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Mental Health Costs and Outcomes Under Alternative Capitation Systems in Colorado: Early Results

Joan R. Bloom[1]*, PhD., Teh-wei Hu[1], Ph.D., Neal Wallace[1], M.P.A., Brian Cuffel[2], Ph.D., Jackie Hausman[1], M.P.P., M.P.H. and Richard Scheffler[1], Ph.D.

[1]*University of California, Berkeley, CA, USA*
[2]*United Behavioral Health*

Abstract

Background: This study presents preliminary findings for the first nine months of the State of Colorado USA Medicaid capitation Pilot Project. Two different models of capitation (model I and model II) are compared with fee for service (FFS) in providing services to severely and persistently mentally ill adults. In model I the state's mental health authority contracts with community mental health centers (CMHCs) who both manage the care and deliver mental health services, while in model II the state contracted with a joint venture between a for-profit managed care firm who manage the care with either a single CMHC or an alliance of CMHCs who deliver the mental health services.

Aims: Our objective is to examine utilization, cost and outcomes of inpatient and outpatient (including community based) services before and after the implementation of a capitated payment system for Colorado's Medicaid mental health services compared to services that remained under FFS reimbursement.

Methods: The stratified, random sample includes 513 consumers (188 for model I, 179 for model II, and 146 for FFS). Consumer outcomes were collected by trained interviewers and include 17 measures of symptoms, health status, functioning, quality of life and consumer satisfaction. Utilization and cost of services are from the Medicaid claims data and a shadow billing data system (post-capitation) designed by Colorado. The first step of the two-step regression procedure adjusts for the presence of individuals with use or no service use during the specified time while the second step, ordinary least-squares regression, is applied to the sample who utilized services.

Results: These preliminary findings indicate consistent reductions in inpatient user costs and probability of outpatient use under capitation. Combining all services, there are consistent reductions in the probability of use in both models: model I had significantly higher initial probability of use for any service. Only model II showed a statistically significant decrease in post-capitation overall user costs, but they were initially higher than model I or FFS. Estimated total cost per person for model I suggests virtually no change from the pre- to post-capitation period. Model II had the highest pre-capitation and the lowest post-capitation estimated cost per person. Examination of pre measures of outcomes across capitated areas suggest that samples drawn from the FFS, model I and model II areas were comparable in severity of psychiatric symptoms, functioning, health status and quality of life. No changes were found in outcomes.

Discussion: These early findings are consistent with the limited literature on capitation. Both studies of capitation integrated with medical care and those specific to mental health settings did not find adverse changes in outcomes compared to FFS. *Limitations* include the short follow-up period, lack of detail and possible under-reporting of outpatient services provided by the shadow billing data system.

Conclusions: For the short term, it is concluded that capitation can reduce service cost per person without significant change in clinical status.

Implications for health care provision and use: Implications are unclear until we can determine whether (i) reductions in the numbers receiving service indicates favorable consumer outcomes or reductions in access and (ii) lack of change in consumer outcomes is due to the benefits of capitation or the lack of sensitivity of the outcome measures.

Implications for health care policy formulation: Implications are premature for these early findings.

Implications for future research: Future research should include longer follow-up as well as analysis of long-term consequences for both cost savings and clinical outcomes.

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Mental Health Costs and Outcomes Under Alternative Capitation Systems in Colorado

The use of capitation for financing mental health care is a growing trend in the United States. Capitation is defined as a method of payment where a fixed price is paid for each enrolled client, for a specified time period, for a specific range of services.[1] A variety of potential impacts from the application of capitation payment systems to publicly funded mental health services, both positive and negative, have been proposed.[1–4] On one hand, capitation payment is expected to provide incentives to reduce reliance on institutional and other inpatient care in favor of community-based outpatient care, to increase coordination of episodes

