehension. We then used logistic regression models to isolate the effect of language proficiency from that of age, sex, education, insurance, income, years in the U.S., ethnicity, and having a usual source of care. Finally, we performed a stratified analysis to examine comprehension problems for LEP and English-proficient respondents in the presence and absence of language-concordant physicians. Interaction models were developed to confirm all stratified results. We also tested our hypotheses by individual language/ethnic group. While sample size limitations prevented us from using logistic regression models, we repeated our stratified analyses after dividing respondents into Spanish-speaking and non-Spanish-speaking groups, reasoning that comprehension problems may be more prevalent among respondents who do not speak Spanish, California’s most prevalent non-English language.

“Don’t know/not applicable” and missing responses to the 4 questions on medical comprehension accounted for 3% to 11% of total responses and were excluded from the analysis. To assess the potential bias introduced by these responses, we performed sensitivity analyses adding all the “don’t know” and missing responses to the LEP respondents who replied “no” or “disagree” to the questions on comprehension. We then repeated the comparison between LEP and English-proficient respondents as described above, with no significant change in results.

RESULTS

The demographic characteristics of survey respondents are shown in Table 1. Five hundred and ninety-two (49%) of the 1,200 respondents were defined as LEP. Limited English-proficient respondents were significantly more likely than English-proficient respondents to be elderly, female, less educated, low income, uninsured or publicly insured, to have been in the U.S. for a shorter period of time, and to have a language-concordant physician. Limited English-proficient and English-proficient respondents were equally likely to report having a usual source of care. Different ethnic groups in our sample had widely varying proportions of respondents who were LEP.

Table 2 compares reports of problems with medical comprehension by English proficiency. Limited English-proficient respondents were significantly more likely than their English-proficient counterparts to report problems understanding a medical situation (OR 3.7/confidence interval [CI] 2.9, 4.8), confusion about how to use medication (OR 1.6/CI 1.3, 2.1), trouble understanding a medication label (OR 2.2/CI 1.7, 2.8), and a bad reaction to medication due to problems understanding the instructions (OR 2.2/CI 1.5, 3.3). After adjusting for potential confounders including age, sex, education, income, insurance, time in the U.S., usual source of care, and language/ethnicity, LEP respondents were still significantly more likely than English-proficient respondents to report problems understanding a medical situation (AOR 3.2/CI 2.1, 4.8) and a bad reaction to medication (AOR 2.3/CI 1.3, 4.4).

Table 1. Characteristics of the Respondents by English Proficiency*†‡

	LEP N=592 N (%)	English Proficient N=608 N (%)	P Values
Age			
18 to 24	35 (6.0)	62 (10.5)	.003*
25 to 44	233 (39.8)	246 (41.6)	
45 to 64	222 (37.9)	219 (37.1)	
65+	96 (16.4)	64 (10.8)	
Sex			
Male	216 (36.5)	278 (46.2)	.0007*
Female	376 (63.5)	324 (53.8)	
Education			
GED or equivalent	221 (38.1)	472 (79.7)	<.0001*
No GED or equivalent	359 (61.9)	120 (20.3)	
Income			
<15,000	203 (46.8)	71 (14.8)	<.0001*
15,000 to 25,000	123 (28.3)	71 (14.8)	
25,000 to 50,000	86 (19.8)	129 (26.9)	
50,000 to 75,000	13 (3.0)	88 (18.3)	
>75,000	9 (2.1)	121 (25.2)	
Insurance			
No insurance	159 (27.9)	83 (14.3)	<.0001*
Public	252 (44.2)	109 (18.7)	
Private	142 (24.9)	384 (66.0)	
Others	17 (3.0)	6 (1.0)	
Years in U.S.			
<5	82 (14.5)	30 (5.7)	<.0001*
5 to 10 years	142 (25.2)	77 (14.6)	
>10 years	340 (60.3)	419 (79.7)	
Language			
Armenian	22 (3.7)	78 (13.0)	<.0001*
Cambodian	63 (10.6)	37 (6.2)	
Cantonese	40 (6.8)	12 (2.0)	
Farsi	21 (3.6)	79 (13.1)	
Hmong	52 (8.8)	45 (7.5)	
Korean	60 (10.1)	38 (6.3)	
Mandarin	18 (3.0)	30 (5.0)	
Russian	35 (5.9)	65 (10.8)	
Spanish	222 (37.5)	78 (13.0)	
Tagalog	10 (1.7)	90 (15.0)	
Vietnamese	49 (8.3)	50 (8.3)	
Usual source of care			
Yes	482 (82.0)	512 (86.1)	0.06
No	106 (18.0)	83 (13.9)	
Language concordance§			
Yes	330 (68.9)	214 (41.4)	<.0001*
No	149 (31.1)	303 (58.6)	

*P < .05.

