

# Use of Antipsychotic Medications in Treating Schizophrenia Among Different Financing and Delivery Systems

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## Abstract

**Background:** In 1995 in an effort to control costs, the State of Colorado implemented a pilot capitated payment system for individuals eligible for public financing of their mental health services. Contracts were with both Not-For-Profit (NFP) firms and For-Profit (FP) firms; the remainder were in the fee-for-service system (FFS). Pharmaceuticals were not included in the capitation rate. However, antipsychotic medications were included in the formularies for consumers who received their medical care through a Health Maintenance Organization (HMO).

**Aims:** This paper examines the use of antipsychotic medication compared to the use of atypical antipsychotics among consumers who are (i) enrolled in a medical HMO or not enrolled in a medical HMO and (ii) whose mental health services are reimbursed on a fee-for-service basis (FFS) or through a capitated system.

**Methods:** Data for this study were collected between 1995 and 1997 as part of the Colorado's Medicaid Mental Health Capitation Pilot Program. Atypical antipsychotics included in the study are: clozapine, risperidone, and olanzapine. The sample of this study consisted of 282 individuals diagnosed with schizophrenia.

**Results:** The utilization of antipsychotics was lower among consumers in HMOs. Compared to consumers in FFS areas of the state, the utilization of atypical antipsychotics was higher in capitated areas of the state.

**Discussion:** There was a strong incentive for the utilization of atypical antipsychotics to increase in capitated systems, unless consumers received their medication prescriptions through an HMO. Limitations include differences in observable and unobservable characteristics among the FFS, DC and MBHO areas, unavoidable selection bias and the small number of HMO enrollees.

**Conclusions:** Capitation of mental health services provides incentives for more cost-effective treatments. HMO enrollment was not a crucial factor to determine access to atypical antipsychotic prescriptions.

**Implications for Policy:** These data suggest that capitation can

affect the use of substitute services not in the capitation rate. Before recommending policy changes, we need to better understand whether the increased utilization leads to better outcomes.

**Implication for Further Research:** The next step is to determine whether the increased use of atypical antipsychotics leads to better outcomes for consumers.

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## Introduction

Since the 1950s, treatment patterns for persons diagnosed with schizophrenia have changed dramatically due to the introduction of antipsychotic medication. Persons with schizophrenia are now able to remain in the community and have improved quality of life. While hospitalization continues to be used as acute therapy, maintenance therapy includes an array of outpatient services and psychopharmacological therapy.

Maintenance of antipsychotic medication for patients with chronic schizophrenia is considered to be a major factor in reducing relapses and rehospitalization<sup>1</sup> that are costly; i.e. the annual cost of short-term hospitalization due to relapses is approximately two billion dollars. Sixty percent of the cost comes from loss of medication efficacy and the remainder from lack of adherence to medication regimens during maintenance therapy.<sup>2</sup> At the same time, the annual treatment costs of schizophrenia are the highest among mental disorders due to its prevalence in the adult population (one percent of adults), early onset (in young adulthood) and chronicity.<sup>3,4</sup>

Since 1989 a second generation of antipsychotic drugs, oral atypical antipsychotics, has become available. These drugs have shown their superiority over typical antipsychotics because not only are they as effective against positive symptoms, but also are more effective against negative symptoms. In addition, they have reduced the risk of neurotoxic symptoms such as extrapyramidal symptoms and tardive dyskinesia,<sup>5,6</sup> though some of them have the risk of inducing agranulocytosis and diabetes.<sup>7-10</sup> There is evidence

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that they may be more effective in reducing relapse and hospitalization, perhaps due to better consumer adherence.<sup>11-16</sup>

Atypical antipsychotics, however, are more costly than the earlier antipsychotic medications.<sup>17</sup> Therefore, how the financing of public mental health services affects the utilization patterns for atypical antipsychotics becomes an important health policy issue. Of additional interest is how the fiscal controls within the delivery systems, specifically those with managed care systems for physical health such as HMOs, affect the use and type of antipsychotic medications.

The purpose of the current paper is to consider the joint effects of the financing system and the delivery system on the utilization of typical and atypical antipsychotics. The capitation pilot program implemented in State of Colorado in 1995 provides the opportunity to study this issue.

