Medicaid Prescription Drug Access Restrictions: Exploring the Effect on Patient Persistence With Hypertension Medications

Jerome Wilson, PhD; Kirsten Axelsen, MS; and Simon Tang, MPH

Objective: To compare rates of discontinuation of prescription therapy for hypertension in Medicaid patients with and without medication access restrictions.

Study Design: Retrospective cohort study.

Methods: Prescription data were extracted from a pharmacy claims database in a large state that implemented a Medicaid preferred drug list (PDL), both before and after the PDL was implemented. Prescriptions filled between June 2000 and May 2003 were included.

Results: Medicaid patients taking prescription medications commonly used to treat hypertension were 39% (odds ratio = 1.39; 95% confidence interval, 1.21, 1.6) more likely to discontinue hypertension therapy after the restriction was implemented compared with Medicaid patients 1 year earlier when there were no restrictions. Patients were classified as "discontinued" if they had therapy available less than 50% of the time during the 12 months after implementation of the PDL. Before the PDL, 17% of patients receiving treatment with hypertension medication discontinued therapy. After the PDL, 21% of Medicaid patients taking hypertension medication discontinued therapy. After the PDL, Medicaid patients were significantly more likely to switch medications from a restricted to an unrestricted drug. Those patients also were less likely to have a restricted drug added to their therapy regimen.

Conclusions: After implementation of the PDL, Medicaid patients were more likely to discontinue filling prescriptions for antihypertensive medication. Because hypertension management is an important challenge within the Medicaid community, the potential connection between access restrictions and patient adherence to medication therapy is a worthy topic for further exploratory studies and quantitative outcomes research.

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Cardiovascular disease, including high blood pressure, coronary heart disease, congestive heart failure, and stroke, affects nearly 65 million Americans (23% of the total US population), and is responsible for more than 931 000 deaths each year.[1,2] According to the National Health And Nutrition Examination Survey 1999-2000, hypertension affects approximately 28% of the adult population in the United States,[3] with expenditures estimated at $55 billion a year1 ($21 billion in drugs and medical durables). Despite the significant amount spent on medicines, one potentially important reason why overall direct expenditures are high is patient nonadherence and nonpersistence with medications, particularly medications for cardiovascular disease. Among Medicaid patients, hypertension medications are among the most frequently used and highest-payment drug categories.[4] It follows that states faced with limited budgets would seek to reduce Medicaid spending on hypertension medicine. However, policies with the potential to disrupt medical treatment in vulnerable populations should be carefully examined for their effect on long-term costs and patient health.

Recently, Cardinal et al cautioned about applying the results of the Antihypertensive and Lipid-Lowering Treatment To Prevent Heart Attack Trial (ALLHAT), the landmark hypertension trial, to real-world clinical settings because of the real-world patterns of poor persistence.[5] Low persistence with hypertension medications is well documented.[6,7] Monane et al examined persistence with hypertension medications in New Jersey Medicaid recipients and found patients initiating treatment for hypertension continued with therapy for an average of 161 days and 21% of them did not refill their initial prescription.[8] Moreover, poor adherence and persistence are costly. In another study of Medicaid patients with hypertension, patients with documented nonadherence to antihypertensive therapy had total medical costs that were $873 higher per patient than those of hypertensive patients without documented nonadherence. The higher costs were primarily due to higher inpatient hospital expenditures (averaging $637 per patient).[9] Another study found that 11% of hospital admissions among the elderly were due to nonadherence.[10]

In an effort to limit drug utilization and contain costs within state Medicaid programs, states have begun to use instruments such as preferred drug lists (PDLs) and

From the Morehouse School of Medicine, Atlanta, Ga (JW) and the Market Analytics Department (KA) and Outcomes Research (ST), Pfizer Inc, New York, NY.

