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Association Between Prior Authorization for Psychiatric Medications and Use of Health Services Among Medicaid Patients With Bipolar Disorder

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Abstract

Background—Prior authorization policies are commonly used by Medicaid programs to control psychotropic drug expenditures. This study examined the association of a prior-authorization policy for atypical antipsychotic and anticonvulsant agents with medication discontinuation and use of health services among patients with bipolar disorder.

Methods—A pre-post-with-historical-comparison-group design was used to analyze Maine Medicaid and Medicare claims data. Newly treated patients were identified during the policy (Jul 2003–Feb 2004; N=946) and a comparison group from the pre-policy period (Jul 2002–Feb 2003; N=1,014). Patients were stratified according to their pre-initiation visits to community mental health centers (CMHCs) that target those with the most serious mental illness: CMHC-attenders (at least 2 visits) and non-attenders (fewer than 2 visits). Changes in rates of medication discontinuation, outpatient, emergency room and hospital visits before and after drug initiation were estimated.

Results—CMHC-attenders had substantially higher rates of comorbidity and use of medications and health services than non-attenders. The policy was associated with increased medication discontinuation in both groups; reductions in psychiatric visits after discontinuing medication among CMHC-attenders (−64/100 patients/month; $p<.05$); and increases in emergency room visits after discontinuing medication among non-attenders (16/100 patients/month; $p<.05$). During the 8-month follow-up, the policy had no detectable impact on risk of hospitalization.

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Conclusion—The Maine prior-authorization policy was associated with increased medication discontinuation and subsequent changes in use of health services. Though small, these unintended policy effects raise quality of care concerns for a group of very vulnerable patients. Long-term consequences of prior-authorization policies on patient outcomes warrant further investigation.

Keywords

prior authorization; bipolar disorder; policy evaluation; Medicaid; health services research

Introduction

Pharmaceuticals, although accounting for a relatively small fraction of total health expenditures (10%) (1), nevertheless represent one of the fastest growing components of healthcare expenditures in the United States (2). In response to this rapid growth, healthcare payers increasingly apply utilization controls, including preferred drug lists, dispensing limits, mandatory use of generic drugs, step therapy, and prior authorization (3,4). A prior-authorization policy requires physicians to obtain pre-approval in order for a patient to receive coverage for non-preferred, and typically more expensive, medications. Approval often requires documents supporting medical necessity for a non-preferred agent or prior treatment failure with preferred medications (i.e., step therapy). Objective data on the intended and unintended consequences of prior-authorization policies on use of medications and health services are limited, particularly in the area of chronic mental illness (5–8).

Bipolar disorder, the sixth leading cause of disability worldwide (9), is a severe and recurrent condition with manic and depressive episodes. It affects about 2.6% of the U.S. adult population (10). On the basis of healthcare claims, patients with bipolar disorder on average spent \$22,110 per annum for overall treatment in 2002, 53% of which was reimbursed by Medicaid programs (11). Pharmacotherapy is the foundation of treatment for the acute and long-term management of bipolar illness (12,13). Maintenance treatment reduces risks of relapse, hospitalization and suicide (14–16).

In July 2003, the Maine Medicaid program implemented prior-authorization policies affecting new prescriptions for non-preferred second-generation antipsychotic and anticonvulsant agents, which are effective treatments for bipolar disorder (12,13,17). Non-preferred second-generation antipsychotics included: olanzapine, olanzapine/fluoxetine, and aripiprazole; and non-preferred anticonvulsants included: lamotrigine, topiramate, gabapentin, brand-name carbamazepine, brand-name valproic acid, oxcarbazepine and levetiracetam. Prior-authorization policies may reduce the actual or perceived range of prescribing options and thereby limit the flexibility of physicians in adapting drug therapy to individual patient needs if therapeutic problems arise. There is substantial biological heterogeneity within mental disorders and psychotropic drugs are less therapeutically interchangeable than drugs in other categories (2). The tolerability of a particular therapy influences patients' adherence (18). Our recent controlled study found that the Maine prior-authorization policy significantly increased the risk of medication discontinuation among newly treated patients with bipolar disorder (adjusted relative hazard ratio=2.28; 95% confidence interval=1.36–4.33) without appreciable cost savings to the state; nor did the policy increase use of preferred agents or rates of switching to other medications (6). We also observed similar findings in a study of prior-authorization for second-generation antipsychotic medications in Maine Medicaid among patients with schizophrenia (7).