* Correspondence to: Joan R. Bloom, Health Policy and Administration, 409 Earl Warren Hall, University of California, Berkeley, CA 94720-7360, USA
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of mental health care, and to increase emphasis on preventative care. The net result of these effects is expected to reduce, or at least stabilize, costs while at the same time maintaining or increasing the quality of and/or access to mental health care. Alternatively, given potential limitations in the ability or willingness to appropriately measure and monitor quality of care, the strong incentives of capitation to seek cost-efficiencies may result in reductions in service access or quality sufficient to yield decrements in treatment outcomes in comparison to those obtained under prior financing systems. These potentially harmful effects have been anticipated to be most likely to occur among the most severely and persistently mentally ill. This client group has service costs that greatly exceed the average client cost, or the greatest potential for savings per client, and may be less able or likely to have their concerns over changes in treatment protocol heard. These vast differences in expectations for capitation provide the foundation for comparative, outcome-based research on capitation payment systems in public mental health.

Despite the growth of capitation and the uncertainty of its impact, there is little research on the effect of capitation on costs, utilization and outcomes. In Minnesota, 35 percent of all Medicaid recipients, including the severely mentally ill, were randomly assigned to HMOs for physical and mental health coverage. Adverse selection led to the early termination of this capitation demonstration. Consequently, only short-term outcomes (6–11 months) could be assessed. Evaluators found that seriously mentally ill beneficiaries enrolled in the capitated payment plan showed no short-term deleterious effects in treatment outcomes. Differences in the use and expenditures of community-based treatment were not found for those assigned to the capitated payment plan.[5–7] A pilot program in California demonstrated that capitated funding provided service flexibility and shifted services towards rehabilitation, but it did not test the potential for direct cost savings.[8] Results from a two-year study in Rochester, NY, indicate that capitation does result in reduced costs, but the savings decrease over time. Thus, they found a reduction of 14 percent at the end of the first year, but only eight percent in the second year. Reductions came from increased intervals between inpatient care.[9–12] First-year results from the study of a capitation project in Utah also indicate cost savings without concomitant reductions in outcomes in the capitated sites compared to the non-capitated sites. The significant reductions in inpatient expenditures in the capitated sites were concentrated in those receiving Aid to Families with Dependent Children (AFDC).[6]

To date the research on the impact of capitation has found no differences in outcomes in the short term (none of these studies followed a cohort for more than two years). Cost savings are primarily due to reductions in utilization of inpatient services.

Background

This paper reports Colorado's experience during the first nine months following the implementation of the pilot capitation program. In this analysis, the focus is on a cohort of adults with severe and persistent mental illness under the assumption that this group may be especially vulnerable to changes in the financing of mental health services.

The purpose of this preliminary analysis is to examine utilization, cost and outcomes of services before and after the implementation of a capitation payment system for Colorado's Medicaid mental health services, and in comparison to a portion of the Colorado system that remained under fee-for-service (FFS) reimbursement. In this study costs are identified for each service user for three aggregate service types: state hospital, local hospital and outpatient care. Outpatient care is defined as all other non-inpatient services which include individual or group therapy, crisis and evaluative services, case management and day treatment programs, as well as treatment costs for supported residential arrangements. The sum of these costs is the total cost of treatment for each individual.

In May 1992, the Colorado State Legislature passed House Bill 92-1306 requiring the State: to design, implement and evaluate (a) pilot program(s) of a single-entry-point prepaid capitated payment system to test the feasibility and cost-effectiveness of providing comprehensive mental health services to Medicaid recipients. This landmark legislation resulted from concerns on the part of the legislature and Colorado's state mental health authority, Mental Health Services (MHS), to both reduce the escalating costs of services (expenditures for services provided to the Medicaid population increased by 83% between 1990 and 1995) and improve the delivery and outcomes of mental health services. The goals for the Colorado Medicaid Capitation Pilot Program are:

(i) to improve the public mental health system in Colorado by expanding community mental health services, particularly those services that can assist consumers to remain in their communities rather than require services in an inpatient hospital,
(ii) to improve coordination of mental health services with other health care and human services,
(iii) to provide services through a more cost-effective and efficient system and
(iv) to slow the rate of growth in the Medicaid mental health budget.