†Due to rounding, totals may not equal 100%.

‡Missing responses are not included.

§Physician speaks the patient's language.

GED, general equivalency diploma;

LEP, limited English proficient.

Table 2 also compares LEP and English-proficient respondents after stratifying the sample into those who had language-concordant physicians and those who had language-discordant physicians. Over two thirds (69%) of LEP respondents and 41% of English-proficient respondents reported that their physicians spoke their native language. Among respondents with language-concordant physicians, LEP were still significantly more likely than English-proficient respondents to report problems understanding a medical situation (AOR 2.2/CI 1.2,3.9). However, they were no longer more likely than their English-proficient counterparts to report confusion about medication use, trouble understanding labels, or a bad reaction to medications. Among respondents with language-dis-

cordant physicians, LEP respondents were significantly more likely to have problems understanding a medical situation (AOR 9.4/CI 3.7,23.8), trouble understanding medication labels (AOR 4.2/CI 1.7,10.3), and a bad reaction to medications (AOR 4.1/CI 1.2,14.7) than English-proficient respondents. The findings from the stratified analyses were confirmed in a regression model pooling all respondents and including an interaction term for LEP and physician concordance. The interaction term was significant for problems understanding a medical situation and trouble understanding labels on medication ($P < .001$).

Figure 1 illustrates differences in comprehension between LEP and English-proficient respondents in the presence of language-concordant and -discordant physicians. Fifty-seven percent of LEP respondents with language-discordant physicians reported problems understanding a medical situation, compared with 44% of those with language-concordant physicians. (χ^2 , $P < .01$). Fewer English-proficient respondents reported problems understanding medical situations and for these respondents, physician language had no significant effect on comprehension (19% vs 23%, $P > .05$).

Table 3 presents physician language concordance, interpreter use with language-discordant physicians, and comprehension problems for LEP respondents by language/ethnicity. Reports of language-concordant physicians ranged widely, from 16% of LEP Tagalog speakers to 84% among LEP Vietnamese. Use of professional interpreters or staff members among LEP respondents with language-discordant physicians also varied widely. Vietnamese respondents had the highest rates of interpreter use (83%), while no respondents speaking Tagalog or Farsi used interpreters. Cambodian-speaking LEP respondents were the most likely (95%) and Tagalog speakers were the least likely (11%) to report problems understanding a medical situation.

Although sample size limitations prevented further analyses by individual language/ethnicity, respondents were grouped into Spanish speakers and non-Spanish speakers for comparison, and multivariate analysis was repeated. The same association between LEP and comprehension problems, and the same interaction between LEP and physician language concordance, were found in both Spanish-speaking and non-Spanish-speaking groups.

DISCUSSION

To our knowledge, this is the first multilingual, population-based study to focus on the impact of English proficiency and physician language on medical comprehension. In order to isolate the effects of language, we limited the study to ethnic Californians who preferred not to respond in English. We found that LEP respondents were more likely to report problems understanding medical situations, confusion about their medications, trouble understanding medication labels, and bad reactions to medications than their English-proficient counterparts. However, having a language-concordant physician provided significant benefit for LEP respondents. While LEP respondents with language-concordant physicians were still more likely to report problems understanding medical situations than English-proficient respondents, they were no more likely than their counterparts to report confusion about their medications, trouble understanding medication labels, or bad reactions to their medications.

Table 2. Problems with Medical Comprehension by English Proficiency*†

	LEP N=592 N (%)‡	English Proficient N=608 N (%)	LEP vs English Proficient			
			Unadjusted OR (95% CI) N	Adjusted		
				All Respondents AOR (95% CI) N	Language- Concordant Physicians AOR (95% CI) N	Language- Discordant Physicians AOR (95% CI) N
Problem understanding a medical situation	282 (49.0)	121 (20.6)	3.7 (2.9 to 4.8)* 1162	3.16 (2.1 to 4.8)* 813	2.19 (1.2 to 3.9)* 391	9.35 (3.7 to 23.8)* 294
Confused about how to use medication	182 (34.7)	132 (24.4)	1.64 (1.3 to 2.2)* 1066	1.36 (0.9 to 2.1) 755	0.98 (0.5 to 1.9) 368	2.03 (0.8 to 5.2) 279
Trouble understanding label on medication	224 (41.5)	134 (24.6)	2.17 (1.7 to 2.8)* 1084	1.47 (0.96 to 2.3) 763	0.95 (0.5 to 1.8) 374	4.24 (1.7 to 10.3)* 282
Bad reaction to medication due to problem understanding instructions	84 (15.8)	42 (7.8)	2.22 (1.5 to 3.3)* 1074	2.34 (1.3 to 4.4)* 758	1.32 (0.6 to 3.2) 371	4.1 (1.2 to 14.7)* 280

*P < .05.

