Adherence to Antipsychotics Among Latinos and Asians With Schizophrenia and Limited English Proficiency

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Objectives: The authors examined data for 7,784 Latino, Asian, and non-Latino white Medi-Cal beneficiaries with schizophrenia to determine the relationship between patients' preferred language for mental health services—English, Spanish, or an Asian language—and their adherence to treatment with antipsychotic medications. _Methods:_ Data reflected 31,560 person-years from 1999 to 2004. Pharmacy records were analyzed to assess medication adherence by use of the medication possession ratio (MPR). Clients were defined as nonadherent (MPR<.5), partially adherent (MPR=.5–<.8), or adherent (MPR=.8–1.1) or as an excess filler of prescriptions (MPR>1.1). Regression models were used to examine adherence, hospitalization, and costs by race-ethnicity and language status. _Results:_ Latinos with limited English proficiency were more likely than English-proficient Latinos to be medication adherent (41% versus 36%; p<.001) and less likely to be excess fillers (15% versus 20%; p<.001). Asians with limited English proficiency were less likely than English-proficient Asians to be adherent (40% versus 45%; p=.034), more likely to be nonadherent (29% versus 22%; p<.001), and less likely to be excess fillers (13% versus 17%; p=.004). When analyses controlled for adherence and comorbidities, clients with limited English proficiency had lower rates of hospitalization and lower health care costs than English-proficient and white clients. _Conclusions:_ Adherence to antipsychotic medications varied by English proficiency among and within ethnic groups. Policies supporting the training of bilingual and multicultural providers from ethnic minority groups and interventions that capitalize on patients' existing social support networks may improve adherence to treatment in linguistically diverse populations. (_Psychiatric Services_ 60:175–182, 2009)

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Antipsychotic medications are the foundation of treatment for people with schizophrenia. Despite the demonstrated ability of antipsychotic medications to reduce symptoms and relapse rates and improve health outcomes, nonadherence to them is common, with average rates of 40% to 50% (1–7). Poor adherence is associated with increased relapse, psychiatric hospitalizations, emergency room visits, and hospitalization costs (3,6,8–12). Nonadherence is also associated with poor social outcomes, including greater risk of arrest, violence, victimization, and substance use and poorer mental functioning and life satisfaction (9).

Numerous factors can influence adherence to a prescribed treatment plan. Osterberg and Blaschke's review (13) of general medication adherence identified numerous factors that may influence adherence, including patient-level factors (such as forgetfulness, other priorities, intentional omission of doses, and emotional factors) and provider-level factors (such as prescription of a complex medication regimen, failure to explain side effects and benefits associated with the medication, disregard for a patient's lifestyle or economic resources, and poor patient-provider relationships). Lacro and colleagues (14) identified additional patient- and provider-level factors predictive of nonadherence to antipsychotic med-

ication among persons with schizophrenia, including poor insight, negative attitude or negative subjective response toward medication, substance abuse, shorter illness duration, and inadequate discharge planning or aftercare environment (14). A patient's knowledge about the benefits of a medication and its side effects, frequency, duration, and dosing may be affected by providers' explanations about new medications (15), which a patient with limited language proficiency may misunderstand. Similarly, a client's level of health literacy may affect the processing of information provided during clinical visits (16).

Few studies have examined the relationship between adherence to antipsychotic medications among adults from ethnic minority groups who have a diagnosis of schizophrenia (6,17,18). Diaz and colleagues (17) conducted a community-based study using an electronic monitoring system of bottle openings to assess psychotropic medication utilization behaviors among 19 African Americans, 44 monolingual and 25 bilingual Latinos, and 34 Caucasians. They found that African Americans and monolingual Spanish-speaking clients were less likely than Caucasians to be adherent. Another study, which used Texas Medicaid data, found that African-American and Mexican-American clients were less adherent than non-Latino whites (18). A third study, in San Diego County, found that Latinos and African Americans were significantly less likely to be adherent than non-Latino whites (6).

