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Impact of Interpreters on the Receipt of New Prescription Medication Information Among Spanish-Speaking Latinos

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Abstract

Background—For Latinos, limited English proficiency (LEP) is a barrier to receiving important information about a new medication prescription. Access to interpreters may impact the receipt of important medication-related information.

Objective—To examine the association between interpreter use and reports of new prescription medication advice among Latinos with LEP.

Methods—We examined cross-sectional survey data from 1590 Latino adults with LEP from 8 sites across the United States. The main outcomes are 5 measures of new prescription medication advising: (1) explanation of medication purpose, (2) explanation of possible side effects, (3) explanation of medication directions, (4) receipt of written information in Spanish from pharmacy, and (5) receipt of medicine bottle with Spanish language label.

Results—Among patients prescribed a new medication, 72% reported being told about the purpose of the medication, 52% about possible side effects, and 70% about how to take the new medicine. Forty-four percent said they received written medication information in Spanish from pharmacy, and 47% said their medicine bottle label was written in Spanish. Interpreter use was independently associated with receiving explanations about: possible side effects (adjusted odds ratio [AOR]= 1.81; 95% confidence intervals [CI]: 1.16–2.45); medication directions (AOR = 2.50; 95% CI: 1.67–3.59); and medication purpose (AOR = 3.55; 95% CI: 2.14–4.65).

Conclusions—Among Latinos with LEP, interpreter use increases patient receipt of important information when a new medication is prescribed. There is a continuing need for effective policies and interventions to improve provider communication with LEP patients.

Keywords

drug information; Hispanic health; language; physician/patient communication

Preventing Medication Errors, a 2006 Institute of Medicine report, recommends that providers and patients work in partnership to achieve the report's goal.¹ This requires that clinicians and pharmacists provide important information when prescribing or dispensing a new medication.

Indeed, *Healthy People 2010* benchmarks and other policy recommendations advise that providers discuss each medication's purpose, side effects, and directions for use.²⁻⁴ The growing linguistic diversity in the United States, however, increasingly challenges health care professionals to provide this information consistently to non-English speaking patients. Language barriers lead to suboptimal communication with health care providers, which can in turn increase prescription medication misuse, treatment nonadherence, treatment failures, and adverse medication reactions.⁵⁻⁷

Approximately, 55 million people in the United States speak a language other than English at home.⁸ An estimated 24 million speak English "less than very well" and are therefore considered to have limited English proficiency (LEP). Sixty percent of this population are Latinos, the fastest growing ethnic group in the United States with a growth rate more than 3 times that of the total population.⁹ Furthermore, Latino populations are now growing rapidly in states where they have previously not had a significant presence.¹⁰ Given these demographic trends, health care providers and pharmacists throughout the US are prescribing and dispensing medicine to increasing numbers of Latinos with LEP. Yet, we know little about the extent to which health professionals provide LEP patients with the information needed to safely administer newly prescribed medications. Studies indicate that when prescribing new medications, both pharmacists and physicians communicate inconsistently with English-speaking patients.¹¹⁻¹⁶ These studies do not include significant numbers of patients with LEP and do not examine the combination of physician and pharmacist counseling.

In the absence of patient-provider language concordance, interpreters can ameliorate some linguistic barriers to health care for persons with LEP.¹⁷ A recent survey found that patients who needed and used interpreters were more likely to report understanding medication instructions than those who needed interpreters and did not have them available (27% vs. 2%).¹⁸ To our knowledge, no prior studies of interpreters and LEP patients have evaluated the combined provision of key medication-related information, such as potential side effects, directions for use, and the purpose of the medication.

Our purpose in conducting this study was to examine the relationship between interpreter use and patient reports of receiving verbal and written medication-related information. We believe that interpreters facilitate access to health care services and therefore hypothesize that Spanish-speaking Latinos who use interpreters will report receiving more information than those who do not use interpreters.

