

Health Services Utilization by Low-Income Limited English Proficient Adults

Elinor A. Graham · Troy A. Jacobs ·
Tao Sheng Kwan-Gett · Jane Cover

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Abstract *Objectives* We evaluated the health care utilization of limited English proficiency (LEP) compared to English proficient (EP) adults with the same health insurance (Medicaid managed care) and full access to professional medical interpreters. *Methods* Health care utilization over two years was compared for 567 LEP and 1162 EP adults. Multivariate analysis controlled for age, gender, months enrolled in Medicaid and morbidity. *Results* LEP compared to EP subjects were enrolled longer and more continuously in Medicaid, were 94% more likely to use primary care and 78% less likely to use the emergency department. Specialty visits and hospitalization did not differ. *Conclusions* When language barriers are reduced and health insurance coverage is the same, LEP patients show ambulatory health care utilization associated with lower cost and more access to preventive care through establishing a primary care home.

Keywords Immigrant · Refugee · Medicaid · Managed care · Interpreter · Ambulatory care · Limited English proficiency

Introduction

Increasing ethnic diversity due to immigration from non-European countries has challenged the United States health care system. The foreign born population in the United States made up 10% of the total population in 2000, with only about one-seventh from Europe [1]. Foreign-born residents in the United States have lower median family incomes compared to native householders and are much less likely to have health insurance [2]. In the 2000 census, English speaking ability was variable among the 18% of the US population 5 years and over who spoke a non-English language at home. About 23%, or 11 million people reported that they spoke English “not well” or “not at all”. With the escalation of health care costs, particularly the public-supported portion of those costs, there have been increasing efforts at state and national levels to limit health care coverage of immigrants [3] and little public funding for adequate interpreter services to facilitate care of limited English proficiency (LEP) persons [4].

Many basic questions about the health services use of LEP patients are still unanswered in the medical literature, but lack of health insurance and language barriers have both been identified as barriers to health care for this population. However, a recent study suggests that lower health care expenditures by US immigrants may not be entirely explained by lack of health insurance [3]. This study compared health care expenditures of foreign born (immigrant) and US born persons from the 1998 Medical Expenditure Panel Survey and found that per capita health expenditures of foreign born persons were 55% lower than those of US-born persons, after multivariate analysis controlling for age, race/ethnicity, insurance status, family income, and self reported health status. Detailed analysis showed that expenditures for low-income immigrants with

E. A. Graham (✉) · T. A. Jacobs · T. S. Kwan-Gett
Department of Pediatrics, University of Washington,
Harborview Medical Center, 325 Ninth Avenue, Box 359774,
Seattle, WA 98104, USA
e-mail: ellieg@u.washington.edu

J. Cover
Department of Sociology, University of Washington, Seattle,
WA, USA

public funded health coverage were 60% lower than US born persons with the same coverage. Unfortunately this study could not address the English proficiency of subjects and whether or not this contributed to altered health care expenditures and utilization.

Language has been reviewed as an important health services barrier [5], and limited English proficiency has been associated with patients reporting trouble understanding a medical situation [6] and with receipt of preventive care [7]. But most previously published studies of the effect of language on use of health services either have been limited to programs for specific health problems (hypertension, diabetes, breast cancer and asthma) [8–11], specific types of health services (emergency services or preventive care) [12, 13], limited to a specific language or ethnic group [14, 15], or focused on LEP uninsured populations [16].

Use of interpreters has been identified as a way to decrease language barriers. A comprehensive review of 36 published articles addressing the impact of interpreters on the quality of care of LEP persons concluded that use of interpreter services positively impacts preventive screening rates, increases the number of office visits and medication prescription and filling, decreases the number and costs of health care tests and hospitalization and improves selected outcome measures of adult chronic care [17]. This review particularly noted that impact of interpreter services varied greatly with the professional quality and training of interpreters, and in many studies the quality and training of interpreters was not clearly described or consistent.

Our study overcomes many of the limitations of previous work by focusing on economically similar groups (Medicaid recipients) and identifying English language limitations, rather than relying on place of birth as a proxy for English language proficiency. Moreover, this research is not restricted to certain health conditions or types of health services, nor is it limited to any particular ethnic or linguistic group. This study was designed to address some of the basic questions about ambulatory health services use by low income LEP populations compared to low income English speaking populations when disparities in health insurance coverage are removed and language barriers reduced through access to professional medical interpreters. Could these language services for LEP patients promote the establishment of a “primary care home”, with the accompanying benefits of greater preventive care? To answer this question more specifically we looked at differences between Medicaid-enrolled LEP and English speaking patients in (1) their demographic characteristics, (2) continuity of health insurance enrollment (3) use of primary care, specialty care, emergency room and hospitalization and (4) utilization of ambulatory services among LEP patients by language groups.

Methods

Ethics

The UW Human Subjects Review Committee approved this study. Personal identifiers were maintained for the purposes of matching. These identifiers were destroyed after the match was performed. All authors were employed or enrolled in graduate programs at the academic medical center where subjects received services.