### *Capitation in Colorado*

In Colorado, outpatient mental health services are provided by seventeen Community Mental Health Centers (CMHCs) and five specialty clinics, and inpatient mental health services are provided by two state hospitals and local general hospitals. After implementation of the Colorado Medicaid Capitation Pilot Program in selected areas in August and September 1995, there are three major delivery and financing systems providing mental health services: Fee-for-Service (FFS), Direct Capitation (DC), and Managed Behavioral Health Organizations (MBHO). In FFS, providers are reimbursed on a fee-for-service basis. In each geographical area of DC and MBHO, one Mental Health Assessment and Service Agencies (MHASA) is selected to contract with the State's Mental Health Services (MHS). It bears full financial risk of providing mental health services, either directly or through subcontracts with other mental health providers, to Medicaid beneficiaries residing in its designated area. In the system of DC, the MHASAs are not-for-profit CMHCs. In MBHO, the MHASA is a joint venture between a for-profit managed care firm and either a single CMHC or an alliance of CMHCs.

The mental health capitation program does not include prescription drugs. How prescription drugs are reimbursed depends on whether or not the Medicaid beneficiary is enrolled in an HMO. All Medicaid beneficiaries are eligible for enrollment in HMOs as long as there are HMOs available in their residential areas. The Colorado's Department of Health Care Policy and Financing (HCPF) reimburses the HMO program on a capitated basis that covers not only prescription drugs, but also acute general medical care. For beneficiaries not enrolled in an HMO, prescription drugs are still reimbursed on a fee-for-service basis by Colorado's HCPF. At the time that these data were collected, there were no formal organizational ties between HMOs and the MHASAs.

### *Antipsychotic Medications*

Psychopharmacotherapy is a key component in the treatment of schizophrenia, a chronic mental illness with rare possibility of complete remission. Both in the acute phase and maintenance phase of the treatment, antipsychotics play an important role of alleviating acute symptoms and preventing relapses.<sup>18-21</sup>

Oral forms of typical antipsychotics such as chlorpromazine, haloperidol, fluphenazine, and thioridazine have been used in the treatment of schizophrenia since their introduction in 1950s. Long-acting depot forms of two typical antipsychotics, fluphenazine and haloperidol, were developed in 1960s and have been applied to achieve better patient compliance and more precise pharmacokinetics. Since 1989, oral atypical antipsychotics -clozapine (1989), risperidone (1993), olanzapine (1996), quetiapine (1997), ziprasidone (2001) and aripiprazole (2002)- have been introduced and applied to the treatment.

Typical and atypical antipsychotics differ in their clinical effectiveness, side-effect profiles, and prices. The characteristic symptoms of schizophrenia include two categories -positive and negative symptoms. The positive symptoms include hallucinations, delusions and formal thought disorders. The negative symptoms include diminishing sociability, restricted emotional expressions, psychomotor retardation, and reduced thought and speech productivity. Typical antipsychotics are effective against positive symptoms but are less effective against negative symptoms. Atypical antipsychotics are no less effective than typical antipsychotics against positive symptoms and are more effective against negative symptoms.<sup>5</sup> In addition, clozapine is effective in the treatment of refractory schizophrenia patients who do not respond to other antipsychotic medications. Typical antipsychotics are notorious for their drug-induced side effects such as sedation, anticholinergic and antiadrenergic effects, neurologic effects etc. Among all side effects, the most troublesome are extrapyramidal side effects that cause not only acute symptoms but also permanent harm. In contrast, atypical antipsychotics have a reduced risk of neurotoxic symptoms such as extrapyramidal symptoms and tardive dyskinesia.<sup>6</sup> However, clozapine causes agranulocytosis in approximately 1% of those who receive it and requires weekly blood monitoring.<sup>7</sup> In addition, there is increasing evidence indicating that clozapine and olanzapine bear the risk of treatment-induced type II diabetes.<sup>9-11</sup>

Although atypical antipsychotics have better clinical effectiveness and side-effect profiles, they have higher acquisition costs than typical antipsychotics. Compared to the therapeutic equivalence of 20mg/day of haloperidol, the cost of clozapine treatment is \$1,056.00 per month,\* risperidone is \$510.00 per month, and olanzapine is \$463.80 per month while haloperidol treatment costs only \$30.60 per month, fluphenazine \$69.00 per month and chlorpromazine \$22.50 per month.<sup>17</sup>