Address correspondence to: Jerome Wilson, PhD, National Center on Minority Health and Health Disparities, National Institutes of Health, 6707 Democracy Boulevard, Suite 800, Bethesda, MD 20892. E-mail: wilsonjer@mail.nih.gov.

other measures that restrict access to medicines.[11] There is little doubt that prior authorization is an effective tool for reducing the use of higher cost medications. However, research is limited on the total healthcare cost effectiveness and long-term outcomes of access restrictions resulting from Medicaid PDLs. Smalley et al used a time-series approach to show that expenditures for nonsteroidal anti-inflammatory drugs (NSAIDs) declined 53% after the implementation of a Medicaid prior-authorization policy by Tennessee that encouraged patients to switch to generic medications.[12] There were no associated increases in medical costs, but the study noted a significant reduction in the use of all NSAIDs. That reduction raises concerns regarding potential consequences of untreated pain for patients' quality of life, particularly as the study did not measure changes in pain and inflammation.[12] Additional studies examined the effect of other drug utilization management practices. Schneeweiss et al reported that a reference pricing policy in Canada resulted in 18% of patients switching to a lower-cost angiotensin-converting enzyme (ACE) inhibitor with no associated increase in medication discontinuation; however, visits to physicians and hospitals did increase moderately in the time immediately following the switch in therapy.[13] Cost sharing among the poor and elderly in Canada was shown to decrease the use of essential and nonessential drugs, but with the consequence of increasing emergency room visits by those patients who reduced their use of essential drugs.[14]

This study extends the existing body of evidence by examining Medicaid patients' prescription refill behavior in a state where several classes of hypertension drugs were restricted. The restrictions resulted in a higher rate of medication switching than had been observed in some of the existing analyses. Furthermore, this study examines the limitations for add-on therapy following the restrictions.

When a Medicaid PDL is implemented, the Medicaid patients already taking a medication that is not on the PDL must have their physicians request prior authorization from the Medicaid program or switch them to another medication not restricted by the PDL. All drugs are available to Medicaid recipients, but the restricted drugs have the additional hurdle of the prior-authorization process. If the physician submits the prior-authorization request and it is approved, then the patient can continue to receive full Medicaid coverage for their existing prescription. If the prior-authorization request is not approved, patients must pay for their prescription out of pocket or switch to a medication on the PDL. In certain states, patients who are already taking a restricted prescription are exempt.

In the state studied, patients taking a restricted medication at the time the PDL was implemented were allowed to refill their existing prescription until it ran out before submitting a prior-authorization request. In the study state, 3 ACE inhibitors, 8 angiotensin II receptor blockers, and 6 calcium channel blockers were restricted in mid June and early July 2002. The state imposed a PDL for high-cholesterol medications 6 months after the hypertension restrictions, so although high cholesterol also is a risk factor for cardiovascular disease, these medications are not included in this study.

Prescription treatment for hypertension is complex and may include initiation of multiple therapies, dose titration, and add-on medications. Many patients require 2 or more hypertension medicines taken concurrently to reach blood pressure goals; patients who are started on monotherapy should have another agent added from a different category of hypertension medication if sufficient blood pressure reduction is not achieved. Patients with comorbid conditions, including diabetes and chronic kidney disease, often require 2 to 3 hypertension medications to lower blood pressure to the recommended level.[15] When a hypertension drug is restricted by a PDL, the patient's physician may switch to another hypertension drug of the same type that is not restricted (eg, replace a calcium channel blocker with another calcium channel blocker), or to 1 or more medications in a different category (eg, replace a calcium channel blocker with an ACE inhibitor or a beta-blocker plus a diuretic). Patients who were not on a restricted drug prior to implementation of the PDL also could be affected by the restrictions later on if a physician attempts to add a restricted medication to their regimen because their blood pressure is not sufficiently reduced.

Given the high prevalence of hypertension among patients in the Medicaid system and the consequences of discontinuing medication, as a first step this study explored the impact of Medicaid access restrictions on persistence with hypertension medications, focusing on patients taking those classes of medications that were subject to restrictions. This study sought to evaluate the following questions within the limitations of the data available in the study state:

- Did the restriction have a measurable effect on a patient's likelihood of discontinuing therapy with hypertension medication?
- Did the restriction have a measurable effect on the likelihood that an existing patient's medication would be switched?
- Finally, did the restriction have a measurable effect on the likelihood that a physician would add the restricted therapy to a patient's pharmaceutical regimen?

