POPULATIONS AT RISK

Impact of Interpreter Services on Delivery of Health Care to Limited–English-proficient Patients

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OBJECTIVE: **To determine whether professional interpreter services increase the delivery of health care to limited–English-proficient patients.**

DESIGN: **Two-year retrospective cohort study during which professional interpreter services for Portuguese and Spanish-speaking patients were instituted between years one and two. Preventive and clinical service information was extracted from computerized medical records.**

SETTING: **A large HMO in New England.**

PARTICIPANTS: **A total of 4,380 adults continuously enrolled in a staff model health maintenance organization for the two years of the study, who either used the comprehensive interpreter services (interpreter service group [ISG]; *N* = 327) or were randomly selected into a 10% comparison group of all other eligible adults (comparison group [CG]; *N* = 4,053).**

MEASUREMENTS AND MAIN RESULTS: **The measures were change in receipt of clinical services and preventive service use. Clinical service use and receipt of preventive services increased in both groups from year one to year two. Clinical service use increased significantly in the ISG compared to the CG for office visits (1.80 vs 0.70; *P* < .01), prescriptions written (1.76 vs 0.53; *P* < .01), and prescriptions filled (2.33 vs 0.86; *P* < .01). Rectal examinations increased significantly more in the ISG compared to the CG (0.26 vs 0.02; *P* = .05) and disparities in rates of fecal occult blood testing, rectal exams, and flu immunization between Portuguese and Spanish-speaking patients and a comparison group were significantly reduced after the implementation of professional interpreter services.**

CONCLUSION: **Professional interpreter services can increase delivery of health care to limited–English-speaking patients.**

KEY WORDS: **communication barriers; ethnic groups; health service delivery; interpreter services; language.**
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We clinicians are better educated and more scientific than ever before, but we have a great failing: we sometimes do not communicate effectively with our patients or with their families.[1] The conversation between physician and patient has long been recognized to be of diagnostic import and therapeutic benefit. Unfortunately, many patients in the United States cannot benefit from this fundamental interaction because of language barriers. According to the 1990 Census, nearly 32 million people living in the United States do not speak English as their primary language.[2] This represents 14% of the total U.S. population and up to 36% of the population of some states.[2] These limited–English-proficient (LEP) patients may not receive needed health care or the standard of care as a result of a lack of interpreter and other services in their primary language.[3] While the provision of interpreter services has been the standard solution to language barriers,[4,5] the use and actual benefit of these services has been little studied.

Several studies have found that patients who cannot speak English well receive less than optimal health care and are at greater risk of not receiving preventive and other services. Woloshin et al. found that Canadian women whose main spoken language is not English were less likely to receive mammograms, breast examinations, and Pap smears than are English-speaking Canadian women.[6] Comparing primarily Spanish-speaking Mexican-American patients with other Latino patients, Hu and Covell found Spanish-speakers were less likely to have a regular source of primary care or to receive timely eye, dental, and physical examinations.[7] The Hispanic Health and Nutrition

Examination Survey also found and association between primary language spoken and receipt of preventive services in Mexican-American patients.[8] Other studies have found that patients have fewer physician visits[9] and are less likely to return for follow-up visits after being seen in the emergency department[10] when compared to patients with better English proficiency. Limited–English-proficient patients are also less satisfied with their health care. Latinos who speak Spanish have been shown to be less satisfied with their communication with health care providers,[11–13] the care they receive,[12] and more likely to report overall problems with care[12] than are English speakers.