The current longitudinal study examined more broadly the impact of the Maine prior-authorization policy for second-generation antipsychotic and anticonvulsant agents among at-risk Medicaid patients with bipolar disorder who were initiating a new episode of drug

treatment. We assessed the association of the prior-authorization policy with medication discontinuation and subsequent changes in the use of non-drug health services, including outpatient visits, emergency room visits, and hospitalization. Importantly, this study differs from our previous studies (6,7) in that it provides empirical evidence about the relative effects of prior-authorization policies among more vs. less severely ill patients with bipolar disorder. We anticipated the policy could result in treatment disruptions among all patients with bipolar illness that may reflect differences in treatment effectiveness, administrative problems (confusion about the policy, the hassle of seeking preauthorization) or other factors (5–8). We also anticipated that disruptions in pharmacotherapy after policy implementation could be associated with either increased use of non-drug health services due to increased symptoms or dropping out of the healthcare system that may reflect differences in patient compliance and care-seeking behavior as prior-authorization adds another barrier to care for a very vulnerable patient population; previous research has reported an association between medication nonadherence and reduced frequency of physician visits (19–22).

Methods

Data Sources

Medicaid and Medicare data—Through the Centers for Medicare and Medicaid Services, we extracted Maine Medicaid enrollment and claims from the Medicaid Statistical Information System for the study period (January 2001–February 2004). We linked these claims data with equivalent Medicare data for the subset of patients with dual Medicaid and Medicare enrollment using unique patient identifier (23). Pharmacy claims contained patient identifier, National Drug Code, dispensing date, number of units provided (e.g., tablets) and days' supply. Health services claims contained patient identifier, service code, provider code, beginning and end dates of service, primary and secondary diagnoses, service type (e.g., emergency room) and medical setting (e.g., psychiatric hospital).

We obtained unique identifiers for Community Mental Health Centers (CMHCs) from Maine Medicaid to identify service claims made by CMHCs within outpatient claims. To calculate patient-level number of CMHC visits, we used claims from the 14 CMHCs with consistent claims reporting (which represented 85% of all CMHC claims during the study period) to create analytic subgroups of CMHC-attenders and non-attenders (defined below). We did not count claims from CMHCs that had irregular patterns of claims, suggesting start-up, discontinuation of services, or incomplete data during the observation period.

Study Cohorts

Newly Treated Cohorts—We included patients in Maine Medicaid who aged 18 years or older in 2001 and had at least one inpatient or two outpatient diagnoses of bipolar disorder (ICD-9 diagnostic codes: 296.0, 296.1, 296.4–296.8, 301.11 and 301.13) (6,24,25). We identified patients who were newly treated with any bipolar medication (second-generation antipsychotic/anticonvulsant agents or lithium). Although not subject to prior-authorization, lithium was included because this agent, like anticonvulsants, is an effective mood stabilizer (17). We required newly treated patients to have had no use of bipolar medications in the 90 days before the initial drug dispensing (index date) and had fewer than 45 days' stay in institutional settings during that period. Patients were required to be continuously enrolled for 8 months before and after the index date.

Using these inclusion rules, we identified two distinct cohorts: those who initiated bipolar medication during the period when the policy was in effect (July 2003–February 2004; policy cohort) and those initiating in an equivalent calendar period one year earlier (July

2002–February 2003; pre-policy cohort). For analytic simplicity, only the first treatment episode for each patient was used, thus an individual was in either the pre-policy or the policy cohort. All patients had 8 months of baseline observations. In order to more precisely characterize patients' pre-existing trends in health services use, we calculated visit rates during the 7 months before the index date, excluding the immediate preceding month (because preliminary analysis showed increases in visits around the time of bipolar drug initiation).