METHODS

Data Sources

The prescription data for this study were extracted from the Verispan Inc. (Yardley, Penn) data warehouse. The Verispan database is derived from pharmacy records, prescription benefit claims, and the pharmacy switch processor. Medicaid prescription data in Verispan are drawn primarily from retail pharmacy chains, pharmacy software used by independent pharmacies to submit claims, and pharmacy switch processors. The data captured directly from the pharmacies include 100% of all transactions in the pharmacy. The full Verispan dataset includes 50% to 55% of US retail prescriptions.

The data for this study were limited to those sources for which Verispan had consistently received data since June 2000. This subset of approximately 270 pharmacies in the study state included approximately 15% of all prescriptions in the state. The prescription data included the name of the drug, the quantity supplied, the date the prescription was filled, the days of supply, the zip code of the pharmacy, and the age and sex of the patient. Verispan utilizes a unique identifier compliant with the Health Insurance Portability and Accountability Act of 1996 (HIPAA) to link patient prescription records together over time for the same patient. The data in this study include prescriptions filled between June 2000 and May 2003.

The US Census 2000 was used to obtain demographic information for the study population. The 3-digit zip code of the pharmacy where the prescription was filled linked the Verispan and census data sources. It would have been preferable to use more granular demographic indicators such as block or census tract and to use the patient's location instead of the pharmacy, but due to HIPAA regulations the 3-digit zip code of the pharmacy was the most precise level of geography available in the data analyzed. Variables for race, percentage of urban residents, and household income were matched from the US Census 2000 data files and were used as proxies for the patients' characteristics in the multivariate models.

The study data included Medicaid prescriptions in all but 2 of the state's 3-digit zip code zones. Those 2 zones include less than 4% of all state's total population and just over 4% of the total households in the study state with an annual income under $15 000. The correlation between the count of patients in a 3-digit zip code in the study data and the count of the total population in the same 3-digit zip code from the census is .73 ($P < .01$). The correlation between the study subjects in a 3-digit zip code and the count of households with an annual income under $15 000 in the same 3-digit zip code, a closer proxy of a Medicaid recipient, is .91 ($P < .01$). The study patients' pharmacies are distributed similarly among the poor population in the study state.

Study Design

This was a retrospective cross-sectional study that included the pharmacy records of 2 groups of Medicaid patients who were taking categories of hypertensive medication restricted by the PDL in the study state in 2002. The design is similar to the pre-post policy methodology described by Tamblyn et al.[14] Patients were included in the AFTER-PDL group if they had a prescription for an ACE inhibitor, angiotensin II receptor blocker, or calcium channel blocker after May 2002, and if they filled a prescription for any hypertension medication from June 2002 through August 2002. Patients were chosen for the BEFORE-PDL group using the same selection methodology, but they were shifted 1 year earlier (ie, they were chosen if they had a prescription for an ACE inhibitor, angiotensin II receptor blocker, or a calcium channel blocker after May 2001, and they filled a prescription for any hypertension medicine from June 2001 through August 2001). Patients were excluded if Medicaid paid for fewer than 75% of their hypertension prescriptions or if they were under 20 years old.

For both groups, electronic pharmacy records were extracted for all hypertension prescriptions in the categories of oral antihypertensives listed in the *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.*[15] Prescriptions were selected from the 12 months prior to the PDL implementation and the 12 months after the implementation for the AFTER-PDL group. Records were included for prescriptions paid by Medicaid or cash. The pharmacy records from the 12 months after the PDL were analyzed for discontinuation, switching, and add-on measures. The first prescription filled after the PDL provided the first date for the follow-up study period. The same methodology was applied to the BEFORE-PDL group, centering the analysis on June 2001 instead of June 2002. The first prescription filled after June 2001 provided the first date for follow-up analysis in the BEFORE-PDL group.