With the exception of the work by Diaz and colleagues (17), we are aware of no other study that has examined adherence to antipsychotics by language status. This study provides a unique contribution by examining the relationship of race-ethnicity and language status to adherence to antipsychotic medications among Latino and Asian clients with schizophrenia in a large public mental health system. San Diego County is a large, ethnically diverse county located on the United States–Mexico border. It is home to large ethnic minority and foreign-born populations, particularly Latinos of Mexican origin and Asians, most of whom are Fil-

ipino and Vietnamese. In 2007 San Diego County had a total population of approximately 3.1 million; 29% were Latino, 9% were Asian, and 5% were African American (19).

Expanding on prior research, the objectives of this study were to analyze the relationship between race-ethnicity, English proficiency, and adherence to antipsychotic medications among persons with a diagnosis of schizophrenia and to analyze the relationships between race-ethnicity, English proficiency, adherence, psychiatric and nonpsychiatric hospitalization, and costs.

Methods
A conceptual model of language, adherence, and service use
We propose an expanded model of adherence that considers the roles of language and family support in predicting adherence to antipsychotic medication and use of mental health services. The studies reviewed above found that patient and provider factors interact to affect adherence and that language proficiency affects the exchange of information between patient and provider. However, a client's level of English proficiency may also be a proxy for migration history, culture, and family and social support. Ramirez Garcia and colleagues (20) found that familial support predicted better medication adherence among Mexican Americans with schizophrenia. Although a client with low English proficiency may experience difficulty in communicating with his or her provider, the client may also benefit from engagement of family members in the treatment process. Thus a client's low English proficiency may result in increased participation in care by family members. Barriers to communication and adherence may be reduced if family members can effectively serve as linguistic and social translators between the patient and provider (21).

Adherence to antipsychotic medications is associated with fewer inpatient admissions (3,6,8–12). We propose an additional link between English proficiency and service use (22,23). That is, we expect that the set of cultural and social factors associated with English proficiency has an in-

dependent effect on hospitalizations and costs beyond their effects on medication adherence.

Sample and independent variables
Data from San Diego County Adult and Older Adult Mental Health Services (AOAMHS) encounter-based management information system (MIS) were merged with data from California's Department of Health Care Services to identify Medi-Cal (California's Medicaid program) beneficiaries with schizophrenia who were living in the community and receiving psychiatric services and who filled prescriptions for oral antipsychotic medications during 1999–2004 (N=31,560 person-years). The MIS includes demographic information—age, gender, self-reported race or ethnicity, and self-reported preferred language for mental health services.

As in previous research, we used a client's preferred service language as a proxy for limited English proficiency status (22,23). Clients report their preferred language for receiving services at admission to each service. In California, language is highly correlated with foreign-born status. We analyzed data from the California Health Interview Survey and found that among Latino adults in San Diego in homes where Spanish is spoken, 73% were born in Mexico, and among Asians in homes where Chinese or Vietnamese is spoken, 86% were born in Asia or the Pacific Islands (24). The sample for the study reported here is limited to Latinos with a preferred language of Spanish or English, Asians with a preferred Asian language (for example, Vietnamese and Tagalog) or English, and non-Latino whites (hereafter, whites) with a preferred language of English. Among the 460 Asian clients in the sample, 44% (N=201) were Filipino, 17% (N=78) were Vietnamese, 8% (N=36) were Japanese, 7% (N=32) were Chinese, and 25% (N=113) were from other Asian groups.

Clients also report their living situation at admission to each service. We classified clients by their most commonly reported living situation. We included persons living independently, residents in assisted living facilities (also known as board-and-care facili-

ties), homeless adults, and adults with unknown living situations. We excluded persons residing primarily in jails or long-term institutional care facilities. We also excluded persons with no insurance, because data on medication use, payment, and health services costs were unavailable. Conservatorship status was ascertained from the MIS, and Medicare eligibility was identified from the Medi-Cal data. Diagnosis of a substance use disorder was identified across both systems. Medi-Cal has strict requirements to verify residency status. Thus clients included in this study are either U.S. citizens or documented immigrants.