### *Utilization of Antipsychotics*

The introduction of different categories of antipsychotics not only changes the treatment patterns for schizophrenia, but also affects their utilization. As the availability of the second generation of antipsychotics increased, an increase in their use over time has been reported. Two reasons are cited:

\* Cost of blood tests is not included.

psychiatrists turn to atypical antipsychotics when consumers are unresponsive to typical antipsychotics or find them intolerable as the first-line drugs. With the exception of clozapine, atypical antipsychotics are increasingly being used as first-line antipsychotic medications to treat individuals newly diagnosed with schizophrenia. In a study of Wang *et al.*, a rapid increase in the use of atypical antipsychotics was reported that accounted for more than half of total antipsychotic utilization.<sup>22</sup> A similar trend has been observed both in the state-run Medicaid programs as well as in the mental health services provided through the US Department of Veterans Affairs (VA).<sup>23</sup> In a longitudinal cohort study of the use of different types of antipsychotics among the Georgia Medicaid population from 1990 to 1997, a moderate increase in the total use of antipsychotics was reported. In addition, a trend of substantially increasing utilization of atypical antipsychotics and decreasing use of oral typical antipsychotics was observed so that by the end of 1997, atypical antipsychotics (clozapine included), depot antipsychotics, and oral typical antipsychotics accounted for 41%, 16% and 43% of the total antipsychotic utilization respectively.<sup>24</sup> A similar finding was reported among New Hampshire Medicaid beneficiaries.<sup>25</sup> The study of Weissman indicates that the use of atypical antipsychotics had increased between 1998 and 2000 so much that by 2000, they exceeded the use of typical antipsychotics.<sup>26</sup>

### *Pharmaceutical Utilization in Managed Care Settings*

To date, little literature considers the effects of the development of these second generation antipsychotics (atypical antipsychotics) in health maintenance organizations (HMOs). This is of concern since HMOs provide the opportunity to integrate mental health and physical health care and HMO enrollees have been reported to have less exposure to antipsychotic medications.<sup>27</sup> One way of managing the utilization and cost of pharmaceuticals is to develop a formulary that includes the pharmaceuticals available to consumers. Another way is to use prior approval programs to control the utilization and cost of medications not in the formularies. Less than half of HMOs use closed formularies and almost all HMOs use prior approval programs.<sup>28</sup> Under those cost-containment strategies, not only is it complicated and time consuming for a physician to order a drug not on the formulary, but also more difficult for medications with higher acquisition costs to be added to formularies without persuasive evidence of their benefits. Over time, as more psychiatrists request an exception, the case for including a new drug in the formulary will take place. We suspect that this process will be slower than when an individual physician prescribes the atypical antipsychotics.

Based on this literature, the following hypotheses will be tested.

### *Hypotheses*

The mixed fee-for-service/capitation reimbursements for mental health services and prescription drugs in the Colorado

setting provides a good opportunity to study an important issue of how these different financing and delivery systems affect the use of antipsychotics and the access to atypical antipsychotics among consumers being treated for schizophrenia. Therefore, our questions of interest include: (i) Does capitation of mental health services affect the utilization patterns for antipsychotics and atypical antipsychotics? (ii) Does capitation of the pharmacy benefit through medical HMOs affect the utilization for antipsychotic medications? Two hypotheses are tested:

- Hypothesis 1 - Capitation of mental health services increases probability of use of atypical antipsychotics.

The design of capitation is to offer incentives for providers to adopt the most cost-effective treatments. In addition, atypical antipsychotics have been proven to be superior to their typical counterparts because of their equal or even better effectiveness against positive symptoms, better effectiveness against negative symptoms and more comfortable side-effect profiles.<sup>29-32</sup> Therefore, it is expected that providers under a capitation program that does not include pharmaceuticals, will be more likely to prescribe atypical antipsychotics than those reimbursed on a fee-for-service basis.

- Hypothesis 2 - Capitation of the pharmacy benefit decreases probability of use of atypical antipsychotics.

In the case of HMOs, formularies are adopted as an instrument to contain cost while at the same time they restrict utilization of some medications by either excluding them from the list or requiring approvals before prescribing them. Because of the fact that atypical antipsychotics have higher acquisition costs than their typical counterparts, it is more likely they are either excluded from the list or prescribed after additional approval processes.

