

PREDICTORS OF HEALTHCARE UTILIZATION AMONG OLDER MEXICAN AMERICANS

Objective: To examine the effects of predisposing, enabling, and need factors on physician and hospital use among older Mexican Americans.

Design: A two-year prospective cohort study.

Setting: Five Southwestern states: Texas, New Mexico, Colorado, Arizona, and California.

Participants: A population-based sample of 1987 non-institutionalized Mexican American men and women age ≥ 65 years.

Main Outcomes Measures: Physician and hospital utilization. Predictor variables included predisposing, enabling, and need factors. Ordinary least square and logistic regression analysis were used to model the effects of predictor factors specified in the Andersen model of health service use on physician and hospital use.

Results: After two years of follow-up, predisposing and enabling factors accounted for $< 5\%$ of the variance in physician and hospital use. Need factors explained 21% of the variance in physician use and 7% of the variance in hospital use. Older age; being female; insurance coverage; having arthritis, diabetes, heart attack, hypertension, stroke, or cancer; and number of medications were factors associated with higher physician utilization. Subjects with arthritis, diabetes, hip fracture, high depressive symptoms, activities of daily living (ADL) disability, or high number of medications increased the odds of having any hospitalization. Subjects with diabetes, heart attack, hip fracture, ADL disabled, and high number of medications had a greater number of hospital nights than their counterparts.

Conclusions: Older age, female sex, insurance coverage, and prevalent medical conditions are determinants of healthcare use among older Mexican Americans. (*Ethn Dis.* 2006; 16:640-646)

Key Words: Aging, Health Services, Hospitalization, Mexican Americans

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INTRODUCTION

Adults age ≥ 65 years make up 12.4% of the US population, and this percentage is estimated to increase to 20% by 2030.¹ Older persons account for more than one third of healthcare expenditures.² Older Hispanics represent one of the fastest growing segments of the older population and are projected to account for 16% of the older US population by the year 2050. Most older Hispanics are expected to be of Mexican origin.¹

Older Mexican Americans are characterized by low income, few years of formal education, high rates of diabetes, obesity, disability, relatively low rates of health insurance coverage, and rates of physician and hospital use that are similar to or higher than those of non-Hispanics.²⁻⁵ While older Mexican Americans have poorer health profiles than older non-Hispanic Whites, they have similar or better life expectancies.⁶ This advantage is attributed primarily to lower death rates from cardiovascular diseases and cancer.^{3,6}

The healthcare services utilization model developed by Andersen and his colleagues⁷⁻¹⁰ has often been used by researchers to investigate the use of healthcare services in the older population.¹¹⁻²³ The model organizes determinants of use into three categories: predisposing factors, enabling factors, and need factors. Predisposing factors capture the propensity to use services.

They include demographics (age, sex, marital status), social structure (education, occupation, and ethnicity), and health beliefs (locus of control or medical knowledge). Enabling factors are those that allow a person to access medical care and include both familial and community resources (ie, income, insurance coverage, having a regular source of care, etc). Need characteristics are specific disabilities or diseases that cause a person to seek health care. Past studies indicate that collectively these three factors have accounted for 7% to 22% of the variance in physician visits, 9% to 16% of the variance in number of hospitalizations, and 9% to 11% of the variance in number of hospital nights.¹¹⁻²³

Cross-sectional studies of Hispanic populations have found that Hispanics are much less likely than the general population to have health insurance, and this lack of coverage is related to low income and educational levels. Hispanics also appear to use hospitals similarly to the general population but are somewhat less likely to see a doctor.⁵ Findings from the National Health Interview Survey (NHIS) reveal that Hispanics have similar and sometimes greater use of health services than other populations.⁴ Cox and colleagues found that being unmarried, having diabetes, and poor self-perceived health status were associated with greater physician utilization among Vietnamese, Portuguese, and Hispanic persons in the area.¹⁵

Schur and colleagues²⁴ found that Puerto Ricans are more likely than Cubans and Mexicans Americans to be covered by Medicaid. Wells and colleagues²⁵ have shown that Mexican Americans with Medicaid coverage report

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more inpatient medical admissions if they are more acculturated than is the case for the less acculturated. Burnette and colleagues,¹⁹ using data from the 1988 National Survey of Hispanic Elderly People, found that insurance coverage, presence of adult children, and disability were associated with physician visits with Cuban Americans, and Puerto Ricans were more likely to have seen a physician than Mexican Americans during the year before the interview.