Despite this differential in care and satisfaction, several national surveys indicate that many health care organizations do not provide interpreter services or provide inadequate services.[14,15] Most of these services are inadequate because they are not planned or staffed to allow for timely access to trained interpreters.[14,15] In many instances interpreter services are ad hoc, consisting of use of other patients, family, friends, untrained nonclinical employees, and nonfluent health care professionals as interpreters.[14,15] Use of ad hoc services appears to have many negative clinical consequences including reduced trust in physicians,[16] lower patient satisfaction,[13] breach of patient confidentiality,[17] inaccurate communication,[18,19] misdiagnosis,[20] inadequate or inaccurate treatment,[16] and reduced quality of care.[6]

The objective in instituting interpreter services is to reduce language barriers to access to care and potentially improve care, yet there have been few studies of their effectiveness. The research that has been done suggests that communicating to patients in their own language improves patient compliance and understanding of their disease[21,22] and that the quality of interpretation correlates with patient understanding and satisfaction with the encounter.[13,22] The key question remains whether institution of an adequate program of professional interpreter services affects the delivery of health care services to LEP patients.

Taking advantage of the implementation of a new interpreter service program in a large HMO, we conducted a retrospective cohort study to determine whether the implementation of professional interpreter services affected the delivery of health care to limited–English-speaking patients. Specifically, we examined whether the new interpreter services increased the receipt of clinical and preventive health services among LEP patients as a means of investigating our hypothesis that these services would enhance patient access to care.

METHODS

Study Setting and Data Sources

Harvard Pilgrim Health Care (HPHC) is the largest managed care organization in New England. This two-year retrospective study was conducted at 4 of 14 staff model health centers where new interpreter services for Spanish- and Portuguese-speaking patients were implemented in June of 1996. The new services differed fundamentally from the previously provided services in three important ways: 1) They were staffed by sufficient numbers of trained medical interpreters. Interpreters were added to each clinic and relieved of any other job responsibility. Training was 50 hours in duration and included instruction on medical vocabulary, the ethics of patient confidentiality, and how to work in a triadic interaction between patient, physician, and interpreter. All interpreters passed an assessment exam at the end of training; 2) Interpreters were scheduled simultaneously with physician visits, and once patients were "flagged" as needing an interpreter they had one scheduled at all subsequent visits; and 3) Interpreters were available to help patients 24 hours a day either by phone or for walk-in visits and at all points in the system, including appointment scheduling, laboratory, radiology, and pharmacy visits. Limited–English-proficient patients who did not speak Spanish or Portuguese continued to receive the ad hoc interpreter services, consisting mainly of family and staff and a few designated interpreters who did not receive this extensive training.

Harvard Pilgrim Health Care's staff model health centers have fully automated medical and pharmacy record data files. The medical record files contain all demographic data and clinical data, including documented completion of recommended preventive services and counseling on drug, alcohol, and tobacco use, and hospital, emergency room, urgent care, health center, and phone dates of service. Data files include service use and billing throughout the entire health plan regardless of site of delivery. Automated pharmacy records contain all medications dispensed from any of the on-site pharmacies. Pharmacy records include only within plan pharmacy use, but because of prescription coverage the majority of patients fill their prescriptions within the plan.[23] Preventive screening is encouraged through internal guidelines and a computerized reminder system that prompts providers to conduct age and gender appropriate screening at intervals set in the guidelines. The Human Studies Committee of Harvard Pilgrim Health Care approved the use of these records for this study.

Study Population

HMO members were eligible for the study if they were adults who were at least 18 years of age at the beginning of the study, were enrolled in one of the health centers where the new interpreter services were implemented, and were continuously enrolled in the HMO from June 1, 1995, through June 1, 1997. Eligible members who accessed care at one of the health centers and used the new comprehensive interpreter services at least once during year two of the study were included in the interpreter service group (ISG). A 10% random sample of all other eligible members who had accessed care at one of the same four health centers at least once during year two of the

study were included in the comparison group (CG). A few persons in the CG were likely to be drawn from the less than 1% of LEP members at these four health centers who were not Spanish- or Portuguese-speaking and therefore did not receive the new interpreter services. The two study groups were followed over the same time period with the aim of examining how use of services changed from year one to year two in each group and how the changes in interpreter service group (ISG) differed from those of the comparison group (CG). The CG functioned as a control for secular trends in health care service use at the four study health centers that were independent of the effect of implementation of interpreter services.