## **Methods**

### *Data and Data Sources*

The study sample was drawn from our previous study that included 522 Medicaid eligible adults over 18 with a primary diagnosis of schizophrenia, bipolar disorder, or had a 24 hour inpatient stay in the past year and were randomly selected from 1994 Medicaid files and 1995-96 admission files from CMHCs. Data of psychotropic medication paid claims between July 1<sup>st</sup>, 1995 to June 30<sup>th</sup>, 1997 (2 years after capitation) were collected by Colorado's HCPF.<sup>33</sup> The current study consists of the 282 consumers diagnosed with schizophrenia by ICD-9 codes (295.xx). The primary diagnosis of schizophrenia comes from the administrative claims data and is consistent for the year prior to selection.

The sample was stratified by their demographic characteristics, 1993 Medicaid cost, pharmacy benefit, and mental health service benefit. The demographic characteristics include three age groups (18-29, 30-49, and above 50), gender, and ethnicity (white and nonwhite, i.e., Hispanics, African Americans, Asian/Pacific Islanders, native Americans and other nonwhite individuals). The 1993

Table 1. Sample Demographic Characteristics and Pharmacy Benefits in the First Year of Capitation

Characteristics	Total		FFS		Direct Capitation		MBHO*		Chi-square df p value
	N	(%)	N	(%)	N	(%)	N	(%)	
Subjects	282		86		93		103		
Age									5.38
18-29	38	(13.48)	11	(12.79)	16	(17.20)	11	(10.68)	4
30-49	171	(60.64)	56	(65.12)	57	(61.29)	58	(56.31)	0.250
50+	73	(25.89)	19	(22.09)	20	(21.51)	34	(33.01)	
Gender									0.35
Male	170	(60.28)	52	(60.47)	58	(62.37)	60	(58.25)	2
Female	112	(39.72)	34	(39.53)	35	(37.63)	43	(41.75)	0.841
Ethnicity									4.84
White	185	(65.60)	51	(59.30)	69	(74.19)	65	(63.11)	2
Nonwhite	97	(34.40)	35	(40.70)	24	(25.81)	38	(36.89)	0.089
Cost									8.58
High cost client	108	(38.30)	39	(45.35)	38	(40.86)	31	(30.10)	4
Low cost client	101	(35.82)	29	(33.72)	36	(38.71)	36	(34.95)	0.072
Unknown	73	(25.89)	18	(20.93)	19	(20.43)	36	(34.95)	
Pharmacy benefit									31.87
Medical HMO	41	(14.54)	6	(6.98)	4	(4.30)	31	(30.10)	2
Non-HMO	241	(85.46)	80	(93.02)	89	(95.70)	72	(69.90)	<0.0001

\* MBHO: Managed Behavioral Health Organization.

Medicaid cost divided the sample into three groups: a low-cost consumer is the one whose cost is below the median of \$1,500, a high-cost consumer is the one whose cost is between \$1,500 and \$85,000, and a consumer whose prior year's cost of care is unknown either because the consumer was new to Medicaid in 1994 or because he did not have any Medicaid claims in 1993. The pharmacy benefits vary by whether or not the consumers were enrolled in an HMO for their medical care. Mental health service benefits of Medicaid beneficiaries depend on their enrollment in FFS, DC or MBHO.

Antipsychotics included both typical and atypical antipsychotics. Typical antipsychotics included both oral and injectable depot forms. Atypical antipsychotics available in the study period were clozapine, risperidone and olanzapine. None of the consumers received quetiapine. Use of antipsychotics or atypical antipsychotics is defined as whether they have at least one paid claim for medications in each year of the 2-year study period.

### Analytic Approach

Based on the hypotheses, the analysis models of the study are as following:

$$Y_{1i} = f(X_i, M1_i, M2_i, C1_i, C2_i, R_i, U_i)$$

$$Y_{2i}|(Y_{1i} = 1) = f(X_i, M1_i, M2_i, C1_i, C2_i, R_i, U_{2i})$$

where  $i$  represents each observation;  $Y_1$  is a dummy variable for use of antipsychotics and  $Y_2$  is a dummy variable for use of atypical antipsychotics;  $X$  are demographic characteristics that include age, gender and ethnicity;  $M1$  and  $M2$  are dummy variables for DC and MBHO while FFS is the comparison group;  $C1$  and  $C2$  represent high cost client and low cost client while unknown is the comparison group;  $R$  is a dummy variable for medical HMO enrollment;  $U$  is an error term.