However, like most healthcare utilization studies, these investigations were based on cross-sectional data, which cannot evaluate the dynamic process implicated in the decision to use medical services (eg, need factors could have resulted from an event that both caused the need and caused the utilization of health services). The aim of this study is to examine the effect of predisposing, enabling, and need factors on subsequent physician and hospital use among older Mexican Americans, avoiding the confounding between healthcare use and need factors typical of cross-sectional studies.

METHODS

Sample and Procedure

Data used were taken from the Hispanic Established Population for the Epidemiological Study of the Elderly (EPESE), a longitudinal study of Mexican Americans age ≥ 65 years who live in Texas, New Mexico, Colorado,

Arizona and California. Sampling procedures and sample characteristics have been reported previously.²⁶⁻²⁷ At the time of the baseline assessment during 1993 and 1994, 2873 subjects (94.2%) were interviewed in person, and 177 (5.8%) were interviewed by proxy. Two years later, 2310 subjects were re-interviewed in person, 129 were re-interviewed by proxy, 109 refused to be re-interviewed, 279 were lost to follow-up, and 223 subjects were confirmed dead through National Death Index (NDI) and reports from relatives. The analysis reported below is based on 1987 subjects who participated in the baseline interview and completed the two-year follow-up interview (1995-1996) and for whom data on health services use were available at followup.

Measurement

Baseline predisposing factors were represented by age, sex, marital status, and nativity (US-born and foreign-born divided into living in the United States < 15 years and for ≥ 15 years).

Baseline enabling factors included years of formal education, health insurance coverage (private insurance, Medicare, and Medicaid), number of children living in the household, financial strain (some/great deal, none/a little difficulty paying bills), and having a usual source of health care.

The following baseline need factors were examined:

1. Self-reported physician-diagnosed arthritis, diabetes, heart attack, hypertension, stroke, hip fracture, and cancer.
2. Depressive symptoms were measured by the Center for Epidemiologic Studies Depression Scale (CES-D).²⁸ Subjects scoring ≥ 16 were categorized as having high depressive symptoms.²⁹
3. Functional disability was assessed with a modified version of Katz's Activities of Daily Living (ADL) scale,³⁰ which included walking across a small room, bathing,

grooming, dressing, eating, transferring from a bed to a chair, and using the toilet. Disability was dichotomized as no help needed versus needing help with or unable to perform one or more of the seven ADLs.

4. Cognitive function was assessed with the Mini Mental State Examination (MMSE) instrument.³¹⁻³² Scores have a potential range of 0 to 30, with lower scores indicating poorer cognitive ability. Subjects with a MMSE scores ≤ 18 were considered to be cognitively impaired.³³
5. Number of prescription medications was assessed by asking the respondents: "During the past two weeks, did you take or use any medication prescribed by a doctor?" If the answer was yes, the interviewer recorded all medicines taken within the past two weeks and those to be taken as needed, by actual inspection of medicine bottles.

Outcome

Outcome variables included physician and hospital utilization measured at the follow-up interview (1995-1996). Physician utilization was assessed by the following question: "How many times in the past 12 months have you visited with a medical doctor." Hospital utilization was assessed by the following questions: "Did you experience an illness or injury that required staying overnight or longer in a hospital in the last year" (yes vs no) and "How many total nights did you stay in the hospital in the last year." Following Wolinsky and Coe's recommendation¹⁸ that truncated variables be used to minimize the distortion caused by the few respondents with extremely high use of health services, the number of physicians visits was truncated from the maximum of 365 to ≥ 15 ; the number of nights hospitalized was truncated from a maximum of 365 to ≥ 44 . As in the

Table 1. Means, standard deviations (SD), and percentages for predisposing, enabling, need factors at baseline