These selection criteria identified 3136 patients for the AFTER-PDL group and 2662 patients for the BEFORE-PDL group. Correlation of the distribution of patients by 3-digit zip geography was .96 ($P < .01$) in the AFTER-PDL and BEFORE-PDL groups. A total of 1501 patients were in both groups.

There is no control for continuous eligibility in the Verispan dataset. If a patient changes pharmacies and

fills a prescription in a pharmacy outside of his or her network, then the record is censored. If the patient dies during the study, the death is not recorded in the data. In this analysis, only pharmacy data from the same stores where the data were continuously available to Verispan was utilized in the BEFORE-PDL and AFTER-PDL groups.

Study Measures

Three outcomes (discontinuation, switching, and medications added on) were measured in this analysis. The outcome of primary interest was discontinuation.

The patients' prescription refill patterns were assessed to determine whether they continued to use hypertension medication after their first refill following the PDL implementation. Patients were considered "discontinued" if they had medication available for fewer than 50% of the days in the time period after their first refill following the PDL implementation to the end of the study. For the AFTER-PDL group, the study period began at the first fill after June 2002 and ended as of May 31, 2003; the study period was 1 year earlier for the BEFORE-PDL group. Discontinuation was defined as a categorical variable with 2 levels (*discontinued* with therapy less than 50% of the time, *not discontinued* with therapy more than 50% of the time). All categories of hypertension medication were included in the persistence calculation, not just the class of therapy taken at the time the PDL was implemented. Because concomitant therapy is common in the treatment of hypertension, refill patterns indicating that multiple medications were taken on the same day were considered to represent 1 day of therapy. It is not possible to tell from the prescription refills if the patient consumed the medication, only that the prescription was picked up from the pharmacy. This dichotomous measure of medication availability has been described by Steiner and Prochazka.[16] It should be noted that Steiner and Prochazka prefer a continuous measure of persistence. For simplicity of explanation, a dichotomous measure was selected for this exploratory analysis.

Switching is measured within category (eg, from an ACE inhibitor to another ACE inhibitor) and out of category (eg, from an ACE inhibitor to an angiotensin II receptor blocker). Switching was measured in the 6 months after June 2002 for the AFTER-PDL group and in the corresponding 6-month period in the prior year for the BEFORE-PDL group. Patients were considered switched if they had taken a restricted medication and then began to take an unrestricted angiotensin II receptor blocker, angiotensin II receptor blocker, calcium channel blocker, beta-blocker, or diuretic, and didn't continue to refill the restricted medication. Up to 30 days of overlap in days of supply was allowed between the restricted and unrestricted medication.

Adding on of a restricted medication was measured during the entire time period studied following the PDL. A restricted add-on occurred in the AFTER-PDL group when a restricted medication was filled after the PDL initiation in June 2002 and it was not filled in the 12 months prior to the PDL. Adding on medication was calculated in the same manner 1 year prior for the BEFORE-PDL group.

Statistical Analyses

Univariate and multivariate analyses were conducted. Discrepancies in homogeneity between the 2 groups were assessed with respect to age, sex, category of hypertension medication prescribed, physician specialty, and neighborhood demographics by using chi-square tests and analysis of variance. The end points were considered significantly different at the 5% level with a 2-sided test. Only univariate analysis was conducted for switching and add-on therapy.

Multivariate logit regression models were used to compute the odds ratios of influencing the likelihood of discontinuation for the covariates. The odds ratio was the primary parameter for estimating the likelihood that patients would discontinue hypertension medications. The covariates utilized in the multivariate analysis—including age, sex, category of hypertension prescription therapy, and specialty of the prescriber—have been shown elsewhere to affect duration of prescription therapy.[6,16]

The 3-digit zip code of the pharmacy was used as a proxy for the patient's socioeconomic characteristics. US Census 2000 data from the 3-digit zip code describing race (percent nonwhite), urban (percent urban), and income (percentage of households with income <$15 000 and <$25 000) variables were highly correlated (.83 correlation of urban with race and .42 correlation of urban with income) in the study population. Only percent urban was included as a control due to this multicollinearity.