Logistic regression with a dichotomous dependent variable indicating use or no use of antipsychotics and atypical

antipsychotics (conditional on use of antipsychotics) was applied to assess use or no use of the medication in each year of the 2-year post-capitation study period. To take into account the potential lack of independence of observations for each subject, standard errors of the coefficients were adjusted by the “cluster” option in STATA at the subject level.

## Results

### *Characteristics of the Sample*

The study sample consists of the 282 individuals diagnosed with schizophrenia. The pooled two post capitation periods increase the analytic sample size to 564 observations. The sample is almost equally divided by the model of financing. Overall, about 15 percent of the sample were enrolled in an HMO. The majority of the sample are between the ages of 30 and 50 and more than 50 percent of the sample are male. The ethnic make-up by financing type is 41% nonwhite in the FFS program, 26% in the DC program, and about 37% in the MBHO program. There are no statistically significant differences in the socio-demographic characteristics in the sample (**Table 1**).

Among the sample of 282, 86% ever used antipsychotics in the first year. Overall, 36% ever used atypical antipsychotics and 50% ever used only typical antipsychotics during the first year while 14% never used any antipsychotics in the first year post capitation (**Table 2**). Of those that had at least one prescription for an atypical antipsychotic, 17% were older than 50. Among those that ever used atypical antipsychotic, 26 percent were nonwhite while among those antipsychotic users who never used atypical antipsychotics in the year, 39 percent were nonwhite. Among those that ever used atypical antipsychotics in the year, 19% enrolled under FFS, 44% under DC, and 37% under MBHO. In contrast, among those antipsychotic users that never used atypical antipsychotics in a fiscal year, 39% enrolled under FFS, 29% under DC, and 32% under MBHO. Chi-square tests indicate that those ever used atypical antipsychotics, those who used only typical antipsychotics and those never used antipsychotics during the first year were significantly different in the distribution of age, cost, pharmacy benefit and mental health services benefit (**Table 2**). Because of these differences, multivariate regression models were used so that the potential moderating effects of these variables could be controlled.

### *Utilization of Antipsychotics and Atypical Antipsychotics*

To compare the effect of the three types of financing (DC, MBHO, versus FFS) on the utilization of antipsychotics, logistic regression is used (**Table 3**). In the estimated model, first year of post capitation, age, gender, ethnicity, and prior cost status are used as controls. No statistically significant changes were found between the post two periods, nor were

there differences between direct capitation, MBHO compared to FFS. A statistically significant lower probability of using antipsychotics for those enrolled under Medical HMO was found, with an odds ratio 0.21 as compared to those not enrolled under Medical HMO. There are no differences in terms of utilizing antipsychotics among age, gender, ethnicity, or base period cost status.

Logistic regression analysis is used to examine the probability of the different programs (DC, MBHO, versus FFS) using atypical antipsychotic medications (among antipsychotic medication users). Enrollment during the second year post capitation results in a higher probability of using atypical antipsychotics than the first year post capitation, odds ratio is 1.56 (**Table 4**). Comparing to FFS members, consumers enrolled in the DC or MBHO programs had a higher probability of using atypical antipsychotics (odds ratios are 2.21 and 2.29, respectively). Older consumers (above 50) had a lower probability of using atypical antipsychotics (odds ratio of 0.31) as compared to consumers who were in the less than 30 years of age group. Finally, among antipsychotics users, nonwhite consumers had a lower probability of using atypical antipsychotic medications (odds ratio is 0.53). No differences by gender or by the base period cost status in the use of atypical antipsychotics were found.

## Discussion and Conclusions

We found that there were differences between the three systems of financing and delivering services, but these differences existed prior to capitation.<sup>34</sup> Consistent with Hypothesis 1, utilization of atypical antipsychotics following capitation was lower in the fee-for-service areas of the state compared to the MBHO and DC areas.

We were not surprised to find higher use of atypical antipsychotics under capitation. Since the medication benefit was not included in the capitation program, there are incentives for the capitated systems to prescribe atypical antipsychotics as they are more effective and may actually reduce the rate and length of hospitalizations.<sup>11-16,35</sup> Although atypical antipsychotics are as effective as typical antipsychotics against positive symptoms, they are more effective against negative symptoms and have fewer side effects. These advantages lead to better control of schizophrenia symptoms and better medication adherence, an important factor to prevent relapse. This, then, is a resource conserving strategy as there would be a reduction in the need for acute services - i.e. inpatient hospital utilization.