METHODS

Sample

We examined pooled cross-sectional survey data collected in 2 waves between 2003 and 2006 from 1590 Latino adults with LEP who participated in the *Hablamos Juntos* (HJ) national demonstration project. HJ was funded by the Robert Wood Johnson Foundation to improve doctor-patient communication by increasing access to and improving the quality of interpreter services for Spanish-speaking patients. We analyzed data from 8 outpatient study sites, which were selected based on the following criteria: (1) service to a significant number of Spanish-speaking patients facing language barriers; (2) impact on quality of communication between Spanish-speaking patients and their providers; (3) need for the development of new or expanded language access services for Spanish-speaking patients; (4) innovativeness of the service model design; and (5) sustainability of the service model after completion of the HJ project. The study sites were located in South Carolina, Alabama, Nebraska, Pennsylvania, Rhode Island, Texas, California, and Washington. The clinics were a mix of Medicaid HMO, hospital affiliated, and private/community clinics.

In the HJ survey, patients chose to interview in Spanish or English using computer-assisted telephone interviews. Survey response rates ranged from 45% to 85% across sites. For this study, we included patients who received a new medication prescription within the last 12 months ($n = 777$). The percentage of patients receiving a new prescription medication ranged from 46% to 53% between sites. A general evaluation of the HJ demonstration project including a description of the study sites is published in detail elsewhere.^{19,20}

Measures

We examined 5 survey items querying patients about information provided by a physician or pharmacist when prescribing or dispensing the patient's most recent new medication prescription over the past 12 months. A new medication prescription was defined to patients as one "that a doctor prescribes and you get from a pharmacy such as birth control pills, antibiotics or medicines for asthma, high blood pressure, diabetes, or other health conditions." Patients were asked if, before they started taking the most recent new medicine, a doctor or pharmacist explained: (1) what the medicine was for; (2) the possible side effects; and (3) how to take the new medicine. They also were queried about written information, in Spanish, received from the pharmacy, such as whether or not they received: (1) their medicine bottle with the label written in Spanish; and (2) any written information in Spanish about the proper uses for the medicine and possible side effects. We collectively refer to these 5 pieces of information as medication advising.

Patients were classified into 3 groups (interpreter not needed; interpreter needed, used; interpreter needed, not used) based on survey responses. All respondents were asked if in the last 6 months they ever wanted or needed an interpreter to help them speak with their doctors at their doctor's office or clinic (response options: yes/no). Respondents who did not need or want an interpreter were placed in the "interpreter not needed" group. Those who needed or wanted an interpreter were asked how often they used an interpreter from their doctor's office or clinic when they needed one in the last 6 months (response options: always, usually, sometimes, never). Respondents who answered "always," "usually," or "sometimes" were classified as "interpreter needed, used" and those who responded "never" were placed into the "interpreter needed, not used" group. Previous studies that assessed the use of interpreters have successfully employed this method of subcategorizing patients into groups based on interpreter need and use.^{18,21-23}

We also examined an additional set of survey items on patient sociodemographic characteristics, such as: age (continuous), gender, marital status, birthplace, and education (categorized as 0–6 years, 7–11 years, or ≥ 12 years of formal schooling). Reported income was adjusted for household size and categorized according to federal poverty level (above the federal poverty level, between half and the federal poverty level, or below half the federal poverty level). Patient responses about health insurance were dichotomized (insured or uninsured). We measured patient self-reported health status by collapsing patient responses to a question asking "In general, would you say your health status is: excellent, very good, good, fair, or poor" into excellent/very good, good, or fair/poor categories. Patients were also asked if they had ever been diagnosed with a selected chronic disease (high blood pressure, diabetes, high cholesterol, or asthma), and the number of nonemergency medical visits to a doctor over the past 6 months.

Statistical Analysis

Stata 9.2 statistical software (Stata Corporation LP 2007, College Station, TX) was used for all analyses. We first used frequencies and cross tabulations to describe the sample by interpreter use and need and unadjusted rates of medication advising. We then conducted bivariate analyses to examine the association between patient reports of receiving new

medication information (5 outcome measures) and patient characteristics. We used χ^2 tests of significance to assess relationships between categorical variables.

We imputed our income variable (19% missing) 5 times using multiple imputation by a chained equations statistical program (ICE) in Stata that uses an iterative multivariable regression imputation technique. All other independent variables had less than 0.6% missing values. Using the imputed data, we performed 5 separate logistic regression models to assess the association between each of the medication advising outcomes and interpreter use and need. We used previous studies in the literature to guide our inclusion of covariates into the regression analyses.²¹⁻²³ We controlled for age, gender, marital status, education, income, insurance, and self-reported health status. Because the intraclass correlation coefficient for our outcome variables ranged from 0.028 to 0.074, we accounted for clustering by site. Wald tests were then used to assess the independent and joint significance of our explanatory variables.