We used *ICD-9* diagnosis codes from the Medi-Cal claims to assess comorbid illness severity with the Chronic Illness and Disability Payment System (CDPS) (25). CDPS is a diagnostic classification system that is commonly used by Medicaid programs to assess illness severity and make health-based capitated payments to health plans that enroll Medicaid beneficiaries. The CDPS software assigns diagnostic codes obtained from claims to 56 diagnostic categories within 18 major diagnostic groups corresponding to major body systems (for example, cardiovascular) or type of disease (for example, diabetes). CDPS scores then are assigned on the basis of age, gender, and presence of diagnostic categories. These scores reflect illness severity on the basis of predicted future expenditures; a score permits comparison to the average expenditure across all Medicaid beneficiaries. For example, a 40-year-old male with schizophrenia but no general medical comorbidity would have a risk score of 1.2, and therefore would be expected to have 20% greater Medicaid costs than an average beneficiary. (Additional information on CDPS and public use software is available at cdps.ucsd.edu).

Dependent variables

Adherence to prescribed regimens was determined by examining Medi-Cal claims by means of medication refill records. Adherence was measured by the annual medication possession ratio (MPR), which was computed for each person in each calendar year. The MPR was calculated by dividing the number of days that medications were available for consumption by the number of days that adults were eligible for Medi-Cal. For example, a person eligible for Medi-Cal for the entire year but who received a total of 240 days' supply of prescribed antipsychotic medication would have an MPR of .66. Quetiapine is commonly used as a sleeping aid; thus, we excluded it when prescribed at a low daily dosage (200 mg or less) in conjunction with another antipsychotic. We also excluded individuals who were prescribed depot antipsychotics, because the pharmacokinetic profiles of depot antipsychotic medications and oral medications vary considerably and because users of depot medications are typically more nonadherent to medication regimens and are frequent users of inpatient services. We categorized adherence during a person-year on an ordinal scale derived from the MPR using the following designations: nonadherent (MPR<.49), partially adherent (MPR=.50–.79), adherent (MPR=.80–1.10), and fillers of excess medication (MPR>1.10). Reasons for excess filling of medications include overuse, loss, or theft of medications.

We used Medi-Cal claims to determine whether someone was hospitalized in a given year in an acute psychiatric facility, a psychiatric ward of a community hospital, or a medical-surgical ward of an acute care hospital. We calculated the total amount paid by Medi-Cal for health services (inpatient and outpatient psychiatric and general medical care, laboratory and radiological services, and other noninpatient acute care), the amount paid for all pharmaceuticals, and the total amount paid for acute care. Costs are reported in 2004 dollars.

This merged MIS–Medi-Cal database has been previously used to examine utilization of mental health services by language status and costs associated with nonadherence to antipsychotic medications (6,23). The University of California, San Diego, Institutional Review Board and the San Diego County Mental Health Services Research Committee approved the use of these data for this study in accordance with the privacy rule of the Health Insurance Portability and Accountability Act of 1996.

Statistical analyses

We used multinomial logistic regression to estimate the probability of being nonadherent, partially adherent, adherent, or an excess filler as a function of race-ethnicity and preferred language while controlling for age, gender, conservatorship status, Medicare coverage, living situation, type of antipsychotic medication, CDPS score, and diagnosis of a comorbid substance use disorder. The resulting parameter estimates were used to calculate estimates of adherence by race-ethnicity and language status standardized to the underlying population characteristics. For example, we calculated the probability of being adherent among Latinos with limited English proficiency as the mean probability of being adherent across all persons as if all had limited English proficiency. Standard errors were estimated by using the nonparametric bootstrap method with 1,000 replications; p values were computed from the estimated distributions (26). To account for potential individual-correlated errors, data for the bootstrap analysis were sampled by the individual, rather than by observation.