Study Measures

The data abstracted from the automated medical record system included demographic information, clinical service use, prescription use, and preventive service delivery. The demographic characteristics included age, gender, date of enrollment, median income for the ZIP code of residence, and use of Spanish and Portuguese interpreter services. Primary language spoken at home and use of ad hoc interpreter services were rarely documented and therefore were not included. Clinical service use measures included numbers of office visits, health center phone contacts, health center urgent care visits, health center urgent care phone calls, and number of prescriptions written and number of prescriptions filled, including new prescriptions and refills. The preventive service measures included those encouraged yearly by the HMO: mammograms completed for women aged 50 years or older, breast examinations and Pap smears in women aged 18 years or older, fecal occult blood testing completed in patients aged 50 years or older, rectal exams in men aged 40 years or older, and flu immunizations in patients aged 65 years or older. All measures that depended on patient age were taken only on patients who met the age requirement at the beginning of the study. Physicians were given a reminder to complete all screening measures once a year with the exception of risk behavior screening.

Statistical Analyses

Our general analytic framework was to compare the receipt of clinical services and preventive service use before and after the implementation of adequate interpreter services. We conducted separate analyses of count and binary data, measuring clinical service use and preventive service receipt respectively. For clinical service use, we assessed the difference in clinical service use from year one to year two in the ISG and CG and compared the difference between these two groups in the change in use of clinical services from year one to year two. For preventive services, we assessed the difference in preventive service receipt from year one to year two in the ISG and CG; and we compared the difference between the ISG and CG in the change in receipt of services from year one to year two. We also calculated the odds of preventive service receipt in the ISG in year one and year two as a means of checking whether odds of receiving preventive services increased between year one and year two. We could not directly compare clinical service use between the two groups because we did not have data to allow us to adjust these rates for differences in disease burden between them. All data analyses were performed using STATA (STATA Corp, College Station, Tex).

For clinical service use the units of analyses were the number of times each clinical service was used per person per year and mean change in number from year one to year two for each service. Paired t tests were used to assess the difference in the number of times a clinical service was used from year one to year two within each of the groups. The differences between the two groups in the number of times a clinical service was used was assessed with two-sample unpaired t tests using the difference between year two and year one as the response variable for each subject. Ordinary least-squares regression analyses of the within-subject differences were used to assess group effects on the change in number while controlling for differences between the groups in baseline characteristics.

For preventive service receipt the units of analyses were the number of each service delivered per person per year and the mean change in number from year one to year two for each service. McNemar's χ^2 tests were used to assess the difference in receipt of each preventive measure from year one to year two within each of the groups. The difference between the two groups in the change in preventive service receipt before and after controlling for differences between the ISG and CG in baseline characteristics was assessed using conditional logistic regression analyses. Two-sample χ^2 tests of independence were used to compare the odds of preventive service receipt in the ISG and the CG in year one and then in year two. Logistic regression analyses were used to assess group effects on receipt of preventive services in each year while controlling for differences between the groups in baseline characteristics.

The conditional logistic regression model used in the analysis of the preventive service use data assumes a subject specific item, which (1) automatically accounts for the correlation among the repeated measures on each subject and (2) implies that the regression coefficients have a within subject interpretation. The model of inference includes group assignment, year, and the interaction between the two. The effect of interest is captured by the interaction term, expressing the degree to which services to the ISG increased from year one to year two, relative to the increase experienced by the CG.