For our main explanatory variable, we use patients in the interpreter not needed category as the reference group. These patients represent the best possible scenario where medication-related information is easily exchanged without language barriers between clinicians and patients.^{18,21-23} They represent standard care or the ideal situation for doctor-patient verbal exchanges.

In separate analyses, we also adjusted for the number of physician visits, Latino subgroup (Mexican, Caribbean, Central American, and South American/other), birthplace, and the number of selected chronic diseases (hypertension, diabetes, high cholesterol, and asthma) (data not shown). We found little difference in the results between the 2 analyses and report the most parsimonious model. We also replicated our regression models discounting participants with missing data but found little difference in results from those obtained with imputed data.

RESULTS

Sample Characteristics

Study participants had a mean age of 39 years ($SD = 13$) and 31% were 44 years of age or older. Eighty percent of participants were women, 54% were married, and 73% reported having health insurance. Thirty-seven percent of participants reported incomes at or above the federal poverty line. One-third of participants had an education level of sixth grade or lower and 56% reported fair or poor health. Fifty-four percent of study participants reported their Latino ancestry or origin as Mexican. Other Latino ethnicities and areas of origin represented in the study are Central America (14%), Puerto Rico (11%), Caribbean other than Puerto Rican (12%), and South American/other (9%). Six percent of patients were born in the United States.

Table 1 compares the sociodemographic characteristics of our study sample by interpreter need and use. Patients who needed interpreters reported lower education levels than those that did not need an interpreter ($P < 0.001$). Patients who did not need interpreters more frequently reported having health insurance, had higher incomes, and were in better health than those who needed interpreters and used one ($P < 0.001$).

Medication Advising

Among patients who were given a new medication prescription, 72% said they were told about the purpose of the medicine, 52% about possible side effects, and 70% about how to take the new medicine. Forty-five percent of patients reported receiving all 3 pieces of information (side effects, medication purpose, and medication directions).

Forty-four percent reported that pharmacists provided written information in Spanish about the medication, and 47% received a medicine bottle label written in Spanish. Thirty-two percent of patients reported receiving both written information in Spanish and a medicine bottle label written in Spanish from a pharmacy.

Interpreter Use

All subjects included in our analysis chose to complete the survey interview in Spanish. Of participants that received a new prescription medication, 13% reported that they did not need an interpreter, 18% needed an interpreter but did not use one, and 69% used an interpreter. Patients who used an interpreter reported higher rates of medication advising compared with those that did not need an interpreter or needed an interpreter but did not use one (Fig. 1). Patients who reported having completed 0 to 6 years of formal schooling tended to use interpreters more often than those that reported completion of 7 or more years of formal schooling. Patients who needed interpreters reported more often being in fair-poor health status.

Bivariate Correlates

Table 2 shows the bivariate relationships between our 5 outcome measures and patient characteristics and interpreter use. Patients with health insurance received information about medication directions from a physician or pharmacist less frequently than those without health insurance ($P = 0.04$). Patients with less education more frequently received information about the purpose of the medication ($P = 0.04$) and information written in Spanish ($P = 0.05$).

Multivariate Results

Table 3 reports adjusted odds ratios (AOR) for patient receipt of new medication advising. Reporting the need for an interpreter and using one was strongly and independently associated with receiving more counseling from a health professional after being prescribed a new medicine. Specifically, the use of an interpreter was independently associated with being told the purpose of the new prescription medicine (AOR = 3.55; 95% confidence intervals [CI]: 2.14–4.65), side effects (AOR 1.81; 95% CI: 1.16–2.45), and directions for use (AOR = 2.50; 95% CI: 1.67–3.59), compared with participants who did not need an interpreter. Likewise, interpreter use at a doctor's office was significantly associated with receiving a new medicine in a bottle with a Spanish language label (AOR = 2.73; 95% CI: 1.74–4.28) and receiving information written in Spanish (AOR = 2.12; 95% CI: 1.37–3.29) from the pharmacy.

Having health insurance was significantly associated (AOR = 0.625; 95% CI: 0.41–0.96) with not being given directions on how to take the new prescription medication. Patients who reported having completed 7 to 11 years of schooling were more likely to receive information written in Spanish at the pharmacy compared with those that completed 12 years or greater of schooling (AOR = 1.64; 95% CI: 1.11–2.41). Age, gender, self reported health, and income were not significantly associated with any of our 5 measures of medication information giving.