We used logistic regression to estimate the probability of psychiatric admission, nonpsychiatric admission, and any inpatient admission and to calculate standardized estimates by adherence category and race-ethnicity language status using the methods described above and similarly controlling for the additional demographic and clinical characteristics. Finally, we used generalized linear regression, assuming a gamma distribution and a log link function, to estimate health services costs, pharmaceutical costs, and total costs and to provide standardized estimates of costs by race-ethnicity and language status using the methods described above (27,28).

Results

Table 1 provides information by English proficiency status on selected characteristics of adults treated for schizophrenia with antipsychotic medi-

Table 1

Characteristics of non-Latino white, Latino, and Asian patients treated for schizophrenia with antipsychotic medication, by language proficiency (N=31,560 person-years)[a]

| | Non-Latino white (N=22,865) | | Latino Limited English proficiency (N=4,671) | | Latino English proficient (N=2,196) | | | Asian Limited English proficiency (N=1,201) | | Asian English proficient (N=627) | | |
	N	%	N	%	N	%	p[b]	N	%	N	%	p[c]
Characteristic												
Age (M±SD)	49.7±12.3		44.2±13.0		49.9±14.6		<.001	43.3±11.6		49.5±13.3		<.001
Female	10,187	45	1,967	42	1,127	51	<.001	581	48	292	47	.463
Conservator	4,312	19	545	12	212	10	.013	179	15	76	12	.104
Medicare	11,250	49	1,677	36	750	34	.157	372	31	153	24	.003
Living situation												
Independent	12,732	56	3,052	65	1,702	78	<.001	827	69	486	78	<.001
Board-and-care home	4,396	19	577	12	162	7	<.001	140	12	57	9	.094
Homeless	1,520	7	271	6	21	1	<.001	32	3	9	1	.067
Unknown	4,217	18	771	17	311	14	.013	202	17	75	12	.006
CDPS score (M±SD)[d]	3.9±2.6		3.7±2.6		3.5±2.2		.006	3.2±2.2		3.1±2.1		.932
Substance use disorder	11,961	52	2,426	52	639	29	<.001	467	39	151	24	<.001

[a] The unit of analysis is the person-year (1999–2004). The person-years for the groups are listed at the top of each column.
[b] For the difference between the Latino groups
[c] For the difference between the Asian groups
[d] Chronic Illness and Disability Payment System. Scores reflect illness severity, predicting the level of future expenditures compared with the average expenditure for all Medicaid beneficiaries.

cations. The data include 7,784 unique Medi-Cal beneficiaries, including 5,695 non-Latino whites, 1,196 English-proficient Latinos, 523 Latinos with limited English proficiency, 298 English-proficient Asians, and 162 Asians with limited English proficiency. Latinos and Asians with limited proficiency were older than English-proficient Latinos and Asians and roughly the same age as whites. Latinos with limited proficiency were more likely than English-proficient Latinos to be female (52% compared with 42%). Asian clients with limited proficiency were less likely than English-proficient Asians to have dual Medicare–Medi-Cal coverage (24% and 31%).

Across language and racial-ethnic groups, the majority of adults (>50%) treated for schizophrenia resided independently. Notably, more than three-quarters of Latinos and Asians with limited English proficiency resided independently (78% of each); these proportions are higher than those of English-proficient Latinos or Asians (65% and 69%, respectively). The mean CDPS score exceeded 3 for each group, indicating that this sample is expected to have health care costs at least three times as high as an average Medicaid beneficiary. Fewer adults with limited proficiency had comorbid substance use disorders compared with English-proficient adults. For example, 52% of English-proficient Latinos had a substance use disorder diagnosis compared with 29% of Latinos with limited proficiency; among Asians, differences by language status were less pronounced but nevertheless significant (39% and 24%, respectively).

Probability of hospitalization by level of adherence is shown in Table 2. Clients who were adherent to their medications were least likely to experience a psychiatric admission (15%), a nonpsychiatric admission (18%), and any admission (28%). Overall, nearly half (48%) of nonadherent adults were hospitalized. These results support the validity of the MPR as a measure of adherence.