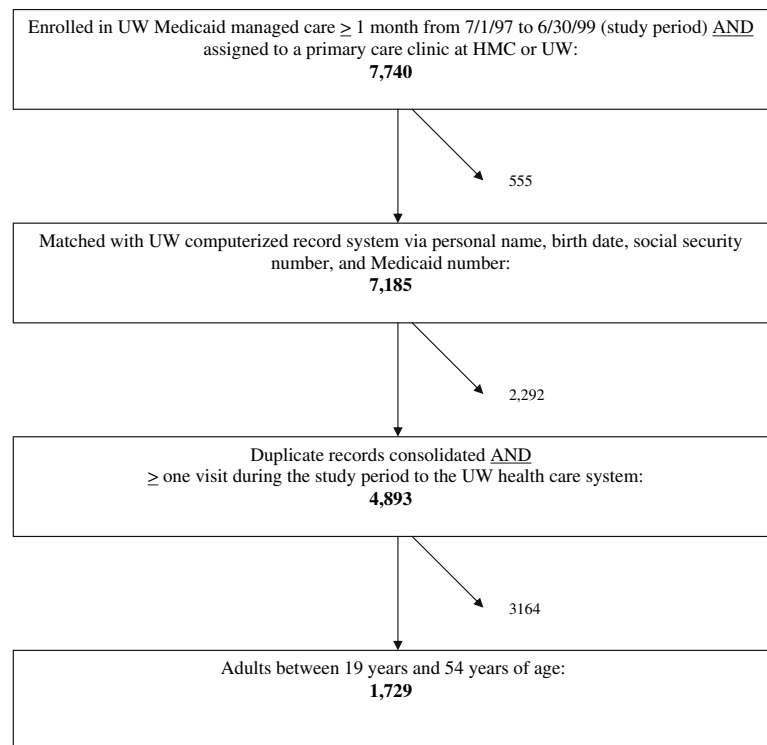
Study Population

Enrollment data was obtained from the UW Medicaid managed care program for patients who used the UW health care system, which included the University of Washington Medical Center (UWMC) and Harborview Medical Center (HMC) hospitals and their associated outpatient clinics and emergency rooms from July 1997 through June 1999. This Medicaid managed care system employed a primary care gatekeeper model at the time of the study.

Around 7,740 subjects were identified as enrolled for at least one month in the Medicaid managed care system and assigned to a primary care clinic at UWMC or HMC (Fig. 1). These subjects were matched with the UW computerized medical record system by name, birth date, social security number and Medicaid number. Only 555 records from the Medicaid managed care system (6%) could not be matched, leaving 7,185 subjects with records in both systems.

Subjects with duplicate medical records in the UW system were identified and records consolidated. Duplicate records occurred because each hospital had a separate medical record identification number and subjects often received primary care at one site and hospital or specialty care at another site. Since designation of a subject’s English language proficiency depended on whether or not they had used professional medical interpreters at visits, it was also necessary to include only subjects who had been seen at least once during the two-year study period.

When subjects with duplicate records were consolidated and those with no evidence of clinic or inpatient utilization during the study period were removed, 4893 unique patients remained. All were enrolled in Medicaid managed care and used the UW health care system during the study period. Of these subjects, 3115 were under 19 years of age and were not included in this analysis of adults. An additional 49 subjects were excluded because they were over 54 years of age and there was a very wide age range above this cut off age. The final sample contained 1729 adult subjects between the ages of 19 and 54 who contributed

Fig. 1 Selection of the study population

12,617 ambulatory visits. The majority of subjects were females of child-bearing age (Table 1).

Utilization & Enrollment Data

Utilization data was obtained from the UW computerized database which could be queried to provide detailed information on many aspects of the patient's medical record, including site of service, service dates, diagnoses, providers, and procedures. Previous work using this database had shown that this information was more timely and accurate than UW Medicaid claims data (H. Goldberg, UW, personal communication, 2000). All primary care and 97% of specialty and emergency care received by the adult Medicaid population took place at the two hospitals (P. Temple, Medical Director, UW Medicaid Managed Care, personal communication, 2000).

Outcome Variables

Unique service dates for each subject were used to identify ambulatory site visits. For each service date there was a site code indicating a hospital or clinic service site (a specific clinic, inpatient floor, emergency department, etc). This code allowed each visit to be placed in one of four service site variables: "Primary Care", "Specialty Care", "Emergency Department" and "Hospitalization". For each visit there was one or more associated ICD9 code. Visits were

only included if they occurred during the months that the patient was enrolled in Medicaid managed care. Visit data was summarized as the number of visits per member month enrolled (VMME).

Analysis of hospitalization data was limited by lack of admission and discharge dates in this ambulatory oriented administrative database. Instead, a dichotomous variable of "No" vs. "Any" hospitalization during the two-year study period was generated for each subject.

Language Services and Classification

At the University of Washington hospitals and clinics, professional medical interpreters are provided at the request of patient or provider. In the 2000 fiscal year at the end of this study period, interpretation services were provided in over 60 different languages with over 100,000 interpretation contacts. In most cases an in-person interpreter can be provided. Use of family and ad-hoc staff interpretation is discouraged and is against official policy of the hospitals although it may occur in emergency situations. At the time of this study, phone interpretation was rarely used or for only part of the visit until an in-person interpreter was available. Interpreters are required to have passed Washington state administered tests of oral and written fluency for the languages in which they interpret. The University provides medical terminology classes and continuing education in interpretation, but completion of

Table 1 Socio-demographic, utilization, & medicaid enrollment characteristics by English proficiency

	English speakers	LEP speakers
Sample size	1,162	567
Gender		
% Female	90.5**	79.9**
Age mean years	31.9 ± 8.1	37.5 ± 9.5
Age distribution		
% 19–24 years	21.7**	10.6**
% 25–34 years	41.3*	32.1*
% 35–44 years	29.9	31.7
% 45–54 years	7.1**	25.6**
Language distribution		
% East African		45.5
% Asian		42.5
% Spanish		2.3
% Other		9.7
Subjects with any hospitalizations (% of total)	253 (21.8)	91 (16.0)
Subjects with any hospitalizations & no ambulatory visits	24	2
Total ambulatory visits	6,559	6,058
Ambulatory visits per member month enrolled	0.430**	0.679**
Total months enrolled	15,260	8,918
Mean months enrolled	15.6 ± 7.3	18.6 ± 7.4
% Enrolled		
<6 months	26.0**	15.2**
24 months	13.7**	26.8**

P* < 0.001*P* < 0.0001

this training was not mandatory at the time of this study. Bilingual providers are asked to use a professional interpreter unless they are a native speaker or have passed the state examination of fluency in the non-English language.