RESULTS

A total of 327 patients were eligible to be included in the ISG and 4,053 in the CG (Table 1). The majority of

Table 1. Sociodemographic Characteristics by Study Group

Characteristic	Interpreter Group (*N* = 327)	Comparison Group (*N* = 4053)	*P* Value
Mean age, y (SD)	46 (13)	43 (14)	<.01
Female, *n* (%)	239 (63)	2330 (57)	.04
Mean duration of enrollment, y (SD)	3.48 (1.12)	3.57 (1.10)	.14
Median income*, $ (SD)	31,647 (559)	40,567 (169)	<.01
Language of interpreter service use, *n* (%)			NA
Portuguese	70 (21)	0	
Spanish	257 (79)	0	

* *ZIP code of residence, 1990 Census.*

patients in the ISG spoke Spanish (*n* = 257). Baseline characteristics of the two groups are provided in Table 1. Relative to the comparison group, the ISG had more females (63% vs 57 %; $P < .05$), was older (mean age = 46 ± 13 years vs 43 ± 14 years; $P < .01$), and lived in a ZIP code with a lower median income ($P < .01$). Mean years of enrollment were similar in the two groups. Adjustment was made for each of these differences between the groups in regression analyses.

Clinical Service Use

Clinical service use in each group in year one and the change from year one to year two are summarized in Table 2. Overall there was a significant increase in clinical service use in both groups for all but one of the 6 measures. Urgent care calls increased significantly in the CG but not in the ISG.

For three of the six measures, the increase in the ISG was significantly greater in the ISG than the CG. There was a significantly greater increase in number of office visits made in the ISG of 1.8 visits per person per year over the study period compared to 0.7 in the CG ($P < .01$). There was a significantly greater increase in the number of prescriptions written for the ISG of 1.76 prescriptions per person per year over the study period relative to 0.53 in the comparison group ($P < .01$). There was a significantly greater increase in the number of prescriptions filled by the interpreter service group of 2.33 prescriptions per person per year over the study period relative to 0.86 in the comparison group. Adjustment for gender, age, and median income in linear regression models produced similar results (Table 3).

Preventive Services Receipt

Results from the analysis to assess the change in receipt of preventive services in each group from year one to year two are summarized in Table 4. Overall there was an increase in receipt of preventive services in both groups in all measures. There was a statistically significant increase for one of the services in the CG: mammograms increased by 0.10 per person-year ($P < .01$). The increase in preventive service receipt in the CG ranged from 0.01 to 0.10 per person-year, while the increases in the ISG ranged from 0.01 to 0.26 per person-year. Despite the smaller sample size of the ISG, the increase for rectal exams of 0.26 per man over age 40 ($P = .02$) was statistically significant. There was one significant difference between the ISG and CG in the change in receipt of rectal examinations. Rectal examinations increased significantly more in the ISG as compared to the CG (0.26 vs 0.02; $P = .05$; not shown). The difference in rectal examination was not significant after adjusting for differences between the two groups in age, gender, and median income in a conditional logistic regression model (odds ratio [OR], 2.41, 0.90 to 6.50; $P = .08$; not shown).

The results from the direct comparison of preventive service receipt in the ISG and CG in year one and year two are summarized in Table 5. Results are reported as the OR of receiving each preventive service if an individual is in the ISG compared to the CG in year one and year two. In year one, the ORs for receipt of preventive services in the ISG were significantly less than one for receipt for fecal occult blood testing, rectal exams, and flu immunizations. After the implementation of adequate interpreter services all ORs for receipt of each preventive service increased, except for mammography, and there were no significant differences between the two groups.

Table 2. Clinical Service Use in Year 1 and Change in Use from Year 1 and Year 2*

Service	Interpreter Services Group (*n* = 327)			Comparison group (*n* = 4053)		
	YR1	YR2–YR1	*P* Value†	YR1	YR2–YR1	*P* Value†
Office visits	8.26	1.80	<.01	7.44	0.70	<.01
Phone calls	2.40	0.58	.01	3.21	0.39	<.01
Urgent care visits	1.23	0.24	.05	0.92	0.17	<.01
Urgent care calls	0.17	0.08	.11	0.26	0.29	.04
Prescriptions written	6.06	1.76	<.01	5.34	0.53	<.01
Prescriptions filled	8.32	2.33	<.01	8.64	0.86	<.01