Adherence to antipsychotic medications by race-ethnicity and English

Table 2

Probability of annual inpatient admission by medication adherence category among patients treated for schizophrenia with antipsychotic medication[a]

| | Psychiatric | | Nonpsychiatric | | Any | |
Category	%	SE	%	SE	%	SE
Nonadherent	26.8	.4	28.2	.5	47.9	.6
Partially adherent	23.1	.6	26.1	.6	42.3	.7
Adherent	14.8	.3	17.6	.3	28.4	.4
Excess filler[b]	20.4	.5	23.3	.4	38.0	.6

[a] 31,560 person-years (1999–2004). The percentages are predicted probabilities and are standardized to the underlying population characteristics for age, gender, race-ethnicity, language proficiency, conservatorship status, dual Medicare–Medi-Cal coverage status, living situation, medication type, and Chronic Illness and Disability Payment System score. All estimates are significantly different from the estimates for the adherent category (p<.001).
[b] Filled prescriptions for excess medication

Table 3

Probability of adherence to antipsychotic medication by language proficiency among patients treated for schizophrenia with antipsychotic medication[a]

	Non-Latino white (N=22,865)		Latino English proficient (N=4,671)		Latino Limited English proficiency (N=2,196)			Asian English proficient (N=1,201)		Asian Limited English proficiency (N=627)		
Category	%	SE	%	SE	%	SE	p[b]	%	SE	%	SE	p[c]
Nonadherent	26.4	.3	27.9	.6	27.4	.9	.686	22.0	1.1	28.7	1.7	<.001
Partially adherent	13.8	.2	15.8	.5	16.7	.7	.356	15.6	1.0	18.7	1.6	.064
Adherent	37.6	.3	35.9	.7	40.8	1.0	.002	45.1	1.4	40.1	1.9	.034
Excess filler[d]	22.2	.3	20.4	.6	15.1	.8	<.001	17.4	1.1	12.5	1.4	.002

[a] 31,560 person-years (1999–2004). The percentages are predicted probabilities and are standardized to the underlying population characteristics for age, gender, race-ethnicity, language proficiency, conservatorship status, dual Medicare–Medi-Cal coverage status, living situation, medication type, and Chronic Illness and Disability Payment System score. All estimates are significantly different from the estimates for the adherent category (p<.001).
[b] For the difference between the Latino groups
[c] For the difference between the Asian groups
[d] Filled prescriptions for excess medication

proficiency is shown in Table 3. Notably, a greater proportion of Latinos with limited proficiency were adherent compared with English-proficient Latinos (41% and 36%; p=.002). In contrast, a smaller proportion of Asians with limited proficiency were adherent compared with their English-proficient counterparts (40% and 45%; p=.034). Both Latino and Asian adults with limited proficiency were less likely than their English-proficient peers to be excess fillers of antipsychotic medication. For example,

15% of Latinos with limited proficiency met criteria for excess medication filling compared with 20% of English-proficient Latinos (p<.001). Similarly, 13% of Asians with limited proficiency were excess fillers compared with 17% of English-proficient Asians (p=.002). Notably, for Latinos the higher rate of adherence among those with limited proficiency was entirely attributable to their being less likely to be excess fillers. Non-Latino whites were most likely to be excess fillers (22%).

Several of the controlling variables were also related to adherence. For the overall sample, the probability of being adherent increased with age, from 25% among those aged 24 or younger to 37% among those aged 25 to 59 and 43% among those aged 60 and older. Clients who resided in assisted living facilities were highly likely to be adherent (47%) or excess fillers (34%), and clients who were homeless were highly likely to be nonadherent (49%). Clients with a diagnosis of a substance use disorder

Table 4

Probability of annual inpatient admission by language proficiency among patients treated for schizophrenia with antipsychotic medication, adjusted for medication adherence[a]