Interpreter Services records included language and service date. If the subject used Interpreter Services at least once during the two years, they were recorded as being limited English proficient (LEP) for the whole time period. If no information was available in either Interpreter Services databases on the subject, they were coded as an “English” speaker. Multiple languages were coded but they were re-categorized as “East African”, “Asian”, “Spanish”, “Slavic” or “Other” languages (Table 1). The non-English languages were grouped into a dichotomous variable that allowed the comparison of LEP vs. English speakers.

At one of the hospitals, Harborview Medical Center, some interpreters were trained in care coordination and have a care management, cultural mediation and advocacy role (Community House Calls program described at

<http://ethnomed.org/ethnomed/chc/chc.html>). Providers or social workers referred high need families to this program and all members of the family were designated as enrolled in “Care-Coordination” in the Interpreter Services database even though only one member of the family (an adult or a child) might be referred due to medical or social complexity deemed likely to benefit from care-coordination. As with English language proficiency, once a family was placed in care-coordination they were considered to be care-coordinated for the whole study period. This was not often the situation but it was not possible to determine when families ceased to be care-coordinated with the data available. Since limited languages were covered by this specialized interpreter service, only subjects in the East African, Asian and Spanish language groups were eligible for care coordination. Analysis of the impact of care coordination on health utilization in LEP subjects was done only for subjects in these language groups.

Potential Confounders

Age was included as a continuous variable calculated at time of first visit or first day of enrollment, whichever was earlier.

Medicaid enrollment was used as the main exposure variable. Enrollment was continuous for 24 months for only one quarter of the total sample. In some instances, individuals were enrolled for a period of months, dropped from enrollment and then re-enrolled. Gaps in health insurance have been shown to be associated with particular health behaviors and are a potential source of bias in data analysis [18]. To accurately portray utilization during insurance coverage, Medicaid enrollment was calculated as the sum of the months enrolled per subject. Information was not available on first enrollment unless a subject became enrolled during the study period. For subjects who were enrolled on July 1, 1997, this date was used as the enrollment start date. Subjects with discontinuous enrollment during the study period had multiple first enrollment dates.

In order to adjust for disease morbidity at the visit level, ICD9 codes associated with each subject’s visits were reviewed for prevalence and clinical relevance. Individual ICD9 codes with more than 100 visits were identified. Related disease ICD9 codes were added to these initial categories as deemed clinically related and relevant. This resulted in the following categories: “Acute Respiratory Illness” (034–034.1, 381–382.9, 460–476, 480–491.9, 786.2), “Atopic Disease” (atopic dermatitis, allergic rhinitis and asthma: 372.05, 372.13–372.14, 477–477.9, 493–493.91, 691–692.9, 786.07, 995.3), “Back Pain” (720–724.9), “Birth Control” (V25–V25.9), “Chronic Disease” (cancer, diabetes and hypertension: 140–208.9, 250–250.93,

401–405.99), “Gastro-Intestinal Disease” (001–009.3, 528–578.9, 787.91, 789–789.09, 780.6–789.69), “Headache” (346–346.91, 784–784.9), “Injury” (800–994.9, 995.5–995.59), “Pregnancy” (normal & complicated pregnancies: 630–677, V22–V24.2), “Preventive” (V03–V07.9, V20–V20.2, V70–V70.9, V72.3), “Psycho-Social Illness” (290–319, 995.5, 995.8, V11–V11.9, V40–V40.9, V60–V62.9, V79–V79.9), “Urinary Tract Infection” (599.0, 788–788.9). These illness categories captured 9318 of the 12,617 ambulatory site visits (74%). The remaining 26% of visits not categorized by these ICD groupings did not differ in frequency distribution by English proficiency.

Statistical Analysis

Statistical analyses were done using the STATA version 7.0/SE (College Station, TX). Adjusting for multiple subject records reflective of multiple visits, robust sandwich estimators of variance were calculated. Because some of the illness categories were specific to females (e.g. pregnancy), analyses were done for the total sample and a female sub-sample where appropriate. Baseline proportions and visits per member month enrolled (VMME) were analyzed using chi squared and *t*-tests [19].

The simultaneous impact of risk markers (age, English proficiency, gender, member months enrolled, visit illness category) on utilization was addressed in two ways. First, the relationship between risk markers and the number of visits

was modeled according to a negative binomial distribution. Discontinuous insurance enrollment can appropriately be modeled as the exposure variable with this distribution [20]. Separate negative binomial regression equations for “Primary Care”, “Specialty Care”, & “Emergency Department” were generated. Second, logistic regression was used to model the relationship between risk markers and “Hospitalization,” which was a dichotomous variable.

Results

Patient Characteristics

Characteristics of the sample are shown in Table 1. About 33%, or 567, of the subjects were LEP. They were less likely to be female (80% vs. 91%) than the English speakers and were older, with significantly fewer in the 19–34 age groups and a higher percentage in the 45–54 age group. Of the LEP subjects, the vast majority spoke East African and Asian languages, in nearly equal numbers, and only a small number spoke other languages.