Although our original protocol (6) had included New Hampshire as a comparison state, non-comparability of baseline trends in use of outpatient services precluded a state-level comparison. Instead, we used a historical comparison group design; pre-policy and policy cohorts of Maine Medicaid beneficiaries were comparable in their baseline trends in use of medications and outpatient visits.

Subgroups of newly treated patients—Within the pre-policy and policy cohorts, we created two subgroups of patients according to their baseline CMHC service use. Because CMHCs specialize in care for adults with the most severe and persistent mental illnesses (26,27), we hypothesized that regular receipt of CMHC services may be useful as a marker for illness severity. We identified a group of patients who had at least two CMHC visits during the baseline period (CMHC-attenders) and a second group with fewer than two visits (non-attenders).

Outcome Measures

Discontinuation of bipolar drug treatments—We created person-level daily indicators for each bipolar medication; generically equivalent products were treated as the same medication. Our previously validated definition of discontinuation was having a gap of more than 30 days in availability of any bipolar medication (6,7). This gap was measured from the date that the supplies from all prior dispensings were finished, assuming perfect adherence, until the date of a subsequent dispensing. Changes in bipolar medication were not classified as discontinuations. The discontinuation date was defined as the first day of such a gap (5–7). Shorter time until discontinuation in the policy cohort relative to the pre-policy cohort would suggest an increased rate of disruption in treatment following policy implementation. We also assessed the use of non-bipolar medications as a comparison outcome.

Health services utilization—We measured rates of use of both outpatient and inpatient health services, including: psychiatric, emergency room and non-psychiatric outpatient visits, and hospital inpatient stays. Psychiatric visits included outpatient visits that were associated with any diagnosis of bipolar disorder, depression (ICD-9 codes: 296.2, 296.3, 298.0, 300.4, 309.1, and 311), or schizophrenia (ICD-9 code: 295), or one-day services in psychiatric hospitals. Outpatient emergency room use was defined as visits to emergency departments that were not connected to an inpatient episode with at least 3 days separation from any hospitalization. Non-psychiatric outpatient visits were those that were not associated with a diagnosis of mental illness.

Statistical Analysis

For all analyses, we used a pre-post with historical comparison group design, examining individual-level variations in the outcomes before and after drug initiation, and then comparing the policy cohort to the pre-policy (historical) cohort to estimate the policy impact. We used the pre-policy cohort to provide information about the counterfactual inference (i.e., what might have happened in the absence of policy change). Separate analyses were conducted for CMHC-attenders and non-attenders.

To examine the impact of prior-authorization policy on the hazard of medication discontinuation, we used Kaplan-Meier survival curves and extended Cox regression models (6,28). Time until event was the number of days from drug initiation until discontinuation. We used the supremum test to evaluate the appropriateness of the proportional hazards assumption (5–7). Given that patients typically receive a month's supply of medicines in the outpatient setting, we could not identify the exact date of discontinuation within a 30-day period following a dispensing. To address this limitation, we used extended Cox Proportional Hazards models, in which patients were stratified according to the timing of discontinuation (≤ 30 days vs. > 30 days) (6).

To examine the association of prior-authorization policy with changes in visit rates, we used a difference-in-difference analytic approach. We first measured patient-level numbers of psychiatric, ER, and non-psychiatric outpatient visits per month during pre-drug initiation and post-initiation periods for each subject (2 observations). For the subset of individuals who had discontinued bipolar medication, we sub-divided the post-initiation period into two segments by date of discontinuation: post-initiation while-on-treatment and post-initiation after discontinuation (3 observations). For each individual, we then calculated the differences in visit rates across these phases. Finally, we estimated the policy impact by comparing the differences between the pre-policy and policy cohorts.

