Mental Health Costs and Access Under Alternative Capitation Systems in Colorado

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Objective. To examine service cost and access for persons with severe mental illness under Medicaid mental health capitation payment in Colorado. Capitation contracts were made with two organizational models: community mental health centers (CMHCs) that manage and deliver services (direct capitation [DC]) and joint ventures between CMHCs and a for-profit managed care firm (managed behavioral health organization, [MBHO]) and compared to fee for service (F.F.S.).

Data Sources/Study Setting. Both primary and secondary data were collected for the year prior to the new financing policy and the following two years (1995–1998).

Study Design. A stratified random sample of 522 severely mentally ill subjects was selected from comparable geographic areas within the capitated and FFS regions of Colorado. Major variables include service cost, utilization, and access (probability of service use) derived from secondary claims data, subject reported access collected at six-month intervals, and baseline outcomes (symptoms, functioning, and quality of life).

Principal Findings. In comparison to the FFS area, cost per person was reduced in the capitated areas in each of the two years following implementation. By the end of year two, cost per person was reduced by two-thirds in the MBHO areas and by one-fifth in the DC areas. Reductions in access were found for both capitated areas, although reductions in utilization for those receiving service were found only in the MBHO model.

Conclusions. Medicaid mental health capitation in Colorado resulted in cost reducing service changes for persons with severe mental illness. Assessment of outcome change is necessary to identify cost effectiveness.

Key Words. Managed care, capitation, mental health

To contain costs and manage utilization, public mental health systems across the country are rapidly implementing capitation payment systems and managed care policies. At least 32 states are in some stage of designing and implementing behavioral health managed care programs. The potential for both positive and negative impacts on mental health consumers has been

suggested (Mechanic and Aiken 1989; Lehman 1987; Mechanic 1991; Schlesinger 1986). It is expected that the financial incentives introduced by capitation can lead to reduced reliance on institutional and other inpatient care in favor of community-based outpatient care, increased coordination of mental health care, and increased emphasis on preventive care. The net result of these effects would be to contain or lower costs while at the same time maintaining or increasing the quality of mental health care. Alternatively, concerns have been expressed that the strong incentives of capitation to seek cost-efficiencies, if combined with inadequate oversight of quality of care, could result in reductions in access to services or quality of care sufficient to lead to decrements in treatment outcomes in comparison with those obtained under prior financing systems (Mechanic and Aiken 1989; Lehman 1987; Mechanic 1991; Schlesinger 1986).

Particular concern has been focused on the impact of capitation on persons with severe and persistent mental illness. Because the level of need, and the use and costs of treatment services for this consumer group greatly exceed the average, it has been anticipated that they would be disproportionately affected (Lurie, Moscovice, Finch, et al. 1992). This group of consumers may be less able or less likely to effectively express, or have heard, any concerns over treatment changes, making them even more susceptible to reductions in treatment quality (Hall and Beinecke 1998). However, it is also well known that persons with severe and persistent mental illness are more likely to be at risk for institutional and other inpatient care, have more complex treatment episodes, and benefit from early detection of, and intervention for, the onset of acute

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episodes of illness (Young et al. 1997). Thus, it could be equally argued that they might disproportionately benefit from the potential positive treatment changes, as noted above, that are also expected from capitation financing.

Most of the mental health services research in this area has focused on how capitation or managed care have led to shifts in utilization and reduction in aggregate costs and utilization. For example, in a two-year study in Rochester, New York, capitation resulted in reduced costs, but the rate of savings decreased over time. At the end of the first year the authors found costs had declined by 14 percent but by the second year costs had declined by only 8 percent. The cost reductions were a result of increased intervals between inpatient care episodes (Lurie, Moscovice, Finch, et al. 1992; Hall and Beinecke 1998; Young et al. 1997; Babigian et al. 1993; Cole, Reed, Babigian et al. 1994). In Massachusetts, Medicaid expenditures were lowered 27 percent compared to levels expected based on prior trends. Because the entire state was capitated, evaluation was limited to pre–post comparisons (Dickey, Normand, Azeni, et al. 1996; Frank and McGuire 1997). Cost savings were also found in the first-year results from the mental health capitation project in Utah (Christianson, Manning, Lurie, et al. 1995). Significant reductions in inpatient expenditures in the capitated sites in Utah were concentrated in consumers receiving Aid to Families with Dependent Children. Compared to non-capitated sites, no reductions in outcomes were reported for these subjects but decrements in functioning and symptom scales were found for the schizophrenic client sample (Lurie et al. 1998). Changes in the process of care were also reported, including a greater likelihood of a patient's terminating treatment or being lost to follow-up and a reduction in standard outpatient therapy visits (Lurie et al. 1998; Popkin, Lurie, Manning, et al. 1998). A pilot program in California reported that capitated funding provided service flexibility and shifted services towards rehabilitation; this study did not examine whether there were cost savings (Chandler, Hu, Meisel, et al. 1997).

In Minnesota, 35 percent of all Medicaid recipients, including people with severe mental illness, were randomly assigned to health maintenance organizations (HMOs) for physical and mental health coverage. Only short-term outcomes (6 to 11 months) could be assessed because adverse selection led to the termination of this capitation demonstration. Differences in use, expenditures of community-based treatment, or outcomes were not found for those assigned to the capitated payment plan, including consumers with severe mental illness (Lurie, Moscovice, Finch, et al. 1992; Christianson and Gray

1994). Consistent with these findings, one-year results in Colorado's Medicaid mental health capitation program also found reductions in both inpatient costs per user and probability of outpatient service use without measurable short-term outcome change (Bloom, Hu, Wallace, et al. 1998; Cuffel, Bloom, Wallace, et al. 2002). However, these studies also suggest the importance of multiyear follow-up in assessing the impact of capitation on costs and outcomes.