Medicaid Managed Care Enrollment

Medicaid enrollment patterns (Table 1) differed between the groups. LEP subjects were enrolled longer in Medicaid than English speakers during the two-year study period

Table 2 Ambulatory utilization comparing subjects by English proficiency and any hospitalization vs. no hospitalizations

Visit site	Total English speakers (N = 1138)			Total LEP speakers (N = 565)		
	Total visits	Mean visits per member month enrolled ^b	% Who visited site ^b	Total visits	Mean visits per member month enrolled ^b	% Who visited site ^b
Primary care	3,929	0.313 (n = 936)	82.2	4,369	0.515*** (n = 537)	95.0***
Specialty care ^a	1,401	0.184 (n = 567)	49.8	1,321	0.245* (n = 341)	60.4***
ED	1,229	0.173 (n = 529)	46.5	368	0.134 (n = 174)	30.8***
	ENG. W/no hospitalization (N = 909)			LEP W/no hospitalization (N = 476)		
Primary care	2,781	0.884	79.8	3,483	0.463	94.1
Specialty care ^a	1,013	0.322 (n = 399)	43.9	1,130	0.150 (n = 280)	58.8
ED	952	0.303 (n = 407)	44.8	294	0.390 (n = 133)	27.9
	ENG. W/any hospitalization (N = 229)			LEP W/any hospitalization (N = 89)		
Primary care	1,148	0.364*** (n = 211)	92.1***	886	0.638** (n = 89)	100.0*
Specialty care ^a	388	0.123*** (n = 168)	73.4***	191	0.138 (n = 61)	68.5
ED	277	0.088*** (n = 122)	53.3*	74	0.053*** (n = 41)	46.1**

n, number of subjects visiting site

^a Specialty includes outpatient surgeries and procedures

^b Statistical comparison with subjects in language group with “No Hospitalization”

**P* < 0.05

***P* < 0.001

****P* < 0.0001

(18.8 vs. 15.8 months) and significantly more were enrolled for the entire 24 months (27 vs. 14%). Fewer LEP subjects than English speakers were enrolled for 6 months or less (15 vs. 26%)

Ambulatory Care Utilization

There were distinct differences between the two groups in the type of services used (Table 2). A higher proportion of LEP subjects visited primary care (95 vs. 82%) and specialty care (60 vs. 50%) sites, but a lower proportion of LEP subjects visited the emergency room (31 vs. 47%). When mean VMME's were compared for each site, only the differences in primary care visits and specialty visits were significant. Annualized numbers of visits to primary care sites were 6.2 per year for LEP subjects compared to 3.8 for English speakers. Specialty visits were 2.9 per year for LEP subjects compared to 2.2 for English speakers.

Illness Diagnosis and Ambulatory Visits

Visits by illness categories (Table 3) showed few significant differences except for higher mean VMME's for chronic disease in LEP subjects compared to English speakers. However the trend was clearly for higher mean VMME's for LEP subjects in most categories, including atopic diseases, back pain, gastrointestinal diseases and pregnancy, although these did not reach statistically

significant levels. Comparing the percent of subjects by type of illness category, a significantly greater proportion of LEP patients had visits for preventive care (49 vs. 37%), acute respiratory illness (33 vs. 25%), atopic disease (26 vs. 12%), headaches (22 vs. 7%), back pain (23 vs. 10%), gastrointestinal diseases (37 vs. 17%) and birth control (22 vs. 16%). Fewer LEP subjects were seen with psychosocial diagnoses (15 vs. 20%).

Pregnancy

This diagnosis was associated with 1781 visits to ambulatory sites and was the largest contributor to ambulatory visits. A sub-sample of the 432 women with a pregnancy diagnosis was analyzed (analysis not shown, tables available upon request). The proportion of women with a pregnancy diagnosis during the two-year study period showed little difference between LEP subjects and English speakers (30 vs. 28%) and the mean age was similar (29.0 vs. 26.1 years for LEP vs. English speakers). The same was true for a diagnosis of complicated pregnancy (16 vs. 18% for LEP vs. English speakers) with similar ages. When pregnancy visits were examined by ambulatory site, the vast majority of the women from both groups made visits to primary care (97 vs. 88% for LEP vs. English speakers with any pregnancy diagnosis and 92 vs. 90% for LEP vs. English speakers with complicated pregnancy) but a smaller proportion of LEP women with a pregnancy diagnosis made specialty visits compared to English speaking women (9 vs. 23% for any

Table 3 Ambulatory visit diagnosis by English proficiency

Visit diagnosis	English speakers (N = 1138)			LEP speakers (N = 565)		
	Total visits	Mean visits per member month enrolled	% Patients with diagnosis	Total visits	Mean visits per member month enrolled	% Patients with diagnosis
Preventive	746	0.131 (n = 425)	36.6	552	0.127 (n = 275)	48.5***
Injury	414	0.138 (n = 224)	19.3	203	0.117 (n = 110)	19.4
Acute respiratory illness	487	0.126 (n = 289)	24.9	381	0.128 (n = 189)	33.3**
Urinary tract infection	162	0.125 (n = 97)	8.4	79	0.091 (n = 55)	9.7
Atopic disease	223	0.124 (n = 134)	11.5	439	0.189 (n = 147)	25.9***
Chronic disease	232	0.178 (n = 97)	8.3	422	0.311* (n = 86)	15.2
Headache	140	0.137 (n = 76)	6.5	277	0.144 (n = 122)	21.6***
Back pain	216	0.132 (n = 122)	10.5	323	0.160 (n = 128)	22.6***
Gastro-intestinal disease	364	0.136 (n = 200)	17.2	536	0.162 (n = 209)	36.9***
Psycho-social illness	548	0.175 (n = 234)	20.1	228	0.174 (n = 83)	14.6*
Normal pregnancy ^a	1052	0.247 (n = 273)	26.5	729	0.323 (n = 135)	29.9
Birth control ^a	312	0.144 (n = 161)	15.3	249	0.159 (n = 99)	21.9**

^a Only females included in analysis

* $P < 0.05$

** $P < 0.001$

*** $P < 0.0001$

pregnancy and 10 vs. 21% for complicated pregnancy). This difference was significant at $P < 0.0001$. Emergency Department use was low for both groups (6 vs. 7%).