Control variables were included for the major categories of hypertension medications prescribed in the study period: ACE inhibitors, angiotensin II receptor blockers, alpha blockers, calcium channel blockers, beta-blockers, and diuretics. When patients took multiple medications in different hypertension classes during the study period, control variables were introduced for each class of medication. Prior nonadherence to therapy was used as a control variable and was defined as the days without therapy divided by the time between the first and last hypertension prescriptions in the 12 months before the PDL implementation (for the AFTER-PDL group) or before June 2001 (for the BEFORE-PDL

group). In addition, the number of days since the initiation of therapy in the 12 months before the PDL implementation was included to control for the patients' prior experience with hypertension medications.

RESULTS

Table 1 presents demographic characteristics of the BEFORE-PDL and AFTER-PDL groups, which were quite comparable. The AFTER-PDL group included 3136 patients, and the BEFORE-PDL group included 2662 patients. There is an insignificant difference in percentage of patients who were male (30% male AFTER-PDL, 29% male BEFORE-PDL). There was a significant but relatively small difference in age for patients aged 41-60 years and patients aged 81 years and older. In **Table 2,** the demographics inferred from the census data were shown to be very similar in both groups.

Table 3 presents some descriptive characteristics about medication behavior in the 2 groups. A significantly smaller portion of patients took a calcium channel blocker after the PDL implementation. A significantly larger portion took an ACE inhibitor, an angiotensin II receptor blocker, or a beta-blocker, while there was no significant change in the use of diuretics and alpha-blockers. Duration of therapy and nonadherence before the PDL restrictions were not significantly different between the groups. Nearly all (98%) of the prescriptions were covered by Medicaid in both groups. Cardiologists prescribed a similar portion of the prescriptions in both groups (5% AFTER-PDL and 6% BEFORE-PDL).

Table 4 shows the univariate analysis of discontinuation and time on therapy. In the AFTER-PDL group, the percentage of patients discontinuing therapy was significant-

Table 1. Patient Characteristics*

Characteristic	BEFORE-PDL Group (n = 2662)	AFTER-PDL Group (n = 3136)	P†
Male, %	29 (n = 766)	30 (n = 944)	.27
Age, %			
20-40 y	6 (n = 164)	7 (n = 210)	
41-60 y	29 (n = 763)	31 (n = 986)	.02
61-80 y	48 (n = 1265)	47 (n = 1469)	.61
81+ y	18 (n = 470)	15 (n = 471)	<.01

*PDL indicates preferred drug list.
†By the chi-square test for dichotomous variables.

Table 2. Neighborhood Demographics*

Demographic	Mean ± SD (%) BEFORE-PDL Group (n = 2662)	Mean ± SD (%) AFTER-PDL Group (n = 3136)
Nonwhite	27 ± 22	29 ± 21
Household income < $15 000	18 ± 5	18 ± 5
Urban	78 ± 21	81 ± 20

*Neighborhood was defined by Census 2000 data based on the 3-digit zip code of the pharmacy. PDL indicates preferred drug list.

Table 3. Characteristics of Prescription Therapy*

Characteristic	BEFORE-PDL Group (n = 2662)	AFTER-PDL Group (n = 3136)	P†
Type of medication filled in study period			
ACE inhibitor	49% (n = 1301)	52% (n = 1617)	.04
Angiotensin II receptor blocker	25% (n = 658)	31% (n = 961)	<.01
Calcium channel blocker	56% (n = 1498)	51% (n = 1580)	<.01
Beta-blocker	31% (n = 829)	35% (n = 1083)	<.01
Diuretic	52% (n = 1393)	50% (n = 1564)	.06
Alpha-blocker	6% (n = 156)	5% (n = 166)	.35
Prior experience with medication			
Prior time on therapy, mean ± SD	307 ± 90 days	297 ± 111 days	
Prior nonadherence, mean ± SD	14% ± 15%	16% ± 15%	
Prescriptions paid by Medicaid, mean ± SD	98% ± 6%	98% ± 6%	
Prescriptions written by cardiologist, mean ± SD	6% ± 22%	5% ± 18%	

*ACE indicates angiotensin-converting enzyme; PDL, preferred drug list.
†By the chi-square test for dichotomous variables.