†Denominators in cells differ due to varying response rates for individual survey items.

‡Number and percentages represent respondents who answered "yes" or "agree" to survey items.

OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio; adjusted for age, sex, education, income, insurance, time in the U.S., usual source of care, language/ethnicity.

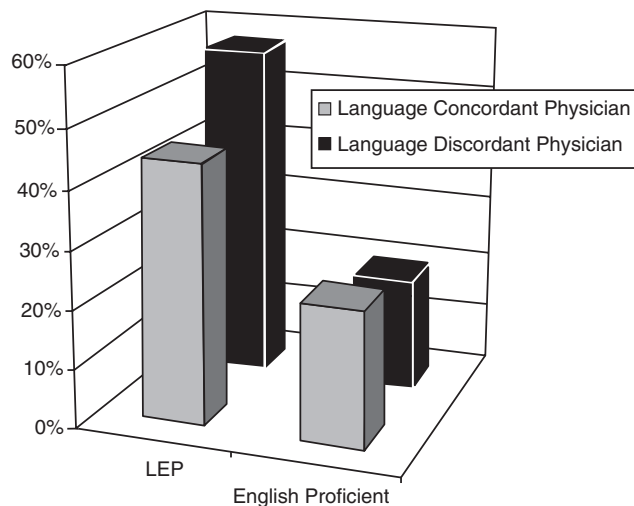
Limited English-proficient respondents were significantly more likely to be older, female, less educated, low income, underinsured, and to have been in the U.S. for a shorter period of time. After adjusting for these demographic and socioeconomic characteristics as well as usual source of care and language/ethnicity, difficulties with medical comprehension persisted. These results highlight 2 important realities that LEP communities encounter in the U.S. health care system. First, LEP status is associated with factors (insurance, income, race/

ethnicity) that have been shown to increase the risk for health disparities.^{35,36} Second, English proficiency is an independent risk factor for difficulty understanding medical situations and reporting problems with medications. It is the combination of these factors that explains the high prevalence of comprehension problem noted in this study. Nearly half of the LEP respondents reported problems understanding a medical situation and over a third reported confusion about how to use a medication.

These findings have broad implications. First, quality improvement efforts to enhance patient safety should recognize LEP patients as a high-risk group. Within this group, LEP patients with language-discordant physicians are at particular risk for problems with medications and understanding medical situations, and require special attention.

Second, access to language-concordant physicians appears effective in reducing reports of adverse medication effects and confusion with medication instructions. This is consistent with previous studies that have examined the impact of language-concordant physicians.^{30,31,37} The potential effect of other language-concordant professionals, such as nurses or pharmacists, should be studied. These results also lend support to policies to increase physician language abilities such as requiring second language proficiency for entry to medical school, providing language retention and enhancement programs for heritage speakers, and admission and preparation policies that increase the number of minority physicians. Language training, however, must be rigorously developed and evaluated to avoid false fluency, which can lead to significant errors in communication.^{21,38}

While increasing physician-patient language concordance may be a particularly effective way to improve comprehension and reduce problems with medications for LEP patients, it is not sufficient. Limiting LEP patients to language-concordant physicians may further segregate the health care system, and



¹ Respondents who answered "yes" to the question: "Have you ever had a problem understanding a medical situation because it was not explained in (respondent language)?" ² Results are unadjusted.

³ P < .01 for limited English-proficient (LEP) comparison; P > .05 for English proficiency comparison.

FIGURE 1. Problems understanding a medical situation by English proficiency and physician language.

Table 3. LEP Respondents Grouped by Language/Ethnicity: Presence of Language-Concordant Physicians, Use of Interpreters, and Problems Understanding a Medical Situation

Total, N (%) [*]	Language-Concordant Physicians 330 (56) [†]	Interpreter Use 67 (46) [‡]	Problems Understanding a Medical Situation 223 (51) [§]
Armenian	14 (64)	3 (75)	6 (35)
Cambodian	24 (38)	15 (32)	58 (95)
Chinese	29 (50)	2 (25)	12 (36)
Farsi	8 (38)	0	9 (75)
Hmong	14 (27)	21 (17)	28 (64)
Korean	33 (55)	1 (25)	15 (39)
Russian	21 (60)	4 (33)	9 (29)
Spanish	140 (63)	16 (41)	68 (38)
Tagalog	6 (16)	0	1 (11)
Vietnamese	41 (84)	5 (83)	26 (59)

^{*}Numbers may vary in different tables due to missing responses.

[†]Column 1: numbers and percentages refer to LEP respondents within each language/ethnic group (row percentages) who answered “yes” to the question: “Does your doctor speak (respondent language)?”

[‡]Column 2: numbers and percentages refer to LEP respondents with language-discordant physicians within each language/ethnic group (row percentages) who answered “professional interpreter” or “staff member” to the question: “Who helps you communicate with your doctor—a professional interpreter, a staff person at your doctor’s office, a family member, a friend, or do you do the best that you can in English?”