Hospitalization

Around 16% of the LEP subjects had one or more hospital stays during the two-year period compared to 22% of the English speakers (Table 1). Only two LEP subjects who were hospitalized had no ambulatory visits during the two-year study period compared to 24 English speakers. Both LEP and English speaking patients who had been hospitalized differed significantly in their ambulatory utilization from patients without hospitalization, but in different ways (Table 2). LEP subjects with any hospitalization had significantly more mean VMME's to primary care, and less to the ED, compared with non-hospitalized LEP patients. English speakers who had any hospitalization had many fewer primary care, ED, and specialty visits than non-hospitalized English speakers. Because of the limitations of our data set, which lacked hospitalization diagnoses, we could not attribute hospitalization to specific illnesses. However, a pregnancy diagnosis during the study period was clearly associated with hospitalization. Of the 344 subjects who were hospitalized, only 10 were male. Of the 334 females hospitalized, during the two-year study period, 255 had normal pregnancy diagnoses and 172 had diagnoses of complicated pregnancy. As already noted, a diagnosis of pregnancy was distributed equally in both the LEP and English speaking groups.

Language Groups and Care Utilization in LEP Subjects

Since the number of subjects in East African and Asian language groups were similar (Table 1), the groups were compared for ambulatory care utilization (analysis not shown, tables available upon request). Similar proportions (95%) of both groups used primary care services and all ambulatory VMME were similar at 0.794 and 0.707. Specialty care use was similar for both groups (62% of East Africans vs. 57% of Asians). However, there were distinct differences observed in ED use with 42% of the East Africans visiting the emergency room compared to 18% of the Asians ($P < 0.0001$). Similar differences were noted for hospitalization with 23% of the East Africans having a hospitalization compared to only 8% of the Asians ($P < 0.0001$). When the data was reviewed for females only, the same pattern was found with a nearly identical distribution. Pregnancy diagnoses were associated with visits in 37% of the East African females compared to 19% of the Asian females ($P < 0.0001$). This difference in

pregnancy diagnosis distribution contributes to the differences in hospitalization rates between the language groups.

Interpreter Care-Coordination and Health Care Utilization

Of the LEP sample, 58% or 330 subjects, were members of families receiving care-coordination services. Since only subjects speaking East African, Asian and Spanish languages were eligible for these services, their demographic characteristics and health care utilization (analysis not shown, tables available upon request) was compared with 182 subjects in those language groups whose families did not receive these services. Family enrollment in care-coordination compared to no care-coordination was associated with being female (82.7% vs. 74.7%). It was also associated with fewer subjects enrolled in Medicaid managed care for 6 months or less (12.7 vs. 16.5%, $P < 0.05$) and more subjects enrolled for the full 24 months (29.4% vs. 24.2%, $P < 0.05$) but no significant difference in mean months enrolled (19.3 vs. 18.3). Subjects from care-coordinated families had significantly greater VMME to primary care (0.587 vs. 0.388, $P < 0.0001$) but no differences in specialty care or ED use. Their health care utilization by visit diagnosis did not differ from subjects whose family was not enrolled in care-coordination.

Multivariate Analyses—Site-Specific Visits

Table 4 presents data on the odds of site-specific visits for LEP subjects compared to English speakers, after adjusting for age, gender, member months enrolled in Medicaid, and illness category of visit (morbidity). LEP subjects were 94% more likely to make a primary care visit and 78% less likely to use the ED compared to English speakers. Specialty visits and hospitalization were not significantly different for LEP versus English speakers. For the female sub-sample, LEP subjects were 90% more likely to be seen in primary care compared to English speakers and 70% less likely to be seen in the ED. As for the sample as a whole, the likelihood of specialty visits and hospitalization for females were not significantly different between language proficiency groups.

For the female sample as a whole, pregnancy visits occurred in primary care (OR = 12.28, 95% CI 7.41–20.35) and during hospitalization (OR = 7.30, 95% CI 4.92–10.83), whereas complicated pregnancy diagnoses occurred much more often in specialty care (OR = 2.28, 95% CI 1.42–3.66) and the ED (OR = 5.05, 95% CI 1.35–18.87). LEP women with a pregnancy diagnosis showed more ED use (OR = 5.74, 95% CI 1.35–18.87) and less specialty care

Table 4 Multivariable analysis of health care utilization by site for LEP subjects compared to English speakers