A common focus of these studies—and central to assessing the impact of capitation policy—is the development of estimates of the change in aggregate costs and utilization due to capitation financing. Studies in both public and private mental health capitation have found that capitation financing does indeed lead to cost reductions. In fact, the cost savings due to capitation are relatively high. Frank and his colleagues suggest that a magnitude of 24 to 48 percent can be expected (Frank, Koyangi, and McGuire 1997). Missing from many studies, however, is information on how these changes in utilization and cost come about. Particularly, how patterns of treatment access and intensity change at the individual and system level.

Cost decreases due to capitation are often expected to occur through substitution of less expensive outpatient services for more expensive inpatient services. Though reductions in inpatient cost or utilization are common elements in capitation study findings, evidence of outpatient increases or substitution are not. This potential discrepancy simply highlights the fact that system-level change involves a variety of individual and sub-group dynamics that cannot be easily generalized. However, to fully assess, develop, and perfect the use of capitation and other prospective payment mechanisms, one needs to identify the path from individual to system dynamics. Changes in access to and intensity of service use are focal elements. These measures need to be identified in the context of different consumer, provider, and payer characteristics.

This paper presents findings through the first two years of Colorado's capitated payment system for Medicaid mental health services on patterns of cost, utilization, and access. The study incorporates several levels of analysis to clearly identify the impact of capitation on the treatment process. These include (1) separate analyses of the probability of service use at a point of time and level of treatment expenditures given that services are used; (2) separate analyses of important treatment services (i.e., local inpatient care, state hospital care and outpatient care), that are important substitutes from a cost and treatment standpoint; and, (3) analyses of consumers' perceptions of access to and the provision of treatment. Analyses of the outcomes of care for this same

group of consumers in Colorado under capitation financing are presented in a separate paper in this issue (Cuffel, Bloom, Wallace, et al. 2002).

Background and Characteristics of the Setting

The major providers of public mental health services in Colorado are seventeen community mental health centers (CMHCs) and five specialty clinics with performance contracts from Colorado's MHS (Hausman, Wallace, and Bloom 1998). Sixteen of the CMHCs are private nonprofit organizations; the one exception is administered by county government. The CMHCs have distinct geographic catchment areas based on county boundaries. They provide a broad range of outpatient mental health services to Medicaid and non-Medicaid clients. Psychiatric inpatient services are provided through two state hospitals and numerous local hospitals. In addition, prior to capitation, the state opened several acute treatment centers to provide short-term intensive residential care for clients.

The Colorado Medicaid Capitation Pilot Program was implemented in selected parts of the state in August and September 1995. Colorado's approach to capitation is one of the ''purer'' models that has been evaluated. Unlike some other states (e.g., Utah, where implementation of risk occurred over a two-year period), the providing organizations were at full risk from the program's commencement. The capitation rate covers all Medicaid-eligible individuals for psychiatric inpatient care at local hospitals, specialty mental health outpatient services, mental health services for persons in nursing homes, and state hospital services for persons 21 years of age and younger and persons 65 years of age and older. The age distinction for state hospital services reflects the general preclusion of Medicaid coverage for state hospital services for persons between 22 and 64 years of age. Medications continue to be reimbursed on a fee-for-service (FFS) basis.

Mental health assessment and service agencies (MHASAs) were created as the organizations to contract with the state for this program. Under capitation contracts, the MHASAs were responsible for provision of all covered services either directly or through contracts with specialty providers. Total capitation payments are determined by the product of the capitation rates and the expected number of Medicaid-eligible clients for each group, paid prospectively on a monthly basis with retrospective adjustment for actual enrollment. Per federal statute, total expenditures under the capitation

payment system cannot exceed the amount that would have been paid for the same group of Medicaid clients under an FFS model. The state chose to offer capitation rates equal to 95 percent of the trended capitation rates based on historical FFS utilization. The state opened contract bidding through an RFP process to any entity that could demonstrate the capability to receive, manage, and execute a prepaid contract for Medicaid mental health services.

While the CMHCs organized within the MHASA framework were primary candidates for capitation contracts, a for-profit managed behavioral health firm bid and won contracts in the western and southern portions of the state. This resulted in capitated service regions identified with one of two organizational models: 1) regions where existing not-for-profit service providing agencies (CMHCs) act as the managed care organization and hold direct contracts with the state, or direct capitation (DC); and 2) regions where a joint venture between a for-profit managed behavioral health organization and the existing provider agencies has been established to hold contracts with the state, or Managed Behavioral Health Organizations (MBHOs). Not all regions of the state were awarded capitation contracts in the initial pilot program. Capitation contracts were given to seven MHASAs. Four of the MHASAs followed the DC model (three are single CMHCs and the fourth is an alliance of three CMHCs). The other three MHASAs followed the MBHO model (one is a single CMHC and two are alliances of three and four CMHCs, respectively). Three CMHCs (one a large multisite CMHC in Denver) continued to provide mental health services on an FFS basis during the study period.

The pilot program provided a natural experiment because areas of Colorado simultaneously were financed by capitation and FFS. Plus, the two distinctive organizational models that resulted from the contracting process provide the opportunity to understand how organizational and financial conditions may interact to produce different outcomes under an otherwise ''uniform'' capitation policy. Expected differences in response to financial incentives of for-profit versus not-for-profit ownership on services production, in general and under capitation, has been a focal issue in health services research (Weisbrod 1988; Ackerman and Rose-Ackerman 1986). Therefore, it is an important dimension to include in the analyses.

Interviews with key informants from the MHASAs indicate both similarities and differences in their management utilization strategies. All MHASAs indicated that their primary target for utilization management was inpatient services. While the DC-area MHASAs focused on decreasing admissions through intensive service provision, the MBHO MHASAs

hired discharge-planning personnel to reduce length of stay after the patient was stabilized. This difference in approach was also evident in outpatient services. The DC-area MHASAs created or expanded specialized outpatient treatment services prior to implementation of capitation. The MBHO areas took a ''wait and see'' approach to making such investments (Cohen and Bloom 2000).