In our findings, consumers who received their medication benefit through a health maintenance organization (HMO) were no less likely to use atypical antipsychotics though they were less likely to use antipsychotic medications. These results contradict our hypothesis that consumers who received their medication benefit through a health maintenance organization (HMO) will be less likely to use atypical antipsychotic medications. One explanation why those enrolled in HMO were no less likely to receive atypical antipsychotics is that there were no formal organizational ties between medical HMOs and MHASAs so that providers

Table 2. Sample Demographic Characteristics and Services Benefits of Atypical Antipsychotic, Typical Antipsychotic and Non-antipsychotic Users in the First Year of Capitation

Characteristics	Total		Ever Used Antipsychotics in FY96				Never Used Antipsychotics in FY96		Chi-square df
	N	(%)	Ever Used Atypical Antipsychotics N	(%)	Used Only Typical Antipsychotics N	(%)	N	(%)	
Subjects	282		100		142		40		
Age									13.96
18-29	38	(13.50)	21	(21.00)	16	(11.27)	1	(2.50)	4
30-49	171	(60.60)	62	(62.00)	85	(59.86)	24	(60.00)	0.007
50+	73	(25.90)	17	(17.00)	41	(28.87)	15	(37.50)	
Gender									0.79
Male	170	(60.30)	63	(63.00)	85	(59.86)	22	(55.00)	2
Female	112	(39.70)	37	(37.00)	57	(40.14)	18	(45.00)	0.675
Ethnicity									4.89
White	185	(65.60)	74	(74.00)	86	(60.56)	25	(62.50)	2
Nonwhite	97	(34.40)	26	(26.00)	56	(39.44)	15	(37.50)	0.087
Cost									10.79
High cost client	108	(38.30)	49	(49.00)	43	(30.28)	16	(40.00)	4
Low cost client	101	(35.80)	27	(27.00)	62	(43.66)	12	(30.00)	0.029
Unknown	73	(25.90)	24	(24.00)	37	(26.06)	12	(30.00)	
Mental health services benefit									18.34
FFS	86	(30.50)	19	(19.00)	56	(39.44)	11	(27.50)	4
Direct Capitation	93	(33.00)	44	(44.00)	41	(28.87)	8	(20.00)	0.001
MBHO*	103	(36.50)	37	(37.00)	45	(31.69)	21	(52.50)	
Pharmacy benefit									25.30
Medical HMO	41	(14.50)	13	(13.00)	12	(8.45)	16	(40.00)	2
Non-HMO	241	(85.50)	87	(87.00)	130	(91.55)	24	(60.00)	<0.0001

\* MBHO: Managed Behavioral Health Organization.

Table 3. Utilization of Antipsychotics as a Function of Financing Delivery Systems

	Coefficient	SE	Odds Ratio	95% CI
Intercept	2.47 **	0.61		
Second year of capitation	-0.32	0.18	0.73	0.51 - 1.03
Direct Capitation	0.38	0.41	1.47	0.66 - 3.25
MBHO	-0.08	0.37	0.92	0.45 - 1.89
Medical HMO	-1.54 **	0.39	0.21	0.10 - 0.46
Age between 30 and 50	-0.76	0.56	0.47	0.16 - 1.40
Age higher than 50	-1.08	0.58	0.34	0.11 - 1.05
Male	0.34	0.32	1.41	0.76 - 2.63
Nonwhite	-0.25	0.29	0.78	0.44 - 1.38
High cost	0.43	0.39	1.54	0.71 - 3.33
Low cost	0.27	0.37	1.31	0.64 - 2.68
Chi-square	34.50 **			
Observations	564			

\* P<0.05, \*\* P<0.01, two-tailed test

Note: Comparison group: first year of capitation, fee-for-service, non-HMO, aged 18-30, female, white, unknown cost.