The Colorado Medicaid Capitation Pilot Program was implemented in selected parts of the state using an RFP (Request for Proposal) mechanism. Colorado's approach to capitation differs from the experience of other states and is one of the purest models of capitation that has been evaluated. First, the capitation rate covers all Medicaid eligible individuals for both inpatient and outpatient services including mental health services for persons in nursing homes. The one exception is expenditures for prescription medications which are not included in the capitation rate. Second, the providing organizations (Mental Health Assessment and Service Agencies or MHASAs) were at full risk from the program's commencement. Third, reinsurance or other measures to protect the MHASA from high-risk

clients is left up to each MHASA. For-profit managed care organizations may take up to five percent profit on the contract. Savings (beyond the 5% cap for the for-profits) from the individual MHASAs are to be used to provide services to non-Medicaid eligible albeit needy adults and children.

In 1992, in collaboration with the Colorado State Mental Health Services and the Association of Community Mental Health Centers and Clinics, we designed and sought funding for a study to examine the outcomes of this natural experiment. In this pilot experiment, there are three geographically based models: (i) the state has capitation contracts with community mental health centers (CMHCs) who both manage the care and purchase or provide services (model I), (ii) the state has capitation contracts with joint ventures between a for-profit managed care firm who manages the care and either a single or alliance of CMHCs who purchase or provide most mental health services (model II) and (iii) the state continues to reimburse CMHCs and other Medicaid providers under an FFS system. The impact of for-profit versus not-for-profit ownership status, in general and under capitation, on service production choices has been a focal issue in human services research. As such, we consider this to be an important dimension to include in our analysis.

Methods

Characteristics of the Setting

The major providers of public mental health services for the seriously mentally ill are 17 CMHCs and five specialty clinics with performance contracts from Colorado's Mental Health Services (MHS). Sixteen of the CMHCs are private non-profit organizations, while one is administered by a county government. The CMHCs in the state are geographically based and 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 through numerous local hospitals. In addition, prior to capitation, several acute treatment centers were opened by CMHCs to provide short-term intensive residential care for clients, and the MHS is interested in the development of additional facilities.

In the geographic regions where the capitation pilot project was implemented, MHS contracts with mental health assessment and service agencies (MHASAs) who provide mental health services directly or through subcontracts with other providers. MHASAs receive a fixed amount, or capitated rate, based on historical usage by Medicaid eligibility categories and geographic location. Total capitated payments are determined by the expected number of Medicaid-eligible clients for each group, paid prospectively on a monthly basis; these amounts are adjusted based on the actual number enrolled each month.

There is considerable variation in the capitation rates across MHASAs for each eligibility category due to historical usage and penetration. For fiscal year 1995–96, the range across MHASAs for Old Age Pension (OAP-A) is $1.31–27.04 per member per month. For Aid to the Needy Disabled, Old Age Pension, Part B, and Aid to the Blind, the range is $23.84–156.54. For Aid to Families with Dependent Children and Baby Care for adults the range is $4.03–24.98, while for children it ranges from $3.96 to 23.22. Foster Care ranges from $181.25 to 668.59 per member per month. Per federal statute total expenditures under the capitated model cannot exceed the amount that would have been paid for the same group of Medicaid clients under an FFS model, and cannot exceed 95 percent of what would have been paid under an FFS model under state regulation.

Capitation contracts were given to seven free-standing MHASAs. In model I the state has contracted with CMHCs, who both manage the care and deliver mental health services, while in model II the state has contracted with a joint venture between a for-profit managed care firm who manage the care and either a single CMHC or an alliance of CMHCs who deliver the mental health services. Four MHASAs follow model I (three are single CMHCs and the fourth is an alliance of three CMHCs). Three MHASAs follow model II. One joint venture is between a free-standing CMHC and a for-profit managed care firm. The other two are joint ventures between alliances of three and four CMHCs, respectively, and the same for-profit managed care firm. Three CMHCs, including the Mental Health Corporation of Denver, are continuing to provide mental health services on an FFS basis.