To encourage independent mental health practitioners to participate in their network, the MBHO areas doubled the low prevailing Medicaid FFS reimbursement rate. Ten outpatient visits were initially authorized to outside providers with increasingly greater scrutiny for reauthorization. All MHASAs reported doing case reviews to determine high utilizers and the necessity of services, but did not systematically enforce these utilization management strategies (Bloom et al. 2000).

The combination of having a single contract per service area and capitation rates based on historical use for each eligibility category to adjust for relative risk reduces the threat of adverse selection. Thus, the primary risk was to produce the, at least, 5 percent savings incorporated into the capitation rates by implementing utilization management strategies. As the MHASAs were concerned with the initial level of total capitation revenue to gauge the ''right'' level of initial investment in treatment management and new service capacity, it is not surprising that they declined the state's offer of a reinsurance program funded from 1.5 percent of capitation payments. In all, by the end of the first year the MHASA with the fewest covered lives reported just breaking even, while the rest indicated that they produced profit.

The MHASAs competed for the right to be a sole contractor in an area. The primary means of maintaining this right was to satisfy the state's expectations. The goal of Colorado's MHS has been that savings under capitation were to be returned to the mental health system in order to provide services to non-Medicaid eligible albeit needy adults or children (Bloom, Hu, Wallace, et al. 1998; Hausman, Wallace, and Bloom 1998). The state's interest in having the savings ''reinvested'' also signaled that it was unlikely to ''ratchet down'' rates in the future if savings were attained. This limits future risk for the contractors. To leave rates unchanged in the face of large savings, limits on funds ''removed from the system'' are necessary. Incentives to produce savings above the profit limit (i.e., for the for-profit MHASAs) are maintained as long as contractors are willing to compete for the right to earn the 5 percent. A MHASA that only made savings sufficient to pay itself a 5 percent profit could not compete in future contract auctions with any potential contractor offering to save more. The combination of

desired reinvestment of savings and explicit rules for distribution of savings between contractor and the state produce a strong dynamic incentive system in this program.

When it became apparent that the MHASAs would have savings after the first year of operation, the Colorado Mental Health Services (CMHS) required all MHASAs to submit a plan for use of their savings to be approved yearly. This contract change further solidified the state's intent and expanded its definition of ''taking profit'' to include expenditures by nonprofit MHASAs without clear consumer benefit. Funds were allowed to increase staff salaries, to develop new outpatient programs, for improvements of facilities, and to increase access to services to non-Medicaid consumers (Bloom, Hu, Wallace, et al. 1998; Hausman, Wallace, and Bloom 1998). The initial contracts were for two years. Because the state auditor's office and CMHS were satisfied with the performance, the contracts were non-competitively renegotiated in the second round without rate changes despite high levels of savings.

Data and Methods

Study Design

Consumers receiving services under these two models of capitation are compared with each other and with the consumers receiving services under the existing FFS model using a quasi-experimental matched group design. Subjects were selected from geographical areas within the capitated and FFS service areas that were matched on percent of poverty, degree of rurality based on the 1990 U.S. census, and comparable industrial bases (e.g., a geographical area whose major industry is mining is not compared with one that is primarily ranching).

Sample

Within the selected counties, severely and persistently mentally ill adults aged 18 years and older, with diagnoses of schizophrenia, bipolar disorder, or at least one 24-hour inpatient stay with a primary mental health (DSM-IV) diagnosis were randomly selected. The sample is stratified by gender. Consumers selected from the 1994 Medicaid files were also stratified by prior year Medicaid cost (based on median of the distribution where low cost was $1,500 and high cost ranged from $1,500 to $85,000). Seventy-five percent of the sample was

already known to the system (they had contact with the system in the year prior to the implementation of capitation), the remainder were new to the system following capitation.

Based on power analyses, we planned to recruit 256 subjects into each model (expected attrition of 15 percent), for a final sample of 653. Fifty percent of our target was drawn from the 1994 Medicaid files. The remaining 50 percent were drawn from CMHC rolls, with half (25 percent of total sample) new to the system following the implementation of capitation. Recruitment targets were not met in some of the smaller community mental health centers. Nevertheless, the final sample of 683 (71 percent acceptance rate and 81 percent retention rate) was greater than initial projections. To examine the impact of the three financial arrangements on cost, access, and utilization, a consumer must have entered the study prior to implementation of capitation. Therefore, the portion of the sample that was recruited following implementation was excluded from these analyses. The sample available for analysis includes 176 subjects from DC areas, 195 from MBHO areas, and 151 subjects from the FFS areas, for a total of 522 subjects.

Measurement

1. Cost of Services. In this study, only direct treatment costs for services covered by Medicaid and recorded in the available claims data are analyzed. Cost is defined as the expenditures made by MHASAs to provide direct treatment services to their members. Costs are aggregated for all treatment services and distributed among three service categories: state hospital, local hospital, and outpatient care. Outpatient care is defined as non-inpatient services that include individual or group therapy, crisis and evaluative services, case management, and day treatment programs, as well as treatment costs for supported residential arrangements. State hospital treatment costs for persons 22–64 years of age are included in the study data, despite the fact that they are not part of the capitation rate, because state hospital care is a direct and mutually exclusive treatment substitute for local inpatient and outpatient care. Although this results in the potential for overstatement of treatment costs ''under capitation,'' it provides a better picture of MHASA performance.

Direct treatment costs of services are obtained from the Medicaid Claims Data for costs of general hospital services and outpatient services prior to capitation and in the FFS areas following capitation. State hospital cost and utilization data were obtained from Cdorado's MHS. Following capitation,

nonstate hospital cost data for the capitated areas came from the Shadow Billing Data System developed by the state for the pilot program.

2. Utilization of Services. Utilization is the amount of a service category used in a period, conditional on any service use in that category and period, and is derived from the claims data. Whether or not a subject uses services in a period is defined as an element of access. State hospital and local inpatient services are measured in terms of days and outpatient services are measured by visits. An outpatient visit is defined by receipt of one or more units of a specific outpatient treatment modality in a day. Multiple outpatient visits may be recorded for a single day if more than one treatment modality is used.