Table 4. Utilization of Atypical Antipsychotics Among Antipsychotic Users as a Function of Financing Delivery Systems

	Coefficient	SE	Odds Ratio	95% CI
Intercept	-0.19	0.49		
Second year of capitation	0.45 **	0.11	1.56	1.25 - 1.96
Direct Capitation	0.79 *	0.31	2.21	1.19 - 4.09
MBHO	0.83 *	0.33	2.29	1.19 - 4.39
Medical HMO	0.14	0.42	1.15	0.50 - 2.62
Age between 30 and 50	-0.38	0.40	0.69	0.32 - 1.49
Age higher than 50	-1.18 *	0.47	0.31	0.12 - 0.77
Male	-0.18	0.28	0.84	0.48 - 1.46
Nonwhite	-0.64 *	0.28	0.53	0.31 - 0.91
High cost	0.55	0.33	1.73	0.90 - 3.31
Low cost	-0.44	0.35	0.64	0.32 - 1.29
Chi-square	43.48 **			
Observations	472			

\* P<0.05, \*\* P<0.01, two-tailed test

Note: Comparison group: first year of capitation, fee-for-service, non-HMO, aged 18-30, female, white, unknown cost.

were less restricted by formularies. Another reason is that the incentives for using more cost-effective treatments may have made providers more willing to go through the prior approval process so that consumers' access to atypical antipsychotics was not dominated by their pharmacy benefit. Because of an unequal distribution of HMO enrollees among the three programs and the small number of HMO enrollees

relative to those not enrolled in HMOs, we did additional analyses and found that neither excluding the HMO variable in our models nor repeating the same analyses on non-HMO subjects changed our results regarding the effect of FFS, DC, MBHO (data not shown). However, this unequal distribution makes it inevitable that to some degree the HMO effect may be compensated by the MBHO effect.

The demographic characteristics, e.g. age and ethnicity, of those who utilized atypical antipsychotic medications in our study are consistent with previous studies.<sup>11,36-37</sup> Younger consumers are excellent candidates for the new antipsychotic medications because they suffer more severe symptoms and use more mental health services than older consumers.<sup>38</sup> Older consumers who have been receiving treatments for a longer time may be responsive to and able to tolerate typical antipsychotics.

There are, at least, two plausible explanations for the finding that non-white consumers, especially African Americans, were less likely to utilize atypical antipsychotics. The first explanation is that there are disparities in treatment for schizophrenia. That is, psychiatrists are either less likely to prescribe atypical antipsychotics or consumers are less likely to have their prescriptions filled. Alternatively, a methodological issue may have a role in the explanation. There is an over-diagnosis of schizophrenia among African Americans and other non-white groups.<sup>39</sup> This seems to be especially true when an individual is initially diagnosed. However, some studies indicate that as the clinical team gets to know the consumer better, the diagnosis is changed to an affective disorder. If true, then prescribing atypical antipsychotics would be inappropriate. This explanation suggests that the prescribing behavior is consistent with the behaviors of the individual rather than their initial diagnosis. Since the consumers in our sample had a consistent diagnosis, albeit only for the prior year, the latter explanation is less plausible in this study.

Individuals who cost the system more prior to capitation did not have a higher probability to use atypical antipsychotics. Prior cost status, a measure of historical patterns of service utilization, may not be as good as direct indexes of disease severity such as the Positive and Negative Syndrome Scale (PANSS) score to determine access to atypical antipsychotics.

Carve-out mental health programs have been increasingly adopted by state Medicaid programs, for example, Massachusetts and Tennessee. Because the pharmacy benefit is usually not included in the programs, the medications consumers receive under the capitation system become an important issue. Our findings provide a glimpse as to how they affect the use patterns of antipsychotics and atypical antipsychotics. However, further study of these issues with a larger sample size and longer follow-up would be helpful for an increased understanding as to how different financing and delivery systems affect the use patterns for antipsychotic medications.

## Limitations

There are some limitations in this study. First, even though the sample was randomly selected from Medicaid beneficiaries, socio-demographic characteristics of subjects such as ethnicity and prior cost status were not equivalent (borderline statistically significant) across the FFS, DC and MBHO programs. Furthermore, unobservable characteristics

that differ among the three programs may also be attributed to different use patterns of antipsychotics.

Second, the fact that HMOs were not available in every area and that there were unobservable consumer characteristics associated with their preference of HMOs result in selection bias. The small number of HMO enrollees limits further understanding of how other consumer and provider characteristics may interact with HMO enrollment to affect access to atypical antipsychotics.

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J. R. BLOOM ET AL.



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