Table 4. Time on Therapy and Rates of Discontinuation*

Variable	BEFORE-PDL Group (n = 2662)	AFTER-PDL Group (n = 3136)	P†
Total time on therapy in study period, mean ± SD	319 ± 93 days	303 ± 105 days	
Number of days between prescriptions (gaps), mean ± SD	47 ± 47 days	45 ± 48 days	
Patients who had medication for <50% of the days	17% (n = 441)	21% (n = 655)	<.01
Percentage of days with medication, mean ± SD	78% ± 26%	74% ± 29%	
Number of days with medication, mean ± SD	272 ± 94 days	258 ± 102 days	

*PDL indicates preferred drug list.
†By the chi-square test for dichotomous variables.

ly greater: 21% versus 17% in the BEFORE-PDL group. The average percentage of days with therapy available during the study time period was 74% in the AFTER-PDL group and 78% in the BEFORE-PDL group. The average duration of therapy and the average number of days between prescriptions (gaps) were not statistically different between the groups in this univariate analysis.

Table 5 presents the results of the medication-switching and add-on univariate analyses. There was a significantly higher rate of switching from restricted to unrestricted medications in the AFTER-PDL group (36%) compared with the BEFORE-PDL group (8%). In the AFTER-PDL group, 29% of patients were switched to another drug in the same class, compared with 1% of patients in the BEFORE-PDL group. The rate of adding on restricted medications to patients' therapy was 3% in the AFTER-PDL group and 9% in the BEFORE-PDL group. The univariate tests for differences on these measures were all significant.

Table 6 presents the results for the multivariate analysis. The main result is a significantly higher discontinuation rate in the AFTER-PDL group compared with the BEFORE-PDL group. The likelihood of discontinuation was 39% higher in the AFTER-PDL group (odds ratio = 1.39; 95% confidence interval, 1.21, 1.6). Prior low adherence with therapy was related to higher rates of discontinuation in the follow-up period for both groups. More prior time on therapy, age more than 40 years (in particular, age more than 60 years), and higher percent urban all were related to a lower rate of discontinuation. There was no significant difference in rates of discontinuation between the categories of medication taken during the study time period.

DISCUSSION

This analysis examined persistence using only pharmacy claims data from a sample of pharmacies for which the data were consistently captured. Diagnosis, rates of hospitalization, and other factors are not captured in the pharmacy claim data and therefore were not included as covariates. The next step in this research would be to control for such factors, as their exclusion could bias the outcome if the diseases of the 2 study groups were very different. Concomitant medications also are not included here, and several other

Table 5. Switching and Adding On Medications*

Variable	BEFORE-PDL Group (n = 2662)	AFTER-PDL Group (n = 3136)	P†
Switching from restricted to unrestricted medications			
All switching	8% (n = 202)	36% (n = 1118)	<.01
Within same category	1% (n = 28)	29% (n = 894)	<.01
Patients with restricted medication added to regimen	9% (n = 237)	3% (n = 83)	<.01

*PDL indicates preferred drug list.
†By the chi-square test for dichotomous variables.

types of medications were restricted in the study state. If patients were taking other medications in addition to antihypertensives, they may have experienced additional restrictions as a result of the Medicaid PDL.

This is a retrospective cross-sectional study. Although attempts were made to control for key covariates and potential confounders, it is not possible to draw strong conclusions regarding the results. The reasons why the medication discontinuation rate increased after the implementation of the PDL require further study. The current analysis suggests that this is an area of potentially fruitful research.

This analysis was designed to investigate whether the PDL affected patient persistence with hypertension therapy, as well as patient switching and the availability of add-on therapy. The data, while exploratory, suggest that such a link may exist. This information is potentially important for policymakers, who are concerned with both the health of patients and the financial consequences of changes in Medicaid drug spending. Access restrictions are meant to save money; however, if they cause a drop in patient persistence, or a flurry of activity (switching) with each new list that is adopted, there could be negative consequences for both patients and the Medicaid budget. We do not have data that allow us to draw inferences or conclusions about such consequences here, but as states gain experience with these programs, opportunities to design appropriate research studies seem likely.