3. Access to Services. The primary measure of access to mental health services is a dichotomous variable indicating whether a subject used treatment services in one of three time periods. This indicator is measured for any service use and for each of the three service categories. Change in access could be the result of improvement in health status or due to structural changes in the treatment decision process.

Additional measures were obtained as part of the subject interview process reported elsewhere (Cuffel, Bloom, Wallace, et al. 2002). Included are relative changes in subjects' responses to the following questions:

- Were you refused any services you believed you needed?
- Were services you have been receiving reduced or discontinued?
- Were services you have been receiving increased in amount or duration?
- Have you received new services?
- Do you have prescheduled appointments?
- When making an appointment, how many days elapsed before you received treatment?
- How long do you have to wait in the waiting room before you see your clinician?

Analytic Approach

To assess changes in service cost, utilization, and access, a standard experimental design is used that identifies differences in effects for subjects in the capitated models after capitation is implemented from their precapitation state and in comparison with the subjects receiving care under FFS. The ''difference in difference'' model is used. The model includes dichotomous or dummy variables indicating whether a subject is from one of the two capitated areas (FFS counties are the cross-sectional comparison group); dummy variables for the two postcapitation time periods; interactions of the

capitation model and post-period dummy variables; a vector of subject-level sociodemographic and diagnostic condition variables; and an error term. The estimated coefficients of the interactions of the capitated area and post-capitation time period terms provide the magnitude of possible differences between capitated area subjects and the FFS subjects (control) in each of the periods after the implementation of capitation.

The use of the ''difference in difference'' approach is based partly on expectations that there may be initial differences in treatment conditions prior to the intervention. In this case, these differences would be primarily expected to arise from the inability to randomize service systems to intervention or control conditions. Internally valid conclusions about intervention effects can be identified with initial differences if these differences can be assumed to be stable over time. That is, there are no supply changes other than the intervention that may be incurring differential shifts in treatment patterns among the study regions. The selection of subjects from FFS and capitated areas with similar underlying supply conditions is intended to mitigate these differences. Review of per user costs suggests some differences between capitation years, but no differential trends. Interviews with key informants have not identified any non-capitation-related supply changes among the regions studied.

Another issue exists regarding external validity, given the possibility that initial differences interact with the intervention. The question here is whether and to what extent any intervention effects found are due to interactions of the intervention with locally specific supply conditions, such as different initial treatment patterns for persons with similar underlying mental health conditions. This study incorporates assumptions about supply characteristic differences by separating capitation regions by ownership characteristics, under the assumption that these may interact with the generic capitation intervention.

For the analysis of cost, utilization, and access as measured using the service claims data, a two-part model is applied. The two-part model separates the assessment of probability of service use from the assessment of the amount of service use. This allows for identification of potentially different capitation effects for each of these two important aspects in the treatment process. The first part of the two-part model uses all subject observations and involves a logistic regression with the dichotomous dependent variable measuring use or no use in a time period. The estimated coefficients of the capitation area by post-capitation time period interaction variables provide the relative probabilities of service use for subjects in the capitated areas after capitation relative to the FFS subjects.

The second part uses only observations of subjects with non-zero cost (and utilization) in a period. Ordinary least-squares regression is then calculated with the dependent variables equal to the logarithm of service costs or utilization amount. Again, the estimated coefficients of the interaction terms provide the magnitude of cost (or utilization level) differences among the capitation models in relation to the FFS area after capitation, given that any services were used.

Because different types of services (local inpatient, state inpatient, and outpatient services) may have different cost, utilization, and access patterns, each of the three is examined separately along with the measures of aggregate total service use. The nine months prior to capitation (October 1994–June 1995) are compared to two nine-month periods post-capitation (October 1995–June 1996 and October 1996–June 1997). The three-month period from July to September 1995, considered the implementation period, and the comparable period from July to September 1996, is left out.

In considering the full effects of capitation, both the probability of service use and relative costs for users need to be combined. Conditional probabilities of any service use and total service cost per user are estimated from the regression model results and are used to calculate estimated total service cost per person. Estimates of the logged total service cost per user are transformed using Duan's smearing technique (Duan 1983). If no heteroskedasticity in the error term is present, a single sample-wide smearing estimate can be used in the retransformation (Manning 1998). Regression of the model covariates on the squared residuals did not indicate any heteroskedasticity.

Analyses of the access questions from the subject interviews also use the general model described above. Logistic and OLS methods are used for dichotomous and continuous dependent variable measures, respectively. For these data, there are five time points (one baseline, and four six-month intervals after capitation). For all of the above analyses the standard errors of the coefficients must be adjusted to account for potential lack of independence of observations for each subject over time. The ''cluster'' option in STATA, applied at the subject level, is used to make this adjustment (Stata Corp. 1997). In consideration of the moderate sample size, comparisons of results from the full sample and randomly drawn 70 percent subsamples were made. Using Hausman's test for consistency as a gauge, we found our estimates to be very stable across these sampling frames (Greene 1997).

RESULTS

Characteristics of the Sample

A majority of the sample described themselves as White and diagnosed as having schizophrenia; 75 percent are between 18 and 50 years of age. As expected, nearly a third of the sample were high-cost clients (based on 1994 Medicaid claims data). Consistent with our stratification scheme, the sample is almost equally divided between men and women. Service use in the period prior to capitation indicates that at least 90 percent of subjects in each area used services. Greater variation exists among areas within the local and state inpatient service categories. Chi-square tests on the distributions across the three service areas indicate that the ethnicity, diagnosis, prior cost distributions, and initial service use are significantly different (Table 1).