Independent Variables	N=1987
Predisposing factors	
Age (mean \pm SD)	1987 (72.6 \pm 6.1)
Sex (female %)	1183 (59.5)
Marital status (married %)	1122 (56.5)
Nativity (%)	
US-born	1149 (57.8)
Foreign-born, <15 years in United States	105 (5.3)
Foreign-born, \geq 15 years in United States	733 (36.9)
Enabling factors	
Years of formal education (mean \pm SD)	1987 (4.9 \pm 3.9)
Insurance coverage (%)	
None	130 (6.5)
Medicare and private	361 (18.2)
Medicare only	829 (41.7)
Medicare and Medicaid	667 (33.5)
Financial strain (%)	
None/a little	813 (40.9)
Some/a great deal	1134 (57.0)
Missing	40 (2.1)
Usual source of health care (%)	1682 (84.7)
Number of children (mean \pm SD)	1987 (4.8 \pm 3.2)
Need factors (%)	
Medical conditions	
Arthritis	833 (41.9)
Diabetes	526 (26.5)
Heart attack	205 (10.3)
Hypertension	875 (44.0)
Stroke	120 (6.0)
Hip fracture	60 (3.0)
Cancer	95 (4.8)
Cognitive function (MMSE \leq 18)	103 (5.2)
Depressive symptoms (CES-D \geq 16)	422 (21.2)
Any ADL limitation	195 (9.8)
Number of medications (mean \pm SD)	198 (2.0 \pm 1.9)

CES-D=Center for Epidemiologic Studies Depression Scale; MMSE=Mini Mental Status Examination; ADL=activities of daily living.

Wolinsky and Coe study, the truncations were set where the tails of the distribution became flat, with only 5% of the sample of respondents exceeding the criterion level.

Analysis

Multiple regression models were used to estimate the parameters specified in the Andersen model of health services use (ie, predisposing, enabling, and need factors) for number of physician visits. To examine the factors associated with hospital admissions, two approaches were used: 1) multivariable logistic regression analysis was used

to examine which factors were related to having been hospitalized; and 2) multivariable regression analysis was used to examine which factors were associated with the number of hospital nights. A hierarchical approach was used by first entering predisposing factors, followed by enabling factors, and then need factors. Predictors were assessed at baseline interview (1993–1994) and outcomes were assessed at follow-up interview (1995–1996). To assess multicollinearity, each independent variable was regressed on all of the other independent variables.³⁴ As has been suggested by Calsyn *et al*,³⁵ additional

analyses were performed to examine if interaction terms can improve the explanatory power of the Andersen model of health services uses. Interaction terms were examined between predisposing and enabling variables (ie, sex, nativity, health insurance, having regular source of care, and financial strain); between predisposing factors and need factors (ie, sex, nativity, prevalent conditions such as diabetes, hypertension, arthritis, high depressive symptoms, and ADL disability); and enabling with need factors (ie, insurance coverage, having a regular source of care, and prevalent conditions). All analyses were performed by using the SAS System for Windows, version 8 (SAS Institute, Cary, NC).

RESULTS

Table 1 presents the baseline prevalence of potential predisposing, enabling, and need factors. The average age of the sample was 72.6 years, and 59.5% of respondents were female. More than half were currently married, 57.8% were US-born, 42.2% were foreign-born, and the average number of years of formal education was 4.9. More than 90% of the sample had insurance coverage, 41.7% had only Medicare, 18.2% had an additional coverage by private insurance, and 33.5% had an additional coverage by Medicaid. Of the total sample, 56.9% reported some or great financial strain and 85.6% identified a usual source of care. The most common medical conditions were arthritis, hypertension, and diabetes; 21.2% had high depressive symptoms (CES-D \geq 16); 9.8% reported at least one ADL limitation; and the average number of medications used in the previous two weeks was two. Eighty-six percent of the subjects had some physician contact during the 12 months before the follow-up interview; the average number of physician visits was 5.4 \pm 4.7 (Table 2). Fewer than

Table 2. Frequency/means of health services use at the two-year follow-up interview

Health Services Use	N=1987
Actual number of physician visits (mean \pm SD)	8.2 \pm 19.3
Actual number of physician visits truncated at ≥ 15 visits (mean \pm SD)	5.4 \pm 4.7
Any hospitalization (%)	19.2
Actual number of hospital nights from all hospitalizations (mean \pm SD) (n=375)	13.7 \pm 28.4
Actual number of hospital nights from all hospitalizations truncated at ≥ 44 hospital nights (mean \pm SD) (n=375)	11.0 \pm 11.4

SD=standard deviation.