	Non-Latino white (N=22,865)		Latino English proficient (N=4,671)		Latino Limited English proficiency (N=2,196)			Asian English proficient (N=1,201)		Asian Limited English proficiency (N=627)		
Admission type	%	SE	%	SE	%	SE	p[b]	%	SE	%	SE	p[c]
Psychiatric	21.1	.3	21.2	.5	17.3	.8	<.001	21.2	1.1	19.0	1.5	.236
Nonpsychiatric	23.4	.3	22.0	.6	19.6	.9	.014	20.2	1.2	18.9	1.6	.506
Any	38.2	.3	37.6	.7	33.0	1.0	<.001	37.5	1.4	33.4	1.9	.070

[a] 31,560 person-years (1999–2004). The percentages are predicted probabilities and are standardized to the underlying population characteristics for age, gender, race-ethnicity, language proficiency, conservatorship status, dual Medicare–Medi-Cal coverage status, living situation, medication type, and Chronic Illness and Disability Payment System score. All estimates are significantly different from the estimates for the adherent category (p<.001).
[b] For the difference between the Latino groups
[c] For the difference between the Asian groups

Annual health care and pharmaceutical costs by language proficiency among patients treated for schizophrenia with antipsychotic medication, adjusted for medication adherence[a]

	Non-Latino white (N=22,865)		Latino English proficient (N=4,671)		Limited English proficiency (N=2,196)			Asian English proficient (N=1,201)		Limited English proficiency (N=627)		
Type of cost	$	SE	$	SE	$	SE	p[b]	$	SE	$	SE	p[c]
Health services	12,362	198	11,907	325	10,956	451	.088	12,664	755	10303	792	.036
Pharmacy	6,410	37	5,791	76	5,534	109	.044	5,799	122	5227	141	.004
Total	18,497	175	17,263	279	15,883	406	<.001	17,732	618	15,138	699	.004

[a] 31,560 person-years (1999–2004). The values are annual costs (2004 dollars) and are standardized to the underlying population characteristics for age, gender, race-ethnicity, language proficiency, conservatorship status, dual Medicare–Medi-Cal coverage status, living situation, medication type, and Chronic Illness and Disability Payment System score.
[b] For the difference between the Latino groups
[c] For the difference between the Asian groups

were less likely to be adherent than those without such a diagnosis (32% and 44%).

The probability of inpatient hospitalization by race-ethnicity and language status is shown in Table 4 (the analysis controlled for level of adherence). Latinos with limited proficiency were less likely than English-proficient Latinos to experience psychiatric admissions (17% and 21%; p<.001) and nonpsychiatric admissions (20% and 22%; p=.014); the rate of overall inpatient admissions was also lower (33% and 38%; p< .001). Overall admissions were lower among Asians with limited proficiency compared with English-proficient Asians, although this effect did not reach significance (33% and 38%; p=.070).

Costs of health services and pharmacy costs by race-ethnicity and language status are shown in Table 5 (the analysis controlled for level of adherence). Latinos and Asians with limited proficiency had the lowest overall costs ($15,883 and $15,138, respectively) compared with other groups, an outcome that resulted from lower health services and pharmacy costs among adults with limited proficiency compared with their English-proficient counterparts.

Discussion

Although several studies have examined adherence to psychiatric medications, only a few have addressed the relationship between antipsychotic adherence and race-ethnicity, and we know of only one small study that examined adherence among monolingual and bilingual Spanish-speaking Latino clients (17). No study that we know of has examined adherence among Asian clients in the United States by language status. The study presented here addressed these gaps by examining the experiences of a large public mental health system providing care to an ethnically and linguistically diverse community. Given the nation's growing immigrant population (29), it is critical to understand the factors that influence the mental health outcomes of ethnically and linguistically diverse adults with serious mental illness.

This study found that Latinos with limited English proficiency were more likely than English-proficient Latinos to be adherent to antipsychotic medications. The difference in adherence among these two Latino groups was entirely attributable to differences in excess filling of prescriptions. Excess filling is also an indicator of poor medication management. In this study, individuals who were excess fillers were more likely than those who were adherent to be hospitalized, and excess fillers have been shown to have higher costs resulting from higher rates of hospitalizations and to increased pharmaceutical costs (6). After the analyses controlled for adherence and comorbidity, Latinos with limited English proficiency were less likely to be hospitalized and had lower pharmaceutical and total costs. In contrast, Asians with limited proficiency were less likely than English-proficient Asians to be adherent, although they were also less likely to be hospitalized and had lower costs.