Table 1: Sociodemographic and Initial Service Use Characteristics

Characteristic	*F.F.S.*(%) ($n = 151$)	*Direct Capitation*(%) ($n = 176$)	*MBHO*(%) ($n = 195$)	χ^2, $d.f.$
Gender				
Male	44.4	47.7	49.7	0.99, 2, $p < 0.610$
Female	55.6	52.3	50.3	
Ethnicity				
White	54.3	73.9	64.1	32.92, 10, $p < 0.001$
Black	15.9	4.0	5.6	
Hispanic	12.6	8.5	16.4	
Asian/Pacific	2.0	0.6	0.0	
Native American	2.0	3.4	4.1	
Other	13.2	9.7	9.7	
Age				
18–35	28.5	35.8	27.2	9.66, 6, $p < 0.14$
36–50	49.0	40.3	42.6	
51–65	13.9	18.2	17.9	
65+	8.6	5.7	12.3	
Diagnosis				
Schizophrenic	75.7	62.3	66.8	8.62, 4, $p < 0.071$
Bipolar	22.2	30.9	26.3	
Other	2.1	6.9	6.8	
High Cost Client	37.1	30.9	31.8	7.80, 4, $p < 0.100$
Initial Service Use				
Total	89.4	93.8	90.3	27.71, 6, $p < 0.0001$
Local Inpatient	14.6	8.0	9.7	
State Hospital	4.0	1.7	14.4	
Outpatient	89.4	93.8	87.7	

Table 2: Probability of Service Use—Logistic Regression Results[1]

Service Type	*Local Inpatient*	*State Hospital*	*Outpatient*	*Total Service*
Direct Capitation	−0.67* (0.37)	−0.87 (0.72)	0.73* (0.44)	0.72 (0.45)
MBHO	−0.48 (0.34)	1.36*** (0.46)	−0.13 (0.37)	0.16 (0.39)
Post(1st)	−0.70** (0.33)	−0.42 (0.60)	−0.08 (0.30)	−0.08 (0.30)
DC—Post(1st)	−0.92 (0.74)	0.95 (0.97)	−1.25*** (0.48)	−1.22** (0.49)
MBHO—Post(1st)	0.19 (0.48)	−0.23 (0.68)	−0.57 (0.41)	−0.80* (0.43)
Post(2nd)	−1.01** (0.41)	−0.42 (0.60)	−0.63* (0.33)	−0.64* (0.34)
DC—Post(2nd)	−0.61 (0.78)	1.45 (0.93)	−1.34*** (0.51)	−1.34** (0.52)
MBHO—Post(2nd)	0.20 (0.58)	−0.55 (0.68)	−1.02** (0.44)	−1.24** (0.45)
Chi-Square	52.1***	48.9***	177.0***	179.2***
Observations	1,566	1,566	1,566	1,566
Subjects	522	522	522	522

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$, two-tailed.

[1]Independent variables not shown include, age, age squared, male, nonwhite, high cost, low cost, schizophrenia, bipolar disorder.

Service Claims Based Measures of Access, Costs, and Utilization

To compare the effects of these three different programs on costs and utilization, the two-part regression technique described above is used. Tables 2 and 3 present results of the two-part model for local inpatient, state hospital, outpatient, and total service access and costs, respectively. Because the samples are not fully comparable in all characteristics, age, sex, ethnicity, diagnosis, and prior cost category are applied as controls. For simplicity only main effects (variables related to time period and service region) are reported here.

The logistic regression analyses of probability of service use indicate statistically significant negative coefficients for both the Post I and Post II variables in column one, which indicate consistent reduction over time in inpatient users across all areas (Table 2). No statistically significant changes in probability of state hospital use are apparent. A statistically significant reduction in the probability of outpatient use for DC areas is apparent in the first post-capitation period, and for both DC and MBHO areas by the second post-period. Statistically significant reductions in the probability of total service use are apparent for both DC and MBHO areas in each of the two post-capitation periods. Initial conditions vary across models among the three services. Direct capitation shows lower initial probability of local inpatient use and higher outpatient use than MBHO or FFS, though MBHO has higher initial state hospital use than either of the other areas.

The OLS regression analyses of costs per user indicate that both DC and MBHO areas incurred significantly lower local inpatient costs per user than the FFS area in the first post-capitation period (Table 3). These differences,

Table 3: Cost per User (log)—OLS Regression Results[1]

Service Type	*Local Inpatient*	*State Hospital*	*Outpatient*	*Total Service*
Direct Capitation	−0.27 (0.21)	0.11 (0.65)	0.47*** (0.14)	0.30* (0.17)
MBHO	−0.47** (0.21)	0.30 (0.49)	0.42*** (0.15)	0.57*** (0.17)
Post(1st)	0.03 (0.24)	0.00 (1.02)	0.15 (0.11)	0.07 (0.13)
DC—Post(1st)	−1.11*** (0.33)	0.42 (1.21)	−0.11 (0.15)	−0.13 (0.19)
MBHO—Post(1st)	−1.26*** (0.36)	−0.78 (1.07)	−0.60 (0.15)	−0.75*** (0.19)
Post(2nd)	−0.36* (0.20)	0.71 (0.66)	0.10 (0.12)	−0.03 (0.16)
DC—Post(2nd)	0.0001 (0.65)	−1.74 (1.10)	−0.04 (0.18)	0.04 (0.21)
MBHO—Post(2nd)	−0.48 (0.31)	−0.88 (0.73)	−0.82*** (0.18)	−0.85*** (0.23)
Adjusted R^2	0.47	0.07	0.22	0.17
Regression F Statistic	10.78***	1.40	14.09***	11.88***
Observations	102	86	1,286	1,299
Subjects	86	68	501	502

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$, two-tailed.

[1]Independent variables not shown include, age, age squared, male, nonwhite, high cost, low cost, schizophrenia, bipolar.

however, do not persist into the second post-period. No statistically significant differences in state hospital user costs are identified. The costs of outpatient use were significantly reduced for MBHO areas in both post-capitation periods. Similar to the outpatient costs results, MBHO areas have total service cost reductions in both post capitation periods in comparison to FFS programs, while DC is not statistically significantly different from FFS programs.