Table 3. Multiple regression results for number of physician visits at the follow-up interview among older Mexican Americans (N=1987)

Explanatory Variables	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Predisposing factors			
Age (years)	.07 (.02)*	.06 (.02)*	.04 (.02)§
Sex (female)	1.64 (.24)*	1.57 (.23)*	.97 (.22)*
Marital status (married)	.45 (.24)§	.42 (.24)	.41 (.22)
Nativity (US-born)			
Foreign-born, <15 years in United States	-1.0 (.49)§	-.72 (.50)	-.43 (.46)
Foreign-born, ≥ 15 years in United States	.14 (.23)	.10 (.23)	.02 (.21)
R²	.03*		
Enabling factors			
Education (years)		.01 (.03)	-.01 (.03)
Insurance coverage (none)			
Medicare and private		1.13 (.50)‡	.39 (.47)
Medicare only		1.38 (.46)†	.89 (.42)§
Medicare and Medicaid		2.17 (.47)*	1.33 (.43)†
Number of children		.07 (.03)§	.06 (.03)
Financial strain (none/a little)			
Some/a great deal		-.07 (.23)	-.23 (.21)
Missing		-.92 (.79)	-.95 (.82)
Usual source of health care		.84 (.30)†	.44 (.28)
R²	.05*		
Need factors			
Medical conditions			
Arthritis			.43 (.22)§
Diabetes			1.10 (.23)*
Heart attack			.76 (.34)‡
Hypertension			.57 (.21)†
Stroke			1.26 (.43)†
Hip fracture			-.25 (.59)
Cancer			1.06 (.46)‡
Cognitive impairment (MMSE ≤ 18)			.40 (.51)
Depressive symptoms (CES-D ≥ 16)			.05 (.25)
Any ADL limitation			.66 (.37)
Number of medications			.65 (.06)*
R²	.21*		

* P value <.0001; † P value <.001; ‡ P value <.01; § P value <.05.

Note: β are unstandardized; reference categories are given in parenthesis.

All respondents (users and non-users) are included in the analysis.

SE=standard error; MMSE=Mini Mental Status Examination; CES-D=Center for Epidemiologic Studies Depression Scale; ADL=activities of daily living.

20% of the subjects had been hospitalized at the time of the follow-up interview, and the average number of nights spent in the hospital was 10.0 \pm 11.4 (Table 2).

Table 3 shows the multiple regression results for number of physician visits. Model 1 includes predisposing factors, model 2 includes predisposing plus enabling factors, and model 3 adds need factors. Predisposing factors accounted for 3% of the variance in the number of physician visits, enabling factors explained 5%, and need factors explained 21%. In the final model, older age; being female; having Medicare coverage; having Medicare plus an additional coverage by Medicaid; having a self-reported diagnosis of arthritis, diabetes, heart attack, hypertension, stroke, or cancer; and number of medications were factors associated with higher physician utilization.

Table 4 shows the multiple logistic regressions for any hospitalization. Model 1 includes predisposing factors, model 2 includes predisposing plus enabling factors, and model 3 adds need factors. Predisposing factors accounted for 1% of the variance in the number of physician visits, enabling factors explained 1%, and need factors explained 5%. In the final model, older age; having a self-reported diagnosis of arthritis, diabetes, or hip fracture; high depressive symptoms; ADL disability; and number of medications increased the odds of having any hospitalization. No significant enabling factors were associated with any hospitalization.