We performed a series of linear mixed models with numbers of visits per month as the dependent outcomes, all treated as continuous variables, using the PROC MIXED procedure in SAS (Version 9.1.3, SAS Institute, Cary, NC). Mixed models can account for correlations among repeated measurements on the same subject and are unaffected by unequal numbers of assessments among individuals (29). The models included a constant term, an indicator for policy or pre-policy cohort, indicators for the two post-initiation time periods using pre-initiation period as the reference, and interaction terms between the indicators for cohort and for post-initiation time periods; coefficients of the interaction terms reflect marginal effects of prior-authorization policy on visit rates across phases. The models provided fixed effects of all independent variables, including interaction terms, and random effects for the intercept.

To examine the association between the prior-authorization policy and the hazard of hospitalization, we used Kaplan-Meier survival curves and Cox Proportional Hazards regression (28). We defined time until event as the number of days from drug initiation until subsequent hospitalization. The models included an indicator for policy.

In both the linear mixed and survival models, we controlled for the following patient-level covariates: age group, sex, dual Medicaid/Medicare enrollment status, and two comorbidity measures: the numbers of distinct non-bipolar medications dispensed and hospital admissions at baseline (6,30). We followed patients until the end of February 2003 for the pre-policy cohort and February 2004 for the policy cohort. *P*-values less than .05 were considered statistically significant in all analyses. This study was approved by the institutional review board of the Harvard Pilgrim Health Care Institute.

Results

Baseline characteristics of patient cohorts

There were 1,960 newly treated patients, with 1,014 patients in the pre-policy cohort (275 CMHC-attenders and 739 non-attenders) and 946 patients in the policy cohort (275 CMHC-attenders and 671 non-attenders). Overall, patients who received care at the CMHCs were more likely than non-attenders to have multiple comorbidities and substantially higher baseline use of psychiatric medications and health services including psychiatric

hospitalizations (Table 1). Among CMHC-attenders, baseline characteristics of pre-policy and policy cohorts were comparable, except for carbamazepine use ($n=15$, 5% vs. $n=4$, 1%; $p<.05$). Pre-policy and policy cohorts of non-attenders were also comparable, except for small differences in Medicaid/Medicare dually enrollment status ($n=244$, 33% vs. $n=182$, 27%; $p<.05$).

Association of prior-authorization policy with medication discontinuation

Rates of discontinuation were higher in the policy cohort compared to the pre-policy cohort for both CMHC-attenders (policy vs. pre-policy: $n=104$, 38% vs. $n=86$, 31%) and non-attenders ($n=273$, 41% vs. $n=243$, 33%).

Overall, CMHC-attenders and non-attenders had similar hazards of medication discontinuation during the 8-month follow-up. Among CMHC-attenders, the policy cohort had a similar hazard of medication discontinuation as the pre-policy cohort during the first month of bipolar drug treatment, but a higher hazard for the remainder of follow-up (adjusted hazard ratio [HR]=1.73; 95% confidence interval [CI]=1.04–2.88; $p<.05$; Figure 1). Particularly, this risk was significantly higher among those who initiated on second-generation antipsychotic medications (HR=2.52; CI=1.20–5.28; $p<.05$). Among non-attenders, the policy cohort was more likely than the pre-policy cohort to discontinue medications within 30 days of initiation (HR=1.30; CI=1.05–1.61; $p<.05$), and this difference persisted until the end of follow-up. Among those who initiated on second-generation antipsychotic medications, the policy cohort had a higher hazard of discontinuation than the pre-policy cohort (HR=1.65; CI=1.16–2.35; $p<.05$). The risk of discontinuation among those initiated on anticonvulsants did not change significantly in either the CMHC-attenders or non-attenders.

We did not observe any changes in the rates of non-bipolar drug dispensings during the study period.

Association of prior-authorization policy with health services utilization

During the post-initiation periods, the average length of observation before bipolar medication discontinuation was 86 ± 70 and 84 ± 68 days for CMHC-attenders and non-attenders, and after discontinuation was 104 ± 54 and 100 ± 60 days for CMHC-attenders and non-attenders, respectively.