Initial conditions also vary for user costs. MBHO areas had lower initial local inpatient costs per user than either DC or FFS. Direct Capitation and MBHO areas had higher initial costs per outpatient user. Overall, MBHO areas had approximately 57 percent higher costs per user and DC areas approximately 30 percent higher user costs than FFS. The high user costs of MBHO areas appear to be due to higher initial state hospital use and costs (although this is not statistically significant in the separate analysis).

To determine if the user cost changes reflect price or utilization changes, OLS regression analyses were also calculated using the logarithm of utilization per user for each type of service as the dependent variable. The coefficients from these analyses reflecting initial differences and MBHO post-capitation changes are similar in magnitude and statistically significance to those in the cost analyses. This indicates that these differences or changes in cost generally reflect utilization changes or differences and not price effects. However, the only significant user cost reduction for DC areas—local inpatient in the first post-period—is not matched by a reduction in inpatient days. This suggests that DC areas obtained a price reduction in that period.

Review of the average cost per day for local inpatient services by service area and for each time period indicates considerable change across periods. Direct capitation average costs per local inpatient day drop significantly from the pre-period to the first post-period and then rebound partially by the last period. Though FFS inpatient prices are stable until the last period, when they drop significantly, MBHO inpatient prices decline slightly in each period.

The estimated conditional probabilities of any service use, total service cost per user and their product—estimated total cost per person—are derived using the regression coefficients while holding sample sociodemographic characteristics at their sample means (Table 4). Estimates of the logged total service cost per user are transformed using Duan's smearing technique (Duan 1983). For the estimated user costs and probability of use, the standard errors of the estimates are used to perform *t*-tests of the post-period values for each model to their respective pre-period estimates. These results indicate a pattern of differences across the three service regions. While the FFS area shows slight reductions in all three estimates by the second year after capitation, these estimated changes are not statistically significant. The probability of service use in the DC areas consistently declines over time but cost per user remains virtually constant. Thus, DC's 20 percent reduction in cost per person by the second year is solely attributable to reductions in users, but not in service prices or level of utilization by those who did receive services. Finally, the dramatic changes in estimated cost per person for MBHO areas—more than half in the first year and more than two-thirds in the second—appears to be the result of both significant reductions in users and in the cost per user. These reductions in cost per user are also apparently due primarily to treatment pattern changes as opposed to price reductions.

Subject Self-Report on Service Access and Utilization

Table 5 presents the results of the analyses of change in the measures of subject reported access and utilization collected in the five ''waves'' of the interview process. The four columns for each capitated area present the coefficients indicating change in each measure from the baseline and in comparison to FFS subjects. The first measure indicates whether a subject indicated that they felt they were refused service that they believed they needed or that they had services reduced or discontinued. These coefficients are generally positive, which reflects a higher probability of these conditions being reported. The coefficients are somewhat larger and more likely to be positive for the DC subjects, with statistically significant differences at the fourth six-month

Table 4: Estimated Total Cost per Person[1]

	FFS			*Direct Capitation*			*MBHO*		
Estimate	*Pre*	*Post*(1*st*)$p <$[2]	*Post*(2*nd*)$p <$	*Pre*	*Post*(1*st*)$p <$	*Post*(2*nd*)$p <$	*Pre*	*Post*(1*st*)$p <$	*Post*(2*nd*)$p <$
Total Cost per Person ($)	3595	3840	3254	5053	4318	4072	6417	2964	1942
Total Cost per User[3,4] ($)	3900	4196	3778	5261	4968	5291	6883	3488*	2863**
Total Probability of Use[2]	0.92	0.92	0.86	0.96	0.87**	0.77***	0.93	0.85	0.68***

[1]Other client characteristics held at the total sample mean.
[2]*t*-Test of the predicted postcapitation value compared to its precapitation value; $^{***,**,*}p \leqslant 0.01, 0.05, 0.10$, respectively, two-tailed.
[3]The estimated total cost per user is a transformation of the estimated logarithm of user costs using Duan's (1982) smearing method.
[4]Based on results from Table 3.

Table 5: Access Change through Wave 5 – Model I and II Compared to FFS

Access Variables	Direct Capitation				MBHO			
	W2–W1	W3–W1	W4–W1	W5–W1	W2–W1	W3–W1	W4–W1	W5–W1
Services refused, discontinued, or reduced[a]	0.40	0.68*	0.71	0.95**	0.59	−0.13	0.28	0.35
	(0.39)	(0.37)	(0.44)	(0.42)	(0.37)	(0.38)	(0.45)	(0.44)
Services more often or longer[a]	0.23	−0.15	0.20	0.21	−0.58	−1.01**	−0.09	−0.21
	(0.37)	(0.41)	(0.44)	(0.40)	(0.38)	(0.41)	(0.43)	(0.41)
Receive new services[a]	0.08	0.17	0.34	0.32	0.39	−0.68	0.98**	0.44
	(0.41)	(0.45)	(0.48)	(0.41)	(0.42)	(0.54)	(0.48)	(0.44)
Have prescheduled appointments[a]	−0.50	−0.55	−0.01	0.17	−1.06**	−1.19***	−0.87*	−0.50
	(0.46)	(0.50)	(0.46)	(0.42)	(0.50)	(0.50)	(0.47)	(0.45)
Log waiting days[b]	0.58	0.85	1.11*	0.39	1.00	1.75*	0.15	1.04
	(0.69)	(0.71)	(0.61)	(0.92)	(0.98)	(0.95)	(0.92)	(1.03)
Log waiting time[b]	−0.30	0.07	−0.57	0.09	−1.40**	−0.45	−2.87***	−2.59***
	(0.63)	(0.68)	(0.69)	(0.78)	(0.61)	(0.69)	(0.70)	(0.79)

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.
[a]Logistic regression.
[b]OLS regression.

interview after capitation (Wave 5) and the second six-month interview after capitation (Wave 3). However, these coefficients are not statistically significant for the MBHO subjects. The second measure indicates whether subjects reported that their services were increased in amount or duration. These coefficients tend to be negative for MBHO areas, indicating lower probability of reported service increases, but are only significant for the second post-capitation interview period. The third measure indicates whether subjects reported receiving new services. These coefficients are generally positive, indicating higher probability of new services reported after capitation, but again, are only statistically significant for MBHO areas for the third post-capitation interview period.