Risk marker	Primary care OR (95% CI)	Specialty care OR (95% CI)	Emergency department OR (95% CI)	Hospitalization OR (95% CI)
For all subjects				
Age	0.98 (0.97–0.99)	1.04 (1.03–1.05)	0.98 (0.97–1.00)	0.95 (0.93–0.97)
LEP	1.94 (1.62–2.33)	0.82 (0.66–1.02)	0.32 (0.25–0.41)	0.76 (0.52–1.10)
Female	1.05 (0.82–1.34)	1.00 (0.77–1.31)	0.93 (0.65–1.35)	1.71 (0.76–3.93)
Member months enrolled	1.00 (0.99–1.01)	1.00 (0.98–1.01)	1.00 (0.99–1.02)	0.99 (0.97–1.02)
Preventive visit	9.36 (6.75–12.99)	0.59 (0.04–0.96)	0.26 (0.17–0.41)	0.57 (0.47–0.68)
Chronic disease visit	1.47 (0.73–2.98)	0.87 (0.40–1.87)	0.28 (0.14–0.59)	0.53 (0.30–0.91)
Injury visit	0.21 (0.16–0.27)	1.06 (0.79–1.44)	6.61 (5.11–8.54)	0.46 (0.33–0.66)
Atopic disease visit	1.48 (1.00–2.19)	0.71 (0.43–1.18)	0.69 (0.44–1.08)	0.41 (0.27–0.62)
Respiratory illness visit	1.03 (0.84–1.26)	0.25 (0.17–0.37)	3.06 (2.45–3.81)	0.53 (0.42–0.68)
For females only				
Age	1.00 (0.99–1.01)	1.02 (1.01–1.04)	0.97 (0.96–0.98)	0.97 (0.94–0.99)
LEP	1.90 (1.56–2.32)	0.91 (0.71–1.16)	0.30 (0.24–0.39)	0.75 (0.48–1.18)
Member months enrolled	1.01 (1.00–1.02)	0.99 (0.97–1.00)	0.99 (0.98–1.01)	1.01 (0.99–1.03)
Preventive visit	11.71 (8.19–16.74)	0.05 (0.03–0.08)	0.22 (0.14–0.35)	0.65 (0.53–0.80)
Chronic disease visit	1.14 (0.53–2.43)	1.20 (0.54–2.66)	0.26 (0.11–0.62)	0.67 (0.38–1.18)
Injury visit	0.25 (0.19–0.33)	0.94 (0.67–1.32)	5.67 (4.27–7.52)	0.68 (0.47–0.97)
Atopic disease visit	1.50 (0.99–2.26)	0.71 (0.41–1.23)	0.70 (0.44–1.11)	0.48 (0.31–0.75)
Respiratory illness visit	1.09 (0.88–1.34)	0.24 (0.16–0.36)	2.89 (2.32–3.61)	0.69 (0.55–0.88)
Pregnancy	12.28 (7.41–20.35)	0.20 (0.13–0.30)	0.04 (0.01–0.17)	7.30 (4.92–10.83)
Complicated pregnancy	0.31 (0.18–0.55)	2.28 (1.42–3.66)	5.05 (1.35–18.87)	0.78 (0.52–1.17)
Pregnancy × LEP	0.99 (0.46–2.14)	0.25 (0.12–0.51)	5.74 (1.47–22.45)	0.84 (0.45–1.58)

visits (OR = 0.25, 95% CI 0.12–0.51) but no significant differences in primary care visits or hospitalization.

Discussion

Our study found significant differences in the demographics, health insurance enrollment, and health utilization of LEP versus English speaking patients. Gender and Medicaid enrollment differences are likely explained by differences in family circumstances and Medicaid coverage provided to refugees. The finding that the LEP population contains more males is characteristic of a greater number of two parent refugee and immigrant families with Medicaid coverage compared to English speaking low-income populations who have more female-headed households. At the time of the study, new refugees were guaranteed nine months of coverage by the federal government. LEP populations in our area have support pathways, either through extended families or resettlement agencies, to access and remain enrolled in Medicaid. Numerous agencies and advocates assist refugees and immigrants to stay on Medicaid while English proficient families may not have this organized support available to them. The life circumstances and community support systems in our area may be

generalized to other areas in the US with large refugee and immigrant resettlement and robust social support systems. Since local community support systems help LEP families enroll in primary care and maintain insurance coverage, the finding of increased primary care use is similar to utilization patterns seen in other Medicaid populations who also are assigned to a primary care provider [21].

Health Care Utilization Differences

Our data, as well as other studies, suggest that the differences observed in utilization patterns between LEP and English speaking subjects are likely due to two major factors. First, the use of interpreters and second to differences in life circumstances between LEP and English speakers that impacted whether or not they used the University system for primary care.

Impact of Professional Interpreters on Utilization

The hospitals in this study provided professional medical interpreters at the request of the patient or the provider as standard operating policy. Interpreters have been shown to

improve access to preventive care [22]. This “interpreter factor” may also contribute to the increased utilization of primary care by our LEP subjects. The finding that LEP subjects enrolled in interpreter care-coordination had significantly higher primary care utilization than those LEP subjects who were not care-coordinated suggests that interpreter care coordination impacts utilization of a primary care medical home. In our system, interpreters act as advocates for patients, help clarify management and follow-up plans, notify patients of appointments, and assist patients to obtain financial counseling and social work services. Other studies also suggest that LEP patients with medically trained interpreters have improved outcomes consistent with less hospitalization, lower costs, and better chronic disease outcomes [17, 23, 24]. In all of these instances, better communication facilitated by interpreters impacts care utilization.

An intriguing finding from our institution is that rates of referrals for screening mammography in women over age 50 are higher among patients who use an interpreter compared to when no interpreter is required (45 vs. 33%). In the latter group, the majority are native English speakers. (HM Linden. UW, HMC, personal communication, 2002.). This suggests that the likelihood of a provider making a referral is influenced by the presence of an interpreter who may remind both the provider and the patient at the end of the visit that a referral was planned. More studies are needed to evaluate this role of interpreters and elucidate the positive components of the “interpreter factor”. Research is needed on health care utilization and preventive care screening for a single language group, such as Hispanics, and comparing those who utilize medically trained interpreters to those who choose to not have an interpreter because they consider themselves English speakers. Research that evaluated use of a navigator/health advocate with low income English speakers and its impact on health care utilization when controlling for health literacy might also address root causes of health disparities in preventive care.