The estimated changes in monthly visits across periods within the pre-policy and policy cohorts are provided in the online supplemental data. In both the pre-policy and policy cohorts of CMHC-attenders, there was an increase in rate of psychiatric visits associated with initiation of medication (pre-policy cohort .54 per patient per month; CI=.25–.82 and policy cohort .44; CI=.16–.73; Figure 2A and data supplement). Relative to the pre-policy cohort, the policy cohort experienced a large and statistically significant reduction in psychiatric visits following medication discontinuation (–.64 per patient per month; CI=–1.26 to –.03; $p<.05$; Table 2: col. 5; Figure 2A).

Among non-attenders, both the pre-policy and policy cohorts experienced increases in psychiatric visits associated with drug initiation followed by reductions after discontinuation, but the differences between the cohorts were not significant (Figure 2A; Table 2). However, compared with the pre-policy cohort, non-attenders in the policy cohort experienced a significant increase in emergency room visits following medication discontinuation (.16 per patient per month; CI=.05–.26; $p<.05$; Table 2: col. 5; Figure 2B).

There were no differences between the pre-policy and policy cohorts in rates of change in non-psychiatric outpatient visits for either CMHC-attenders (.10 per patient per month; CI= -.29 to .48) or non-attenders (.10; CI= -.07 to .27).

During the 8-month follow-up, results of the Cox proportional hazards model suggest that the policy had no detectable impact on the risk of hospitalization among CMHC-attenders (HR=1.14; CI=.78–1.65) nor non-attenders (HR=1.26; CI=.93–1.69).

Discussion

Our previous study (6) had found that the Maine prior-authorization policy for second-generation antipsychotic and anticonvulsant agents increased medication discontinuation. The current study suggests that the prior-authorization policy had a differential impact on medication discontinuation and use of health services among newly treated patients with bipolar disorder. Among CMHC-attenders, the policy was associated with both an increase in rates of disruptions in pharmacotherapy and a greater decline in psychiatric visits after drug discontinuation. The policy impact was immediate among non-attenders, who had a higher risk of medication disruption within the first month of treatment and relative increases in emergency room visits following medication discontinuation. CMHC-attenders appeared to stay on therapies longer than non-attenders, which may reflect monitoring of more severely ill patients in the CMHC setting, although rates of discontinuation were ultimately higher in both groups.

Prior-authorization policies are controversial as they can introduce barriers to the timeliness or appropriateness of treatment initiation or selection (5–8,31). It is a concern that the policy was associated with increased medication discontinuation among all patients with bipolar disorder. Medication nonadherence is already a frequent problem in patients with bipolar disorder and can be as high as 65% (32), which is higher than that in schizophrenic patients (40–50%) (32) or patients with non-psychiatric conditions (an average of 25%) (33). Due to the longevity of bipolar illness, management of such patients requires routine care and maintenance treatment to minimize residual symptoms and reduce risk of recurrence (34–36).

We observed a greater reduction in rates of psychiatric visits following medication discontinuation in the policy cohort of CHMC-attenders. As prior-authorization is administratively cumbersome for both patients and doctors, it may create unintended barriers that influence patient compliance behavior. Reduced psychiatric visits after medication discontinuation could represent a significant concern if it compromises continuity of care in these seriously ill patients. Further, our results suggest that the policy cohort of non-attenders utilized emergency room services more frequently after medication discontinuation. This may indicate an increased incidence of symptoms while off-treatment. An alternative, potentially more plausible, explanation is that this reflects attempts to manage medication access issues in outpatient emergency rooms, which are a possible setting of care for patients not regularly attending CMHCs. Although the Maine prior-authorization policy reduced pharmacy reimbursement (about \$27 per patient over 8-month policy period (6)), it is unlikely that these small savings offset the cost of increases in acute care services, imposing greater societal treatment costs for this group of patients.

We did not detect any effect of the policy on rates of hospitalization. However, interpretation of this outcome is limited by the lack of data on state psychiatric hospitalizations, the short 8-month follow-up due to sudden discontinuation of Maine's prior-authorization policy in March 2004 following reports of adverse effects associated with the policy (7,37), and small sample size. Longer term consequences of prior-

authorization policies on health and economic outcomes could not be reliably ascertained from this study.