The last three measures relate to questions pertaining to specific aspects of the process of obtaining services. The first measure indicates whether subjects reported having pre-scheduled appointments. These coefficients are generally negative, which would indicate lower probability of pre-scheduled appointments after capitation. The coefficients are generally larger and statistically significant for the first three post-capitation periods for MBHO areas. The second measure is the log of the number of days from the time an appointment is made to receipt of services. These measures are generally positive, which would indicate longer times from appointment to service after

capitation. Only one coefficient is significant for each of the models. The last measure is the log of minutes spent in a waiting room waiting for an appointment. These are large and statistically significant for three of the four periods for MBHO areas, suggesting that waiting time decreases significantly for subjects in the MBHO areas following capitation.

Characteristics of Subjects with Reduced Access

Given the reduced probability of service use after capitation among the subjects in the capitated areas, as shown in Table 4, it would be useful to know whether subjects experiencing reduced service use under capitation differ in any way from the other subjects. To assess these differences, we categorized subjects into three groups: continuous users, intermittent users not associated with capitation, and intermittent users associated with capitation. Intermittent users are defined as having at least one time period for which no service use was recorded. Intermittent users associated with capitation are defined as subjects from the capitated areas that use services in the pre-capitation period but not in one or both of the post-periods. The intermittent users not associated with capitation are either FFS subjects or capitated area subjects that did not use services in the pre-capitation period. Overall, one-third of the sample was intermittent users; two-thirds of which had access changes that can be associated with capitation (47 from DC areas and 59 from MBHO areas).

Regression analyses were used to identify differences among these three groups (i.e., sociodemographic, diagnostic, level of functioning, and quality of life) (Cuffel, Bloom, Wallace, et al. 2002). Intermittent users, in comparison with continuous users, were slightly more likely to be male ($p < 0.10$); more likely not to have a diagnosis of schizophrenia or bipolar disorder ($p < 0.01$, respectively); and were more likely to have the ''low cost'' designation based on service use two-years prior to capitation, while less likely to have the ''high cost'' designation ($p < 0.01$, respectively). They were also rated as higher functioning ($p < 0.01$), but were more likely to view their finances as inadequate ($p < 0.01$); were more likely to have been arrested and made court appearances ($p < 0.05$, respectively); and were more likely to be employed ($p < 0.01$).

Subjects with intermittent use that can be associated with capitation were found to differ from other intermittent users. Like the continuous users, they were more likely to have a diagnosis of schizophrenia or bipolar disorder ($p < 0.01$, respectively) and less likely to have a ''low cost'' designation ($p < 0.01$). However, they shared the mental health status and quality of life

characteristics of the intermittent users not associated with capitation noted above. Direct capitation subjects were slightly more likely to have poorer housing ($p < 0.05$), while MBHO subjects were slightly less likely to have regular social contacts ($p < 0.05$) (Cuffel, Bloom, Wallace, et al. 2002).

DISCUSSION

The unique aspects of this study are reflected by the fact that multiple dimensions of costs were reduced under capitation. These include access or probability of service use, intensity of use as measured by the average cost of care, differential changes in the types of care provided, and differences attributable to the characteristics of local service systems under capitation. Because these results are based on following a fixed set of consumers with serious mental illness known to the service system prior to capitation, interpretation of the findings generally and in relation to other studies of capitation must be made clearly and carefully.

The overarching measurement of the effect of capitation in relation to the study subjects is the average cost per person (Table 4). Reductions in the estimated cost per person found for the capitated areas follow from identified changes in probability of service use and average costs of treatment given any service use. These reductions in cost per person range from moderate (20 percent by the second year for the DC areas) to very large (more than 66 percent for the MBHO areas) given ranges of estimated savings found under public and private mental health capitation of 25 percent to 40 percent (Frank, Koyangi, and McGuire 1997). It is important to note, however, that comparison of these study results to other general studies of mental health capitation has several caveats.

First, studies of capitation's effects on cost typically focus on the cost per service user, thus excluding effects of changes in access on population or total member average costs. Second, most study results reflect aggregate results for multiple service sites whereas studies incorporating site specific observations under uniform changes in financing policy have found large variation in effects (Scheffler, Wallace, Hu, et al. 2000). Third, many study results are for one, as opposed to two or more years. Last, reflected are the effects of capitation on a particular consumer sub-population known to the system prior to capitation. Thus, these results cannot be directly extrapolated to overall levels of system cost or access, which will reflect changes for other consumer groups or for consumers newly accessing services.

The differences in effect size for the two types of capitated organizations conforms with the general expectation that the not-for-profit DC areas would respond relatively less to the incentives of capitation than the MBHO areas, where a for-profit firm is involved. These results indicate, as previously suggested, that the 5 percent profit cap on the MBHO areas does not meaningfully constrain their incentive to save money. In addition, in key informant interviews the 5 percent cap was not indicated as a significant issue (if mentioned at all) in terms of MBHO activities. Indeed, if MHASAs are competing as expected against the state's desire to see savings produced for redistribution within the system, then the MBHO areas would need to obtain at least 5 percent more savings than the DC areas to be viewed as equally successful. This 5 percent difference is not sufficient to explain the full variation in DC and MBHO cost changes. Differences in initial conditions between these areas, and differences in services management that may or may not be related to the for-profit involvement in the MBHO MHASAs, also appear to provide likely explanations. Similarly, one cannot assume that the large cost reductions in the MBHO areas were related to lowered quality or effectiveness of care (Cuffel, Bloom, Wallace, et al. 2002).