Life Circumstances and Health Care Utilization

Medicaid enrollment is an imperfect control for socioeconomic status; there may well be unobserved heterogeneity between LEP and English speaking populations that impacts their use of health care services. English speaking patients may have had limited education and resources and may find it harder to navigate a complex health care system on their own.

Our data also suggests that life circumstances were different for LEP and English speaking subjects. Many subjects in our sample were females who received Medicaid health coverage for pregnancy and delivery.

Hospitalized English speakers used ambulatory services at a much lower rate than English speakers who were never hospitalized, suggesting that they either received no care or received care outside of the university system. English speakers, whose access is not limited by availability of interpreter services, have a wider range of options for health care available to them in the community. Thus they may have only used the University system and Medicaid managed care for pregnancy care and deliveries, and had their true primary care home elsewhere. Lower odds ratios of use of specialty care and complicated pregnancy diagnoses in LEP women compared to English speakers (Table 4) suggests that the latter may have had more complications of pregnancy and used the University system for that reason. In contrast, hospitalized LEP subjects used primary care sites more than those who were never hospitalized suggesting that they used the university system as a primary care home.

Other factors that may have influenced our results include general language barriers in the community, cultural influences on the expression of illness, and acculturation. Language barriers may have prevented LEP patients from accessing over the counter medications in local pharmacies and resulted in more visits to the health care system for minor and somatic complaints. Language barriers may also result in less telephone triage that could prevent visits.

Disease burden in the LEP subjects was slightly greater than for English speakers based on higher mean visits per member month enrolled for chronic disease (Table 3: cancer, diabetes, hypertension). In spite of this, they received most of their care in primary care and specialty sites and did not use the ED. The increased visits for atopic disease in our subjects has been reported in immigrant populations in European studies [25–28]. A tendency to express psychosocial stress as back pain, headache, and gastrointestinal complaints in LEP subjects may explain the greater frequency of these visits and the finding of fewer psychosocial and mental health diagnoses in LEP compared to English speakers. Similar use patterns have been documented among non-English speaking patients in Australia [29].

The length of time that ethnic groups have lived in the Seattle area was likely a factor in the higher percent of East African compared to the Asian language speakers that used the ED in our study. East Africans immigrants and refugees began coming to the Seattle area in the early 1990s while many of the Asian language speakers came in the late 1970s and 1980s. As a result Asian immigrants have had more time to learn what hospitals consider to be “appropriate” ED use. In addition, Asian immigrant communities have a more extensive system of traditional therapies, as well as more co-ethnic traditional and western trained

providers available to them in the Seattle area than do East Africans. This lack of cultural and language health resources likely resulted in more East African subjects using the ED. In addition, East African women had more pregnancy diagnoses than Asians, reflecting the generally shorter acculturation period for East Africans, as well as the much higher total fertility rate among East Africans compared with Asians in their respective countries of origin [30].

Pregnant LEP women showed more ED use than pregnant English speaking women. Lack of experience with the health care system among LEP subjects may have influenced their use of ED for pregnancy-related visits rather than accessing labor and delivery or their primary care clinic.

Study Strengths

The main strength of our study is that it describes the use of health care services by an LEP population when health insurance and language barriers are reduced and compares it to an English speaking population of similar socio-economic status and the same health insurance coverage. To our knowledge, there is no other similar study in the current literature. The number of subjects and the two-year study period provide robust data on the differences between the groups. In spite of the cost associated with maintaining a well-trained medical interpreter program, it appears that the utilization pattern of individuals using this service is in a direction of lower cost health visits. The finding of more primary care and less ER visits by patients using interpreters suggests that for institutions similar to ours the costs of providing full access to medical interpreters may be at least partially offset by more appropriate health care use by LEP patients.

Study Limitations

First, the study was retrospective and used an administrative data that presented challenges in correct identification of patients and duplicate record systems. This resulted in fewer individual patients identified than was suggested by the managed care enrollment lists.

Second, hospitalization data did not have specific dates for length of stay or diagnoses and this limited the use of this important predictor of health care utilization to the “No vs. Any Hospitalization” dichotomy.

Third, the categorization of subjects to “LEP speakers” vs. “English Speakers” based on whether they had used an interpreter at least once during the study period probably resulted in some individuals who did not speak or understand English well being included among the “English

speakers”. The UW registration system does not employ a standard question asking how well a person speaks English. The decision to use an interpreter was determined by patient request at the time they made an appointment or presented for care. A provider could also request an interpreter based on their judgment of the adequacy of communication. If the patient never requested an interpreter, the provider might have assumed better English proficiency and understanding than actually existed and this could have adversely impacted health care utilization. However, if anything, this would underestimate the true differences in use patterns between LEP and English speakers. Similarly, the imprecise identification of care coordinated patients produces conservative estimates of distinctions in use patterns within the LEP population.

Fourth, our study reflects the utilization patterns of “users” of the health care system because LEP patients could not be identified until they had used the health care system and requested an interpreter. There may have been unidentified language-related barriers that kept large numbers of patients enrolled in Medicaid managed care from ever using the system during the study period. Additionally, because we could not use the managed care claims data, our utilization data may underestimate the use of outside emergency rooms and hospitals for English speakers. As interpreters were less available at outside hospitals for LEP subjects, and English speakers had more community care options available to them, this may have resulted in capturing a higher percentage of visits among the LEP population than among the English speaking population.

Fifth, generalizing results of our study may be limited in areas with large Spanish-speaking populations as our LEP groups were largely from East Africa and Asia and were legal immigrants or refugees in the US. Finally, acculturation has been associated with health care utilization and health care seeking behavior and we have no information about how long our LEP subjects may have been in the US, other than a general knowledge of changes in the ethnic groups over time in our area.