Table 6. Multivariate Analysis of the Probability of Discontinuing Hypertension Medication*

Variable	Odds Ratio (95% CI)	$P^{\dagger}$
AFTER-PDL group	1.39 (1.21, 1.60)	<.01
Male	1.09 (0.93, 1.27)	.29
Age 41-60 y	0.69 (0.54, 0.88)	<.01
Age 61-80 y	0.45 (0.35, 0.58)	<.01
Age 81+ y	0.49 (0.36, 0.65)	<.01
% Urban	0.43 (0.30, 0.60)	<.01
Prior days on therapy	0.997 (0.996, 0.998)	<.01
On restricted medication in study period	1.13 (0.96, 1.31)	.14
% Prior nonadherence	9.6 (6.2, 14.9)	.01
% Prescriptions written by cardiologist	0.73 (0.49, 1.07)	.11
ACE inhibitor	0.69 (0.57, 0.82)	.00
Angiotensin II receptor blocker	0.54 (0.44, 0.68)	<.01
Calcium channel blocker	0.64 (0.54, 0.75)	.01
Diuretic	0.75 (0.65, 0.87)	.01
Beta-blocker	0.77 (0.66, 0.90)	<.01
Alpha-blocker	0.79 (0.55, 0.82)	.17

*Logit model predicting discontinue = 1. Likelihood ratio beta = 0, <.01 (χ^2 = 443.2, 16 *df*).
ACE indicates angiotensin-converting enzyme; CI, confidence interval; PDL, preferred drug list.
†Value of parameter in logistic regression.

Limiting access to medication could potentially have an adverse effect on health disparities experienced by racial and ethnic minority populations. Despite notable progress in the overall health of the nation, there are continuing disparities in the burden of illness and death experienced by African Americans, Hispanics, Native Americans, Alaska Natives, and Asian Pacific Islanders, compared with the United States population as a whole.[17] Age-adjusted hypertension rates are about 50% higher among African Americans than whites.[18] Any program that restricts access to hypertension medication for this population is likely to exacerbate persistency problems. Moreover, decreased access to the proper medication is likely to contribute to increased numbers of hospitalizations and medical procedures, and increased rates of mortality.

Medicaid is a principal source of healthcare for minority Americans and a large number of medically underserved white individuals. In 1997, the Medicaid program covered 1 in 5 nonelderly African Americans, Hispanics, and Native Americans compared with fewer than 1 in 10 nonelderly white Americans.[19]

Race and ethnicity often are correlated with socioeconomic status, and both of these "variables" are related to various measures of healthcare outcomes. These interrelated issues merit careful study as states move forward in redesigning their Medicaid programs. Although Medicaid clearly has been a factor in reducing disparities for covered populations, erosion in the quality of the benefit structure may serve to undermine or reverse some of the progress that has been made.

CONCLUSIONS

It is critical for policymakers to understand the consequences of their decisions. In the Medicaid program, rapid adoption of medication access restrictions has provided an opportunity for substantial research that has, to date, gone untapped. According to this exploratory analysis, Medicaid patients who experienced the PDL

restrictions were more likely to discontinue prescription hypertension medication than Medicaid patients in the previous period who did not experience such restrictions. When the PDL was adopted, 36% of the patients taking a hypertension medication were switched to another medication. This rate is much higher than the rate had been for patients before the PDL was implemented. In addition, restricted medications were rarely added to the therapy regimen after the PDL was implemented. Furthermore, restricted medications tended to be more recently introduced therapies with fewer side effects. The medications selected as "preferred" may be the least expensive for the state rather than the most tolerable and efficacious for the patient. In addition, patients could become confused when 1 or more of their drugs are switched at the pharmacy.

The limitations of this analysis and the potentially large impact on patient outcomes that would accompany a significant drop in patient persistence suggest that the impact of PDL access restrictions on patient outcomes and health disparities requires further scholarship and evaluation. Future research also should examine the total nonprescription costs of restrictions on access to medications.

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