[§]Column 3: numbers and percentages refer to LEP respondents within each language/ethnic group (row percentages) who answered “yes” to the question: “Have you ever had a problem understanding a medical situation because it was not explained in (respondent language)?” LEP, limited English proficient.

have unintended consequences in decreasing access to medical resources.³⁹ For logistical and demographic reasons or by personal choice, many LEP patients will still encounter physicians who do not speak their native language fluently. In these circumstances, specific efforts are needed to improve communication in language-discordant encounters. Use of trained medical interpreters has been shown not only to decrease clinically meaningful communication errors,²¹ but also to be an effective way of enhancing the quality of care.²⁹ More recently, health systems have experimented with novel technologies such as remote simultaneous interpreting and video-conferencing interpreting as a way to enhance access to quality interpreting services. Increased access to and adequate funding of professional interpreter services are critical components of any effort to improve health care for LEP patients.

Third, access to a language-concordant physician did not completely mitigate the likelihood of LEP individuals reporting difficulty comprehending medical situations. While these findings may reflect imperfect language concordance or may result from unmeasured confounding factors, they highlight the difficulty that LEP patients encounter in navigating the complex health care system and add empiric evidence to models that posit the importance of cultural and linguistic competence for health systems as a whole, as well as for the individual clinicians working in these systems.

Although this study defined LEP by speaking ability, problems with medical comprehension may also reflect limited English reading proficiency or limited functional health literacy (FHL). Research has demonstrated the negative effects of inadequate FHL on self-rated health,⁴⁰ patient knowledge and understanding,^{41–43} health services utilization,⁴⁴ and disease management.⁴⁵ A recent study found that patients with inadequate FHL were more likely to report worse communication in several domains, suggesting that poor FHL may be a marker for oral communication.⁴⁶ Our study did not ask about the availability of translated materials or attempt to measure respondent FHL, but given the effect of FHL on oral communication, future research should examine both literacy and language barriers. This may be particularly important when

designing interventions. For example, medication directions and labels could be printed in the patient’s language at appropriate literacy levels with verbal explanations given by a language-concordant pharmacist or via a trained interpreter.

This study has several limitations. The study sample was confined to California and limited to respondents from a probability sample of ethnic encoding and therefore may not be representative of all LEP communities. LEP individuals in areas with more recent increase in linguistic diversity, such as Georgia, South Carolina, and Nevada are likely to have less access to language-concordant physicians, and therefore more difficulty with medical comprehension. Second, the sample was limited to immigrants who preferred to answer the survey in their native language and may not generalize to immigrants who would prefer to answer a survey in English. We limited the study to respondents answering in their native language, reasoning that immigrants who prefer to respond in English would be more acculturated to the U.S. health care system and might therefore find medical situations less confusing. Third, the survey did not directly verify medical comprehension or adverse medication events. However, patient understanding is an important component of effective medical decision making⁴⁷ and patients who report adverse medication effects are less likely to adhere to medication instructions.⁴⁸ Fourth, the study sample was not large enough to fully explore differences between LEP and English-proficient respondents by specific ethnic groups, nor was the survey designed to investigate the possible effects of culture on comprehension problems. However, the finding that some language/ethnic groups were more likely to report comprehension problems despite high rates of interpreter use underscores the importance of designing culturally appropriate interventions to reduce language disparities.

Finally, the high rates of physician language concordance were unexpected. Anecdotal evidence suggests that LEP patients may be willing to travel long distances to consult a language-concordant physician, and prior research has demonstrated concordance rates among Vietnamese patients comparable to those found in this study.^{49,50} However, it is also

possible that respondents misunderstood the question and included non-physician clinicians or office staff in their assessment of physician language concordance. High rates of language concordance may also reflect a geographic clustering of respondents from a particular language/ethnic group in a community with at least 1 language-concordant physician available to these individuals. Unfortunately, the survey data did not include information on the place of residence of respondents. It should also be noted that English-proficient respondents may not have been as proficient as reported, given that all respondents preferred to be interviewed in a language other than English. If this was the case, however, our findings would only underestimate the differences between LEP and English-proficient individuals.

In summary, this study is the first to describe differences in medical comprehension between LEP and English-proficient respondents from a large, linguistically diverse population-based sample. We found that LEP individuals report more difficulty understanding medical situations and medication use than their English-proficient counterparts, but that access to a language-concordant physician substantially reduces the risk of comprehension problems among LEP individuals. Efforts to reduce language barriers and improve the quality of care for LEP patients should target increasing the number of language-concordant physicians, enhancing use of professional interpreters in linguistic-discordant encounters, and facilitating the linguistic competence of the health care system as a whole.

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