DISCUSSION

In this study, we examine the influence of interpreter use on new medication advising for Spanish-speaking Latinos. We find that Latino patients who use interpreters receive significantly more verbal information when a new medication is prescribed than Latino patients who do not need interpreters. This is important because better patient-provider communication and more detailed medication explanations may improve patient medication adherence²⁴⁻²⁶ and clinical outcomes.²⁷⁻²⁹ Thus, physicians should not only convey important medication-related information, but also ensure that patients understand the information given.

Patients who reported needing an interpreter but not using one also received more medication advice than those who did not need an interpreter. This was only statistically significant for discussions about medication directions, but the trend suggests enhanced provider attention to medication-related communication when treating patients with LEP. This is encouraging because it shows that providers may be amenable to interventions to improve communication with non-English speaking patients. Similarly, the finding that patients without health insurance are given more verbal information on medication directions suggests that providers may give more information when they think patients might have difficulties with their follow-up care. Alternatively, providers in the private setting who see primarily insured patients may not be sensitized to more vulnerable LEP patients and may not have interpreters as readily available to communicate information. Potential bias from the sample's high insurance coverage rate also may contribute to this finding.

Despite communicating more information to Spanish-speaking Latinos who used or needed interpreters, physicians and pharmacists still conveyed key medication information^{30,31} very inconsistently to all patients in our study sample. Medication side effects are communicated to patients more frequently, whereas medication purpose and directions are communicated less often compared with previous direct observation studies focused on physicians and English-speaking patients.^{12,13,15,24} This is particularly concerning given that patient responses in this study incorporate both physician and pharmacist information provision, and reflects what generally happens in the community, where patients obtain counseling from both parties. Comparable with our analysis of Spanish-speaking Latinos, a previous survey of English-speakers also showed that about one-third of patients do not receive new medication instructions.³²

Our results show that pharmacies often fail to provide Spanish-speaking Latinos with information that may be needed to safely use new medications. More than half of patients reported not getting a Spanish language medicine bottle label and medication information written in Spanish. Our results are in agreement with other survey studies examining non-English language pharmacy services.^{33,34} Compared with English-speakers in the 2004 Food and Drug Administration survey, Spanish-speaking Latinos in this study report receiving less language concordant written information from pharmacies (77% vs. 44%, respectively).¹⁴ These findings are concerning and call for attention to the challenges pharmacies face in adapting to rapidly changing community demographics and in providing adequate language access services to non-English speaking patients. Although patients need an adequate level of health literacy to understand written information, our findings suggest that the health care system is failing to deliver even basic information that patients with LEP may need to safely self-administer prescribed medication.

For this study, patients were only asked if they used interpreters during their physician visits. Yet, the results demonstrate that interpreter use during physician visits is also associated with the provision of better pharmacy services. One of 3 possible explanations for this finding is that patients who report using interpreters in the doctor's office may also have access to interpreters in pharmacies. Second, physicians who use interpreters may be more sensitive to patient language barriers and therefore be more likely to check mark or write a note on the prescription that identifies the patient's need for non-English language services. A third possible explanation is that patients who use interpreters during a physician visit are aware and attuned to the benefits of interpreters. These patients may take an interpreter to the pharmacy or ask for materials written in Spanish. The findings suggest that patients who take interpreters with them or access available interpreters in pharmacies are more likely to receive higher quality pharmacy services. We also cannot discount the possibility, however, that some patients received information in Spanish because they self-identified to the pharmacist that they did not speak any English.

All patients in our sample chose to respond to the survey questionnaire in Spanish – even those who reported not needing an interpreter. Previous studies have found survey language to be an important predictor of health status, access to care, and barriers to care among Latinos.³⁵ This suggests that even Spanish-speaking patients who do not identify themselves as needing an interpreter may actually benefit from one. Zun et al found that a significant number of Latino patients who report being competent English-speakers do not have adequate health literacy levels, and that physicians and nurses do not accurately recognize patient English proficiency levels.³⁶ Our results support a more liberal approach to offering interpreters to patients who speak a primary language other than English. Such a strategy, however, may require reimbursement of interpreter services and educational interventions targeting physicians that provide medical care to linguistically diverse populations.