Study Design

Consumers receiving services under these two models of capitation are compared with each other and with the existing FFS model. Capitated and FFS areas were selected for each group. Geographical areas were matched on percent poverty, degree of rurality based on the 1990 US census, and comparable industrial bases (e.g. a geographical area whose major industry is mining is not compared to one that is primarily ranching).

Sample

Severely and persistently mentally ill adults 18 and over with diagnoses of schizophrenia, bipolar disorder or at least one 24-hour inpatient stay were randomly selected from 1994 Medicaid files and 1995–96 admission rolls from the CMHCs. 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 below the median of $1500 in the prior year and high cost ranged from $1500 to 85 000). Seventy-five percent of the sample were already known to the system (had contact with the system in the year prior to the implementation of capitation), the remainder were new to the system following capitation.

We planned to recruit 256 subjects into each model. 50 per cent of our target were drawn from the 1994 Medicaid files. The remaining 50 percent were drawn from CMHC

rolls, with half (25% of total sample) new to the system following the implementation of capitation. These numbers were based on an expected attrition of 15 percent. We were not able to meet recruitment targets in some of the smaller CMHCs. Our final sample is 683 (71% acceptance rate). Retention of 92 per cent (five deaths) for wave two and 91 percent (four deaths) for wave three has been higher than expected. The sample currently available for analysis includes 188 subjects for model I, 179 for model II and 146 subjects from the FFS areas, a total of 513 subjects.

Measurement

Consumer Outcomes

Consumer outcomes were collected for the study by trained interviewers. At the beginning of the study, the interviewers were trained on the instrument. At the time that the interviewing began in April 1995, inter-rater reliability had been achieved. To maintain reliability, two individuals coded the same in-person interview. These double-coded interviews were conducted for each of the seven interviewers at six-month intervals. For this report, only a sampling of the outcome measures collected are reported. In addition to the measures described below, the Colorado Client Assessment Rating Scale (C-CAR) was also collected. Since it is collected at one year intervals, a second measure was not available for this analysis.

General health is measured by the MOS SF-36.[10] It includes eight subscales, two of which were eliminated from the study after pilot testing demonstrated that the study population had difficulty in responding to scale items. The difficulties that were encountered for both the social role and physical role functioning subscales are consistent with those found by previous researchers.[14] *Physical functioning* is a measure of ten items ranging from limitations in ability to engage in vigorous activities to limitations in activities of daily living. *Bodily pain* is measured by two items which focus on the amount of pain experienced and the extent to which it interfered with normal work. The measure of *general health* combines the responses to five questions including a scale rating health from excellent to poor on a five-point scale and four single items rating aspects of health. *Vitality* (energy/fatigue) is composed of four Likert-scaled items. This scale defines health as the absence of limitation or disability. The data were scored using the RAND method.[13] *Social functioning* was measured by two items from the MOS SF-36 which focus on the intensity and amount of time that one's physical health and emotions interfered with social activities with family and friends. *Mental health* is measured by five items from the MOS SF-36 which focus on the respondent's mood. Consistent with the RAND method of scoring, these measures have a range, with the highest possible score being 100 when no limitations are observed.

Mental health symptoms were measured by the Brief Psychiatric Rating Scale (BPRS).[15] Eighteen symptom constructs are rated on seven-point behaviorally anchored scales during a clinical interview. BPRS scores ranged from '0' to '6' with '0' reflecting no symptoms and '6' reflecting frequent and severely impairing or distressing symptoms in the previous week. The inter-class coefficient, based on 30 inter-rated interviews, is 0.95.

Functional status consists of four different measures: the Global Assessment of Functioning scale (GAF), which provides a global rating of each consumer's functional status on a scale of 1–100,[16] the average of daily activity scores, frequency of family contact and the average frequency of social contact. The inter-class coefficient, based on 30 inter-rated interviews, was 0.83. *Average daily activity* is the mean of (up to) 16 binary choice variables for daily activities with non-missing values. *Frequency of family contact* is a 1–5 scale based on frequency of contact. *Average frequency of social contact* is the mean of (up to) five questions on non-family contact (the scale goes from 1 to 5).