One explanation for the higher rate of adherence and lower rate of hospitalization among Latinos with limited English proficiency is that they may benefit from a higher level of familial and social support. Cultural variation within and between groups may lead to differential adherence outcomes associated with race-ethnicity and English proficiency. Family social support may serve as a cultural buffer, and family involvement in the client's life and treatment plan may improve medication adherence and independently affect service utilization. Barrio and colleagues (21) found that the monolingual Spanish-speaking Latino clients were often accompanied during medical visits by English-speaking relatives (for example, adult children, spouses, or siblings), who advocated on their behalf with providers. Ramirez Garcia and colleagues (20) found that family instrumental (task-oriented) support predicted higher medication adherence among Mexican Americans with schizophrenia who were living with family members. In contrast, Kopelowicz and colleagues (30) did not find improved medication adherence among Latino

clients who received skills training.

However, the hypothesis about greater family support is inconsistent with our finding of lower adherence and a lower probability of hospitalization among Asians with limited English proficiency. It may be that familial and social support operates differently among Asians. Perceived susceptibility to disease, perceived benefits of Western medication, perceived benefits of cultural or traditional medication, or stigma associated with psychiatric medication may serve to reduce adherence among Asians with limited English proficiency (31,32). Culturally appropriate medication management services may prove effective in improving adherence among Asian clients.

Unfortunately, we were unable to test explicitly for the independent effects of language proficiency and social support. The language status measure is potentially correlated with several aspects of clients' life experiences, including heritage, culture, acculturation, physiology, genetics, and preferences. Future data collection efforts may address these limitations by including specific measures that will permit us to more fully explore the mechanisms that drive these differences in adherence and service utilization.

Our results are limited by the use of administrative data, which lack some of the dimensions needed to fully study issues related to antipsychotic medication adherence among racial-ethnic minority populations. At the same time, our large sample size may have resulted in findings that are statistically significant but clinically insignificant. We used medication refill records from claims data to assess adherence. Although this approach is limited in its inability to directly monitor medication administration, claims data represent an objective and unobtrusive measure of adherence. We lacked clients' self-reported English proficiency status, and we did not have data on the language that was most commonly spoken at home. Both of these measures have been employed in other research examining the impacts of language on health service use (33). Patients' use of alternative treatments was unknown in this study. Use of alternative practitioners by Asian patients is common and may have resulted in lower rates of adherence or service use (34,35). Because of sample size limitations, Asians were classified as a single group despite the wide heterogeneity of cultural backgrounds, language, and family dynamics. For these reasons, our findings should be replicated with a larger sample that can disaggregate data by Asian subgroup. Future investigations may examine the role of various levels of social support provided by families (for example, instrumental support compared with emotional support) in medication adherence and service utilization across Asian subgroups. Finally, the high rate of excess prescription filling among residents of assisted living facilities warrants further investigation. Medication therapy management, which is a pharmacist-led review of clients' pharmacotherapy that includes consideration of therapeutic goals, interactions, side effects, and adherence, would provide a deeper understanding of the causes of excess filling in this setting and may provide a vehicle for intervention if excess filling is inconsistent with clients' treatment goals.

Conclusions

We found that adherence to antipsychotic medication among Latinos and Asians with schizophrenia varied by English language proficiency. A systematic examination of clinical outcomes by language status is needed in order to assess whether health disparities may be emerging among certain patient subgroups. Health care organizations should continue to prioritize the use of professional translation services for patients with limited English proficiency, rather than relying on family or friends, in order to ensure both patients' confidentiality and the accurate conveyance of health information (36). It is also critical that medical schools and allied health professional programs, such as nursing and physician assistant programs, continue to promote an ethnically diverse and linguistically adept health care workforce (37), so that patients and providers may communicate with each other in a timely manner and without intermediaries.

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