This study focuses on Spanish-speaking Latino patients, and may not be generalizable to other populations and languages. Although the study sample is from multiple sites, participants may not be representative of all Latinos in the United States. Furthermore, the study participants had a high rate of insurance coverage and were mostly women, which also limits the generalizability of our findings. Because our results are based on a cross-sectional survey, we cannot infer cause and effect between interpreter use and receipt of medication information. Patient reports are not focused on a particular experience during one specific doctor or pharmacy visit but on what generally occurred over several visits during the last 6 months. They are also subject to recall bias, although social desirability to underestimate communication barriers may lead to an overestimate of the amount of information participants received. We did not have objective measures of whether patients used interpreters such as those from administrative data or direct observations.

For this analysis, we did not have detailed or systematic clinic-level measures of structure. It is possible that different patterns of services by study site contribute to the results. For example, clinics that have more bilingual staff or providers may provide better medication counseling. This would support, however, the premise that improving structure results in better quality of doctor-patient communication. Future studies should examine the associations between structural variables and medication information giving.

Finally, we did not have information about interpreter types (professional, family member, medical staff) in our analysis. Studies have documented decreased satisfaction with care and the risks of using ad hoc interpreters compared with professional interpreters.^{17,37} We, however, postulate that our findings reflect typical community-based medical care, since most outpatient community practices do not have professional or trained interpreters.

Our findings have important policy implications for areas that are experiencing an increase in Spanish-speaking populations. Despite federal regulations³⁸ requiring access to appropriate language services, physicians in communities with small but growing Latino populations report more language barriers compared with physicians practicing in major Latino population centers.³⁹ Policies should address linguistic barriers not only by increasing and standardizing interpreter services but also through comprehensive efforts, such as requiring health professionals to participate in tailored CME about the importance of linguistically appropriate care^{40,41}; and improving community access to adult education in areas with growing numbers or high concentrations of people with LEP. Furthermore, efforts to reduce language barriers around medication prescribing for LEP patients should focus on increasing the number health professionals who are fluent in non-English languages.

Future areas of investigation could include novel uses of technology such as web-based translators in pharmacies. Patients could use multimedia in a private booth and receive new prescription medication information in their preferred language. Pharmacies should

incorporate computer software that accurately provides translated medication-related written information in the desired foreign language.³² Similar technology could be incorporated into physician electronic-prescribing systems so that important drug information is automatically printed in the designated language when a new medicine is prescribed. The use of multimedia and portable or handheld electronic devices may have promise, but they should be combined with counseling from providers or staff. The redesign of primary care into a team-based setup⁴² may provide opportunities for team members such as dual-role staff interpreters to provide new medication prescription counseling.

This study demonstrates that interpreter use increases the amount of information that Spanish-speaking Latinos receive when they are prescribed a new medication. Among studies that looked at communication between patients and providers around medication prescribing, this study is unique as it examines reports of care from Spanish-speaking Latinos at multiple sites and accounts for medication advising provided by both physicians and pharmacists. This study supports the case for the liberal provision of interpreters to all patients who need or request one during any type of clinical encounter.

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FIGURE 1.

Receipt of new prescription medication information by interpreter use and need among Spanish-speaking Latinos.

Comparison of Sociodemographic Characteristics and Health Status by Interpreter Need and Use for Spanish-Speaking Latinos Prescribed a New Medication

TABLE 1

Primary Characteristics	Interpreter Not Needed (n = 143)	Interpreter Needed, Not Used (n = 97)	Interpreter Needed, Used (n = 533)
Age (mean, yr) (n = 777)	38	40	39
Female (%) (n = 777)	78	82	80
Married (%) * (n = 775)	45	50	57
US born (%) ** (n = 777)	17	4	3
Formal education (%) †			
0–6 yr (n = 270)	15	26	41
7–11 yr (n = 247)	38	38	30
≥12 yr (n = 255)	47	36	29
Income/poverty level (%)			
Below 0.5 (n = 139)	16	23	24
Between 0.5 and 1.0 (n = 258)	38	43	41
Above 1.0 (n = 233)	46	34	35
Insured (%) * (n = 774)	83	77	70
Self-reported health (%) ** †			
Very good-excellent (n = 121)	26	10	13
Good (n = 219)	33	29	27
Fair-poor (n = 436)	41	61	60

* Difference between interpreter needed, used and interpreter not needed; $P < 0.01$.