With regard to cost per service user only, the DC areas show no change due to capitation, while the MBHO areas reduce cost per user by 58 percent by the end of the second year. The reductions in service intensity for MBHO areas distinguish service process change for MBHO areas from DC areas. However, the estimated initial cost per user based on equivalent sample characteristics is much higher for the MBHO than the DC or FFS areas. The higher MBHO initial cost per user reflects much higher initial probability of using expensive state hospital services among MBHO subjects. This raises the total service cost per user for MBHO areas even without identified differences in average costs for those who use state hospital care. For the MBHO areas simply to reduce average user costs to equal the DC areas, or the next highest user cost level, would require a 23 percent reduction. A reasonable interpretation of these facts is that a large portion of the MBHO areas' change in user costs reflects ''low hanging fruit'' in regard to higher relative use of state hospital care and unrelated to MBHO organizational structure. Managed behavioral health organization MHASAs were much more aggressive in reducing census at the state hospital serving their areas than the DC MHASAs were for their respective state hospital.

Reductions in the probability of local inpatient use for the capitated service areas were found, consistent with results in other capitation experiments

(Reed, Hennessy, and Babigian 1992; Reed et al. 1994; Dickey, Normand, Azeni, et al. 1996). The extension of this decrease to the control group makes it difficult to interpret these findings as an effect of capitation. This may, however, signal a ''spillover effect'' from the capitation pilot implementation because statewide implementation has been anticipated, barring failure of the pilot. First year decreases in inpatient user costs identified are also consistent with other states' experience with capitation where most of the savings are accrued during the first year (Reed, Hennessy, and Babigian 1992, Reed et al. 1994). Chief executive officers of the community mental health centers in the capitated sites have claimed that they have been able to negotiate better hospital rates when they use local hospitals. However, evidence of cost reductions by the second year is much weaker and spans all areas. Again, there is a possible spillover effect evidenced by price reductions for the FFS area by the second year after capitation.

The changes in local inpatient cost and use, however, do not apparently have much impact on total service use or costs, because the prevalence of inpatient use is low and many inpatient users are concurrently using outpatient services within the periods measured. They also do not differentiate the DC and MBHO areas. Changes in probability of use and cost of outpatient services are the dominant factors in capitated area changes and in differentiating MBHO and DC effects. The low relative prevalence of inpatient use among this representative sample of consumers with serious mental illness may well reflect a historical trend in managing inpatient use and substituting outpatient services. From this perspective, expectations for gaining future cost savings would shift towards ''fine-tuning'' access to outpatient care.

The analysis of continuous versus intermittent users suggests that consumers for whom intermittent use is related to capitation share characteristics of both continuous users and intermittent users not related to capitation. This suggests that the capitated areas have incurred cost savings for persons with severe mental illness through marginal expansion of the criteria for persons to receive intermittent versus continuous care. Such a change is generally consistent with re-evaluations of the level of cost-effective care. There is some indication of longer waiting times from appointment to service for both areas that could be construed as increased general barriers to access. There is no strong indication of consumers reporting refusal, reduction, or discontinuation of services with the few significant effects for DC consumers. Further analysis indicated that consumers reporting these conditions are much more likely to be receiving services.

Different investment patterns may explain the greater reduction in probability of use and cost for outpatient services in the MBHO area. The DC areas invested in new service development prior to capitation, while MBHO areas waited until savings were evident after the first year of operation. This is reflected in consumers' reports of new service provision only in the MBHO area and after one year of capitation (Wave 3 or later). Delays in new service development may have led to greater decreases in outpatient use for MBHO areas within the context of other treatment protocol changes brought on by capitation.

Consumers reported reductions in pre-scheduled appointments and decreased waiting times at outpatient clinics in the MBHO areas. This may signal a more fundamental, and potentially more efficient or effective, change in access to treatment. A greater focus on immediate, walk-in access, and less reliance on scheduled ''maintenance'' outpatient visits would be consistent with these findings.

The foregoing discussion highlights some general limitations of a natural experimental design as discussed in the methods section. Though we selected service regions that were comparable, and randomly selected participants within each region, we were unable to randomly allocate the regions to capitation or FFS. Therefore, we were unable to avoid initial differences in treatment patterns for like groups of subjects. These initial differences can be plausibly related in some cases to the extent of the intervention effects found. This is a limitation to the extent that one presupposed that the capitation program effects found in this study could be exactly replicated elsewhere regardless of local context. Alternatively, this can be seen as a strength of natural experimental designs, as opposed to true experimental designs that organize out initial differences, because most policies or interventions do interact with their local environment. Creating two distinct treatment groups allows exploration of the policy relevant question: How do local conditions influence policy outcomes?

CONCLUSION

Consistent with expectations for the impact of capitation on cost, and other studies of capitation programs noted above, Colorado's Medicaid mental health capitation project resulted in significant cost reductions for a sample of severely and persistently mentally ill individuals compared to an FFS program. The specific finding that these cost reductions are focused in outpatient

service use, as opposed to inpatient, appears to be unique. Differences in service process change were also found between the two different organizational arrangements for the regional managed care organizations. In DC regions, cost per person was reduced on average by 20 percent through reductions in the probability of inpatient and outpatient service use while apparently maintaining service intensity for those receiving services. In MBHO regions, cost per person was reduced by more than two-thirds through reductions in service use and intensity. Some portion of this relative change reflects differential change in treatment access processes such as prescheduled appointments. Some portion of the difference in post-capitation cost change is due to the initial service mix. While the findings are consistent across the two years of capitation studied, two years may be too short a time to understand the full impact of capitation.

This study directly addresses the important question of whether, and to what extent, capitation financing changes treatment patterns for persons with severe mental illness. As with any study, there are as many important questions raised as there are answered. Cuffel, Bloom, Wallace, et al. (2002) suggest that these savings were achieved without any negative effects on outcome. Planned analysis of system-level change under capitation in Colorado can identify how these specific results relate to broad measures of access, use, and cost, as well as change among different groups of consumers. Future analyses of substitute services outside the mental health capitation coverage, such as psychotropic drugs, may clarify the nature of covered treatment changes and their relationship to consumer outcomes.

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