Table 5 shows the multiple regression results for number of hospital nights spent in the year before the follow-up interview. Model 1 includes predisposing factors, model 2 includes predisposing plus enabling factors, and model 3 adds need factors. Predisposing factors accounted for 1% of the variance in number of hospital nights. Enabling factors explained 1% of the variance, and need factors explained 7% of the variance. Subjects with self-reported

Table 4. Multiple logistic regression predicting odds of any hospitalization at the follow-up interview among older Mexican Americans (N=1987)

Explanatory Variables	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Predisposing factors			
Age (years)	1.03 (1.01–1.05)	1.03 (1.01–1.05)	1.02 (1.00–1.04)
Sex (female)	1.17 (.91–1.49)	1.14 (.89–1.46)	.94 (.72–1.22)
Marital status (married)	1.17 (.91–1.50)	1.17 (.91–1.51)	1.20 (.93–1.56)
Nativity (US-born)			
Foreign-born, <15 years in United States	1.29 (.80–2.08)	1.33 (.81–2.19)	1.42 (.85–2.37)
Foreign-born, ≥15 years in United States	1.02 (.81–1.30)	1.01 (.79–1.29)	.98 (.76–1.26)
<i>R</i> ²	.01		
Enabling factors			
Education (years)		1.01 (.98–1.05)	1.01 (.97–1.04)
Insurance coverage (none)			
Medicare and private		1.13 (.65–1.99)	1.00 (.56–1.77)
Medicare only		1.18 (.71–1.97)	1.02 (.61–1.72)
Medicare and Medicaid		1.47 (.88–2.47)	1.18 (.70–2.01)
Number of children		1.01 (.97–1.04)	1.00 (.97–1.04)
Financial strain (none/a little)			
Some/a great deal		1.21 (.94–1.54)	1.13 (.88–1.46)
Missing		1.12 (.49–2.54)	1.02 (.40–2.61)
Usual source of health care		1.13 (.82–1.58)	1.12 (.80–1.56)
<i>R</i> ²		.01	
Need factors			
Medical conditions			
Arthritis			1.31 (1.02–1.68)
Diabetes			1.42 (1.10–1.83)
Heart attack			1.40 (.98–1.99)
Hypertension			.94 (.74–1.21)
Stroke			.80 (.49–1.28)
Hip fracture			1.84 (1.02–3.31)
Cancer			1.56 (.97–2.52)
Cognitive impairment (MMSE ≤18)			.98 (.55–1.74)
Depressive symptoms (CES-D ≥16)			1.39 (1.05–1.83)
Any ADL limitation			1.50 (1.04–2.18)
Number of medications			1.11 (1.04–1.19)
<i>R</i> ²			.05*

* *P* value < .0001.

Note: reference categories are given in parenthesis.

All respondents (users and non-users) are included in the analysis.

MMSE=Mini Mental Status Examination, CES-D=Center for Epidemiologic Studies Depression Scale, ADL=activities of daily living.

diagnosis of diabetes, heart attack, or hip fracture were significantly associated with a greater number of hospital nights than their counterparts. Similarly, subjects with any ADL limitation and high number of medications were significantly associated with a greater number of hospital nights than their counterparts.

Of the 20 interactions terms performed for each outcome, only five were significant. Foreign-born subjects living in the United States for <15 years and having Medicare and Medicaid coverage were significantly more likely to have

more physician visits ($\beta=2.37$, standard error [SE]=.93); ADL-disabled subjects covered by Medicare only were more likely to have more physician visits ($\beta=1.34$, SE=.69); subjects having a usual source of care and covered by Medicare and Medicaid had a reduced odds of being hospitalized (OR .48, 95% confidence interval [CI] .21–.97); foreign-born subjects living in the United States for ≥15 years who were ADL disabled were more likely to have more hospital nights ($\beta=1.93$, SE=.99); and ADL-disabled subjects

with arthritis were more likely to have more hospital nights ($\beta=1.94$, SE=.99).