† Difference between interpreter needed, used and interpreter needed, not used; $P < 0.05$.

** Difference between interpreter needed, not used and interpreter not needed; $P < 0.05$.

For continuous variables, t tests were used to test significant differences between groups. We used χ^2 tests to compare differences for categorical variables. All study sites were ambulatory care clinics.

TABLE 2
New Prescription Medication Advising for Spanish-Speaking Latinos by Sociodemographic Characteristics and Health Status

Patient Characteristics	Explained Purpose of Medication (%)	Explained Medication Side Effects (%)	Explained Medication Directions (%)	Received Written Medication Information in Spanish From Pharmacy (%)	Medicine Bottle Label Written in Spanish (%)
Study sample (n = 777)	72	52	70	44	47
Age 18–29 yr	70	55	73	43	47
Age 30–43 yr	71	48	66	42	46
Age 44+ yrs	74	57	71	48	50
<i>P</i>	0.600	0.125	0.173	0.353	0.556
Female	70	56	68	38	43
Male	72	52	70	45	49
<i>P</i>	0.572	0.274	0.568	0.093	0.229
Married	69	51	67	43	47
Not married	75	54	73	46	48
<i>P</i>	0.090	0.395	0.115	0.415	0.920
US born	66	62	61	57	14
<i>P</i>	0.388	0.223	0.222	0.075	0.849
Education 0–6 yr	77	55	74	44	51
Education 7–11 yr	67	54	68	49	46
Education ≥12 yr	71	49	67	38	44
<i>P</i>	0.041*	0.318	0.144	0.047*	0.263
Below 0.5 poverty level	74	56	78	49	48
Between 0.5 and 1.0 poverty level	67	48	48	42	44
Above 1.0 poverty level	74	54	54	45	48
<i>P</i>	0.205	0.263	0.065	0.383	0.701
Insured	71	53	68	45	48
Not Insured	74	51	75	40	46
<i>P</i>	0.471	0.485	0.042*	0.210	0.611
Health very good/excellent	71	51	69	41	46
Health status good	69	53	71	44	43
Health status fair/poor	73	53	69	45	50

Patient Characteristics	Explained Purpose of Medication (%)	Explained Medication Side Effects (%)	Explained Medication Directions (%)	Received Written Medication Information in Spanish From Pharmacy (%)	Medicine Bottle Label Written in Spanish (%)
<i>P</i>	0.513	0.951	0.813	0.709	0.253

* *P* < 0.05.

Bivariate results present percentages of patients in each predictor category (left hand column) that reported receiving respective new medication advice. Tests for associations are by Pearson χ^2 tests (DF = 2).

TABLE 3

Adjusted Odds Ratio for Receipt of New Prescription Medication Advising Among Spanish-Speaking Latinos Adjusting for Interpreter Use, Sociodemographic Characteristics, Health Status, and Clinical Site

Patient Characteristics	Adjusted Odds Ratio (95% Confidence Intervals)				
	Explained Purpose of Medication	Explained Medication Side Effects	Explained Medication Directions	Written Medication Information From Pharmacy in Spanish	Medicine Bottle Label Written in Spanish
Interpreter not needed	1.00	1.00	1.00	1.00	1.00
Interpreter needed, used	3.55* (2.28, 5.51)	1.81 [†] (1.20, 2.73)	2.50* (1.62, 3.87)	2.12 [†] (1.37, 3.29)	2.73* (1.74, 4.28)
Interpreter needed, not used	1.72 (0.96, 3.06)	1.37 (0.79, 2.40)	1.83 [‡] (1.02, 3.30)	1.66 (0.92, 3.00)	1.81 (0.99, 3.33)

* $P < 0.001$.

[†] $P < 0.01$.

[‡] $P < 0.05$.

Controlling for age, gender, marital status, education, income, insurance status, self-reported health status, survey year, and site of care using random-effects models; Likelihood ratio test of $\rho = 0$ is significant for all models ($P < 0.05$). A comparison with fixed-effects (using indicator variables for 7 of the 8 sites in regression equation) yielded similar results. Both fixed effects and random effects coefficients yielded consistent results under Hausman-Wu test. We only report results from more efficient random effects models.