Several limitations merit discussion. First, continuously enrolled patients can represent a selected subgroup of the Medicaid population; however, this was unavoidable in order to obtain complete information about patients' outpatient medication use. A sensitivity analysis in which we included individuals continuously enrolled for at least 90% of the study period (additional 173 subjects: CMHC attenders: pre-policy n=21; policy n=29 and non-attenders: pre-policy n=53; policy n=70) found no changes in the characteristics of study groups or in our results. Second, because we did not have access to medical records and state psychiatric hospital data, we used regular receipt of CMHC services as a marker for disease severity, however, some individuals may be misclassified. Notwithstanding this limitation, there is a need to examine the impact of cost-containment policies by patients' illness severity. Third, a small number of individuals who had visited the excluded CMHCs at baseline were categorized as non-attenders by our study definition (n=77; pre-policy n=30, policy n=47). To address possible misclassification, we conducted a sensitivity analysis in which we excluded these individuals, and we observed no changes in the characteristics of the non-attender group or in our results. Fourth, we could not observe changes in visits to state psychiatric facilities that do not bill Medicaid. Finally, changes in visit rates might have been due in part to patients' care-seeking behavior and care management patterns of CMHCs; however, the use of the pre-policy cohort as a counterfactual comparison in our analyses of policy effects is likely to have minimized such confounding.

In conclusion, introduction of the Maine prior authorization policy for atypical antipsychotic and anticonvulsant agents was associated with increased rates of medication discontinuation among vulnerable groups of patients initiating new episodes of medication for bipolar disorder, and following these discontinuations, reductions in psychiatric visits among the sickest patients treated in community mental health centers and increases in emergency room visits in other patients. These small but meaningful unintended policy effects raise quality of care concerns. Long-term consequences of prior-authorization policies on patient outcomes warrant further investigation.

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Figure 1.
Time to treatment discontinuation (>30 days without bipolar drug therapy after initiation) among CMHC-attenders and non-attenders in the pre-policy (Jul 2002–Feb 2003) and policy (Jul 2003–Feb 2004) cohorts.

Figure 2.

(A) Estimated number of psychiatric visits per month before and after bipolar drug initiation, (B) Estimated number of emergency room visits per month before and after bipolar drug initiation among CMHC-attenders and non-attenders in the pre-policy (Jul 2002–Feb 2003) and policy (Jul 2003–Feb 2004) cohorts.

Baseline[‡] characteristics of newly treated patients[‡] the policy and pre-policy cohorts, comparing patients attending and not attending community mental health centers (CMHC)

Table 1

Characteristics	Pre-policy cohort (Jul 2002–Feb 2003; N=1,014)				Policy cohort (Jul 2003–Feb 2004; N=946)			
	CHMC attenders (N=275)		Non-attenders (N=739)		CHMC attenders (N=275)		Non-attenders (N=671)	
	N	%	N	%	N	%	N	%
Female	172	63	495	67	180	65	425	63
Age in January 2001								
18–34	124	45	374	51*	134	49	375	56
35–54	138	50	301	41	123	45	258	39
55–64	9	3	35	5	13	5	22	3
65+	4	2	29	4	5	2	16	2
White race	268	98	721	98	264	96	642	96
Medicare/Medicaid dually enrolled	115	42	244	33*	105	38	182	27*
Bipolar medications used [£]								
Lithium	20	7	39	5	14	5	21	3
2nd-generation Antipsychotic	68	25	82	11*	71	26	81	12*
Non-preferred	20	7	32	4	17	6	22	3*
Preferred	52	19	56	8*	57	21	65	10*
Anticonvulsant	82	30	125	17*	75	27	106	16*
Carbamazepine	15	5	10	1*	4	1	4	1
Valproic acid	23	8	46	6	21	8	45	7
Non-preferred	52	19	76	10*	53	19	62	9*
Lithium with 2nd-generation antipsychotic	11	4	8	1*	5	2	8	1
Lithium with anticonvulsant	10	4	12	2	4	1	5	1
2nd-generation antipsychotic with anticonvulsant	38	14	37	5*	34	12	34	5*
Mental health diagnoses [§]								