Conclusions

When language barriers are reduced by the use of professional medical interpreters and health insurance coverage is the same, LEP patients are enrolled longer and more consistently in Medicaid than the English-speaking poor. They use more primary care and have less emergency department visits. In a health care setting that reduces major barriers to care, they appear to be more likely to establish a primary care home in comparison to the English speaking poor. These health utilization characteristics are likely a reflection of the life circumstances and social supports for immigrants

and refugees compared to the English-speaking poor and are a positive consequence of using professional medical interpreters to navigate a complex health care system.

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References

1. Profile of the Foreign-Born Population in the United States: 2000, Current Population Reports. December 2001:23–206.
2. US Census Bureau, Health Insurance Coverage: 2000, <http://www.census.gov/hhes/hlthins/hlthin00/hi00tc.html>.
3. Mohanty SA, Woolhandler S, Himmelstein DU, et al. Health care expenditures of immigrants in the United States: a nationally representative analysis. *Am J Public Health* 2005;95:1431–8.
4. National Health Law Program and the Access Project: 2004. Language services action kit. Washington, DC: National Health Law Program. <http://www.healthlaw.org/pubs/2004>.
5. Woloshin S, Bickell NA, Schwartz LM, et al. Language barriers in medicine in the United States. *JAMA* 1995;273:724–8.
6. Wilson E, Chen A, Grumbach K, et al. Effects of limited English proficiency and physician language on health care comprehension. *J Gen Intern Med* 2005;20:800–6.
7. Jacobs EA, Karavolos K, Rathouz PJ, et al. Limited English proficiency and breast and cervical cancer screening in a multi-ethnic population. *Am J Public Health* 2005;95:1410–6.
8. Perez-Stable EJ, Napoles-Springer AN, Miramontes JM. The effects of ethnicity and language on medical outcomes of patients with hypertension or diabetes. *Med Care* 1997;35:1212–9.
9. Tocher TM, Larson E. Quality of diabetes care for non-English-speaking patients: A comparative study. *West J Med* 1998;168:504–11.
10. Stein JA, Fox SA. Language preference as an indicator of mammography use among Hispanic women. *J Natl Cancer Inst* 1990;82:1715–6.
11. Pachter LM, Weller SC. Acculturation and compliance with medical therapy. *JDBP* 1993;14:163–7.
12. Manson A. Language concordance as a determinant of patient compliance and emergency room use in patients with asthma. *Med Care* 1998;26:1119–28.
13. Woloshin S, Schwartz LM, Katz SJ, et al. Is language a barrier to the use of preventive services? *JGIM* 1997;12:472–7.
14. Jang M, Lee E, Woo K. Income, language, and citizenship status: factors affecting the health care access and utilization of Chinese Americans. *Health Social Work* 1998;23:136–45.
15. Derose KP, Baker DW. Limited English proficiency and Latinos' use of physician services. *Med Care Res Rev* 2000;57:76–91.
16. Andrulis D, Goodman N, Pryor C. What a difference an interpreter can make. Health care experiences of uninsured with limited English proficiency. The Access Project, Center for Community Health Research and Action, Brandeis University, Boston, MA; 2002.
17. Flores G. The impact of medical interpreter services on the quality of health care: a systematic review. *Medical Care Res Rev* 2005;62:255–299.
18. Kogan MD, Alexander GR, Jack BW, et al. The effects of gaps in health insurance on continuity of a regular source of care among preschool aged children in the United States. *JAMA* 1995;274:1429–1435.
19. Fleiss JL. Statistical methods for rates & proportions. New York, NY: Wiley; 1981.
20. Sturmer T, Glynn RJ, Kliebsch U, et al. Analytic strategies for recurring events in epidemiological studies: Background and application to hospital risk in the elderly. *J Clin Epidemiol* 2000;53:57–64.
21. Berman S, Bondy J, Lezotte D, et al. The influence of having an assigned Medicaid primary care physician on utilization of otitis media-related services. *Pediatrics* 1999;104:1192–7.
22. Jacobs EA, Lauderdale DS, Meltzer D, et al. Impact of interpreter services on delivery of care to limited—English-proficient patients. *J Gen Intern Med* 2001;16:468–74.
23. Hampers LC, McNulty JE. Professional interpreters and bilingual physicians in a pediatric emergency department. *Arch Pediatr Adolesc Med* 2002;156:1108–13.
24. Baker DW, Parker RM, Williams MV, et al. Use and effectiveness of interpreters in an emergency department. *JAMA* 1996;275:783–8.
25. Asseyr AF, Businco L. Atopic sensitization in children of Somali immigrants in Italy. *J Investig Allergol Clin Immunol* 1994;4:192–296.
26. Sladden MJ, Dure-Smith B, Berth-Jones J, et al. Ethnic differences in the pattern of skin disease seen in a dermatology department—atopic dermatitis is more common among Asian referrals in Leicestershire. *Clin Exp Dermatol* 1991;16:348–9.
27. Tedeschi A, Barcella M, Bo GA, et al. Onset of allergy and asthma symptoms in extra-European immigrants to Milan, Italy: possible role of environmental factors. *Clin Exp Allergy* 2003;33:449–54.
28. Dervaderics M, Fust G, Otos M, et al. Differences in the sensitization to ragweed pollen and occurrence of late summer allergic symptoms between native and immigrant workers of the nuclear power plant of Hungary. *Immunol Invest* 2002;31:29–40.
29. Knox SA, Britt H. A comparison of general practice encounters with patients from English-speaking and non-English speaking backgrounds. *Med J Aust* 2002;177:98–101.
30. Haub C. "2006 World population data sheet" The Population Reference Bureau, 2006.