* *Reported as number of each service used per person-year.*

† *Paired* t *tests.*

Table 3. Adjusted Between-group Differences*

Service	Difference†	Adjusted Difference	*P* Value‡
Office visits	1.10	1.08	.02
Phone calls	0.19	0.10	.73
Urgent care visits	0.07	0.06	.62
Urgent care calls	−0.21	0.06	.31
Prescriptions written	1.23	1.44	<.01
Prescriptions filled	1.47	1.28	<.01

* *Adjusted for age, gender, and mean income by ZIP code.*
† *Difference, change in ISG−change in CG.*
‡ *For adjusted difference.*

DISCUSSION

We found that a program of professional interpreter services can increase delivery of health care to limited–English-speaking patients in a large staff model HMO. Patients who used the new interpreter services had a significantly greater increase in office visits, prescription writing, prescription filling, and rectal exams compared to a control group. Disparities in rates of fecal occult blood testing, rectal exams, and flu immunization between Portuguese- and Spanish-speaking patients and a comparison group were significantly reduced after the implementation of professional interpreter services. These findings support our hypothesis that interpreter services enhance LEP patients access to care.

To our knowledge this is the first study to report the effectiveness of an intervention to improve the delivery of health care to a population of limited–English-speaking patients. Multiple studies have revealed the significance of being a limited–English speaker on health[3,7,16,17,20] and utilization of physician services.[7–10] Other studies have shown that use of interpreters whether trained or untrained can improve patient satisfaction, perceived understanding of disease, and compliance with care and follow-up appointments.[21,22] Our study indicates that in an ambulatory care setting a program of professional interpreter services can increase the delivery of therapeutic and preventive care.

There are several mechanisms through which provision of interpreter services could have increased provision of clinical, prescription, and preventive services. The first is through enhanced patient and physician understanding. The services in which there were significant differences between the ISG and the CG may be considered communication sensitive services. Visits may have increased in the ISG because patients are more likely to make and keep an appointment when they are able to adequately communicate with clerical and clinical staff and they understand the importance of the visit. Prescription use may have increased as a result of an improvement in the physician's ability to take an adequate history and answer the patient's questions, increasing the physician's confidence in the diagnosis and the patient's understanding of the risks and benefits of a medication. Patients may have been more likely to fill and refill prescriptions because they understood their purpose and the instructions for taking the medication. Rectal examinations may have increased at such a great rate because adequate communication is essential for consent to and performance of this exam.

Enhanced physician-patient trust and patient satisfaction are two other mechanisms by which provision of professional interpreter services could have increased clinical, prescription, and preventive service use. Increased trust has been correlated with both increased patient adherence and satisfaction,[24] and communication is essential to the establishment of trust in the physician–patient relationship. Trust has been shown to be related to communication-dependent physician characteristics such as understanding, caring, clear and complete communication, partnership building, and question answering.[24–26] Patient satisfaction among LEP patients may also be communication-dependent. Spanish-speaking Latinos have been found to have lower patient satisfaction scores than both Latino and non-Latino English-speakers,[11] and provision of interpreter services have been shown to increase satisfaction among Spanish-speakers.[13] While it has not been documented empirically, greater patient satisfaction likely increases patient proclivity to visit their health center and follow

Table 4. Preventive Service Receipt and Change in Receipt from Year 1 to Year 2*

	Interpreter Services Group (*n* = 327)			Comparison Group (*n* = 4053)		
Service	YR1	YR2−YR1	*P* Value†	YR1	YR2−YR1	*P* Value†
Mammograms	0.57	0.01	.89	0.61	0.10	<.01
Breast exams	0.51	0.06	.24	0.51	0.02	.20
Pap smears	0.56	0.08	.09	0.62	0.01	.35
FOB testings‡	0.44	0.07	.28	0.55	0.02	.35
Rectal exams	0.26	0.26	.02	0.49	0.02	.54
Flu vaccinations	0.49	0.08	.32	0.70	0.01	.65

* *Reported as number of each service received per person-year.*
† *McNemar's* χ^2 *tests.*
‡ *FOB, fecal occult blood.*