DISCUSSION

This is the first study that examines the effects of predisposing, enabling, and need factors specified in the Andersen model of health services use in terms of future use of medical care, based on longitudinal data from a large probability sample of older Mexican

Table 5. Multiple regression results for number of hospital nights at the follow-up interview among older Mexican Americans (N=1987)

Explanatory Variables	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Predisposing factors			
Age (years)	.08 (.02)†	.08 (.03)†	.03 (.02)
Sex (female)	.20 (.32)	.12 (.32)	-.22 (.32)
Marital status (married)	.14 (.32)	.07 (.33)	.11 (.32)
Nativity (US-born)			
Foreign-born, <15 years in United States	-.18 (.66)	.03 (.69)	.19 (.67)
Foreign-born, ≥15 years in United States	.05 (.31)	.06 (.32)	-.001 (.31)
R²	.01§		
Enabling factors			
Education (years)		.08 (.04)	.04 (.04)
Insurance coverage (none)			
Medicare and private		.50 (.69)	.19 (.68)
Medicare only		1.00 (.63)	.64 (.61)
Medicare and Medicaid		1.41 (.64)§	.71 (.63)
Number of children		.05 (.04)	.04 (.04)
Financial strain (none/a little)			
Some/a great deal		.28 (.32)	.11 (.31)
Missing		1.58 (1.08)	1.09 (1.18)
Usual source of health care		.62 (.41)	.44 (.40)
R²	.01§		
Need factors			
Medical conditions			
Arthritis			.29 (.31)
Diabetes			.94 (.34)†
Heart attack			1.84 (.49)*
Hypertension			-.40 (.31)
Stroke			-.99 (.62)
Hip fracture			2.30 (.85)†
Cancer			1.03 (.67)
Cognitive impairment (MMSE ≤18)			-.30 (.74)
Depressive symptoms (CES-D ≥16)			.06 (.36)
Any ADL limitation			2.74 (.53)*
Number of medications			.33 (.09)*
R²	.07*		

* P value <.0001; † P value <.001; ‡ P value <.01; § P value <.05.

Note: β are unstandardized; reference categories are given in parenthesis.

All respondents (users and non-users) are included in the analysis.

SE=standard error; MMSE=Mini Mental Status Examination; CES-D=Center for Epidemiologic Studies Depression Scale; ADL=activities of daily living.

Americans. Baseline predisposing and enabling factors accounted for <5% of the variance on use of both physician and hospital admission. Baseline need factors explained 21% of the variance on physician use; 5% of the variance on being hospitalized; and 7% of the variance on hospital use.

Predisposing factors such as older age and female sex were significantly associated with greater physician use. Unlike other studies,^{13,21} we found that older Mexican American women are likely to have more physician visits than

men. Another finding was the fact that the foreign-born subjects living in the United States for <15 years who were covered by Medicare and Medicaid reported more physician visits, and foreign-born subjects living in the United States for ≥15 years and those who were ADL disabled were more likely to report more hospital nights. As expected, need factors were the strongest determinants of medical care utilization.

Our findings are similar to those found in other longitudinal studies.^{16,22} For instance, Stump and colleagues,²²

Older age, female sex, insurance coverage, and prevalent medical conditions are determinants of healthcare use [for older Mexican Americans].

assessing changes in physician utilization over time among older adults, found that age, education, having Medicaid, several medical conditions (hypertension, angina, stroke, arthritis, and diabetes), as well as advanced ADL and lower body limitations were associated with greater number of physician visits.

This study does have limitations. First, health services use variables were based on self-reported data rather than provider records. Second, the nature of physician visits and hospital admissions were not determined. However, when self-reported data on healthcare utilization are compared with administrative data, self-reports appear to underestimate actual utilization. For instance, Glandon et al³⁶ found that underreports of utilization are smaller for elderly persons with lower health status as measured by disease history and larger for those with higher levels of utilization. Despite these limitations, this study has several strengths, including its large sample of older Mexican Americans living in the community and its longitudinal design.

In conclusion, we found several factors strongly associated with subsequent healthcare use among older Mexican Americans. Older age, female sex, insurance coverage, and prevalent medical conditions are determinants of healthcare use. Knowledge of these factors can make contributions to health policies in this population. Of great

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importance is insurance coverage, which ensures access to health care. Insured elderly are more likely to receive preventive care, seek care for serious symptoms, and have a continuing source of care. Finally, efforts to improve elders' health conditions, such as diabetes, hip fracture, and disability, including interventions aimed at prevention or better treatment, are of paramount importance.

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