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	N	%	N	%	N	%	N	%
Bipolar Type 2	35	13	51	7*	47	17	55	8*
Schizophrenia	46	17	40	5*	44	16	37	6*
Depression	154	56	264	36*	162	59	257	38*
Hospitalization	71	26	116	16*	81	29	129	19*
Psychiatric Hospitalization	27	10	24	3*	30	11	29	4*
Emergency room (ER) visits	184	67	369	50*	188	68	358	53*
No. of unique medications (M±SD) [†]	7.0±4.6		5.7±4.6*		7.4±5.1		5.6±4.5*	
No. emergency room visit/month	4±.6		2±.3*		3±.5		2±.4*	
No. of CMHC visit /month	1.2±1.1		.02+ ±.05*		1.2±1.1		.02+ ±.05*	
No. of psychiatric visits /month	2.4±2.6		.7±1.5*		2.2±2.1		.7±1.3*	
No. of outpatient visits /month	3.3±2.6		1.6±1.8*		3.2±2.3		1.9±1.8*	

* P<.05 between CMHC-attenders and non-attenders

[†] Baseline period consists of 7 months prior to the index date excluding the month immediate before the index date.

[‡] Patients initiated a bipolar drug (second-generation antipsychotic, anticonvulsant, or lithium) with no use in previous 90 days; had less than 45 days' stay in institutional settings in previous 90 days; and had at least one inpatient or two outpatient diagnoses of bipolar disorder.

[£] Percentages represent use during 5-month period because patients were required to have no use during 90 days prior to initiation.

[§] At least one inpatient or two outpatient diagnoses of schizophrenia (ICD-9 295), depression (ICD-9 296.2, 296.3, 311) and bipolar type 2 (ICD-9 296.89 and 301.11) during the baseline period.

[¶] Number of unique medications (distinct chemical entities) as defined by the National Drug Codes.

Table 2

Impact of prior authorization policy on outpatient visits per patient per month [‡]

Patient subgroups	Outcome measures	Policy cohort vs. pre-policy cohort					
		Post-initiation while on treatment vs. pre-initiation		Post-initiation after discontinuing medication vs. pre-initiation		Post-initiation after discontinuing medication vs. post-initiation while on treatment [§]	
		Change Estimate	95% CI	Change Estimate	95% CI	Change Estimate	95% CI
CMHC-attenders (N=550)	Psychiatric visits	.09	-.31 to .50	-.55	-1.17 to .06	-.64	-1.26 to -.03*
	Emergency room visits	-.06	-.18 to .06	-.00	-.19 to .18	.06	-.13 to .24
	Non-psychiatric outpatient visits	-.14	-.41 to .12	-.05	-.43 to .34	.10	-.29 to .48
Non-attenders (N=1,410)	Psychiatric visits	.07	-.15 to .29	.21	-.11 to .53	.14	-.18 to .46
	Emergency room visits	-.05	-.13 to .02	.10	-.00 to .21	.16	.05 to .26*
	Non-psychiatric outpatient visits	-.07	-.19 to .05	.03	-.14 to .20	.10	-.07 to .27

* P<.05 between policy and pre-policy cohorts (bold)

[‡] Estimates shown are differences between the policy (Jul 2003–Feb 2004) and pre-policy (Jul 2002–Feb 2003) cohorts across three time periods: pre-initiation, post-initiation while on treatment, and post-initiation after discontinuing medication. Linear mixed models control for baseline age, sex, Medicare/Medicaid dually enrollment status, number of unique medications and hospitalization counts.

[§] Overall policy impact on visit rates following medication discontinuation (shaded) in newly treated patients is estimated by the difference between the previous two comparisons. For example, psychiatric visits for CMHC-attenders, the policy impact was estimated by: -0.55 minus 0.09 equal to -0.64 visits per patient per month.