Table 5. Logistic Regression Odds Ratios for Preventive Service Receipt in Year 1 and Year 2 Comparing the Interpreter Service Group to the Comparison Group*

	Year 1		Year 2	
Service	ISG vs CG Odds Ratio	95% CI	ISG vs CG Odds Ratio	95% CI
Mammograms	0.80	0.46 to 1.27	0.60	0.35 to 1.02
Breast exams	1.00	0.75 to 1.34	1.29	0.97 to 1.73
Pap smears	0.86	0.64 to 1.15	1.22	0.90 to 1.66
FOB testing‡	0.66†	0.44 to 0.99	0.86	0.57 to 1.28
Rectal exams	0.42†	0.20 to 0.87	1.13	0.59 to 2.17
Flu vaccinations	0.45†	0.22 to 0.92	0.50	0.24 to 1.03

* *Note: All odds ratios have been adjusted for age, gender, and mean income by ZIP code.*
† $P < .05$.
‡ *FOB, fecal occult blood.*

health care provider recommendations to return for visits, take medication, and undergo screening.

Several limitations should be considered when interpreting our study's findings. Some of the measures may be difficult to interpret. The interpretation of the need for the increased clinical service and prescription use is limited by the information we have about the health status of the HMO members in the study and the need for those visits or prescriptions. The increase in preventive service delivery could be interpreted as the result of targeted interventions or programs, but no physician or patient programs within or outside of the HMO could be identified during the study timeframe. It could also be argued that the significant increase in rectal examinations is not important because of this screening's questionable value. However, it reflects the provision of appropriate care within the HMO studied because physicians were reminded to do this examination on men of the appropriate age each year.

The study design was constrained by the available data. The sample size of the ISG was small due to the restrictive sampling of continuous enrollment over two years and may not have provided us with sufficient power to detect some effects. The data was abstracted only one year after the implementation of the new interpreter services. One year may have been too short a time to fully assess the impact of the new services. We were also unable to eliminate LEP patients who did not speak Spanish or Portuguese from the CG because data on need of interpreter services or use of ad hoc interpreters in other languages was not consistently collected. However, it was known that the overwhelmingly majority of patients in need of interpreter services at the four health centers studied were Spanish and Portuguese speaking.

The study may have limited generalizability. It was conducted at a well-established staff model HMO with a highly sophisticated system of interpreter services and care and among enrollees who were continuously insured for an average of more than three years. These services may have had a different impact on a patient population in a different health system or with less familiarity with or less access to a health care system. In addition, the only interpreter services studied were for one group of Portuguese- and Spanish-speaking patients. The results may be different for a group with a different level of acculturation, or other limited–English-speaking or cultural groups.

Finally, the study did not address the questions of improvement in quality of care and health outcomes or cost-effectiveness. Our findings suggest that provision of interpreter services may improve the quality of care delivered to LEP patients, but increased delivery of services alone does not necessarily result in quality improvement or better health outcomes. Given current concerns about cost containment and quality of care in health care, these are important areas for future research.

This is just one of the areas in which more research is warranted. Our findings suggest that current disparities in delivery of care to limited–English-speaking minority groups may be partially explained by communication barriers and that interventions focusing on those barriers can have a direct effect on delivery of care, but this relationship needs to be better elucidated. Important areas for future research include studies in different health care settings with different patient populations that are longer in duration, involve larger populations and examine the impact of interpreter services on delivery of specific services or outcomes. Identifying the mechanisms by which interpreter services impact care and enhance understanding, trust, and satisfaction (or all three) would also allow design of services that maximize their impact.

The physician–patient relationship is dependent on effective communication. Limited–English-speaking patients need to be able communicate adequately with their health care providers if we are to improve access to health care for this large and growing U.S. population. Cultural, educational, and economic barriers still exist for many limited–English-speaking patients, and should be addressed, but providing these patients with the means to inform us about their symptoms and concerns and to navigate health care delivery systems is a necessary first step toward improving their health.

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