Quality of life[14] measures client functioning and life satisfaction in areas potentially affected by capitation such as housing and homelessness, activities of daily living, social relations, finances, work, education, legal problems and physical health. *Homelessness* is a binary variable indicating whether a subject experienced any incidence of homelessness in the prior six months (1 = homelessness). *Housing* is the mean of appropriate housing facilities/appliances (e.g. toilet, sink, refrigerator etc) with non-missing values. Three measures of *finances* were developed: *income* refers to self-reported current monthly income; *inadequacy of finances* refers to whether the consumer considered their income adequate in any of six areas (food, clothing, social activities etc) during the prior six months (1 = not ever adequate) and a second measure of *adequacy of finances* is the mean of the 0–2 scale for adequacy (no, sometimes, yes) for the six areas.

Consumer satisfaction is measured using Colorado's Consumer Satisfaction Survey which contains nine items. These items concern the consumer's opinion about the services received from one's primary mental health provider in the past six months. For this analysis the items have been combined and averaged.

Utilization of Services

In the current analysis, we consider utilization for inpatient and outpatient services and total utilization of services. State and general hospitals are combined as inpatient services, and outpatient services are also aggregated. In the future, we will break down utilization in terms of units of service provided to consumers in terms of inpatient services, residential services, crisis services, outpatient services, individual therapy, group therapy, case management and vocational rehabilitation.

Cost of services

Direct treatment costs of services are calculated based on the Medicaid claims data for costs of general hospital services and outpatient services for all three areas of Colorado prior to capitation and in the FFS areas following capitation. State hospital utilization data for all areas originate from separate files supplied by the Colorado Mental Health Services. Following capitation, non-state hospital cost data

for the capitated areas are from the shadow billing data system developed for the managed care program. At this time, there is no information available on the reliability of the shadow billing data (the systems were in the process of being developed during the state's audit so they were not assessed). However, it is generally believed that some under-reporting of service provision by the MHASAs may have occurred. The shadow billing claims for FY97 will be audited with close examination of medical records.

Analytic Approach

Because different treatment modalities for the severely mentally ill may have different outcomes and costs, each treatment is examined separately. Conceptually, cost is defined as the value of resources used to serve the severely and persistently mentally ill under different modalities. The value of these services can be either directly incurred by the treatment program or financed by other public or private sector agencies, the sum of these costs is the total cost to society.

Most costs can be measured in terms of the actual or market value of services, while other costs, such as informal care, home care and psychosocial stress, cannot be easily measured in dollar values. Optimally, two types of cost can be estimated: direct costs and indirect costs. Based on the results of two recent studies of mentally ill adults, which indicated that only two percent of the total costs were indirect, we have chosen to estimate direct treatment costs only.[17,18] Additionally, since the capitation program, and thus the available claims data, cover only Medicaid reimbursable services, direct treatment costs are limited to these service types.

In this analysis, the nine months prior to capitation (October 1994–June 1995) are compared to a nine-month period post-capitation (October 1995–June 1996). The three-month period between July 1995 and September 1995, considered the implementation period, was left out. Ultimately, our cohort will be followed up to two years prior to capitation and for two years following capitation for both service utilization and costs and from six months prior to capitation to two years post-capitation on outcomes.

To compare mental health costs under three alternative payment systems (i.e. two different capitation systems and one FFS system), a general regression model for individual clients in the study is specified as follows:

$$\text{costs}_{it} = f(\text{c}_1,\ c_2,\ t,\ s_i,\ c_1t,\ c_2t,\ u_{it})$$

where costs are measured as total treatment costs, inpatient costs and outpatient costs in the pre- and post-capitation periods; c_1 and c_2 are dummy variables for capitation model I and model II respectively (FFS counties are the comparison group); t is a dummy variable for the post-capitation period; s_i is a vector of socio-demographic and diagnostic condition variables; c_1t and c_2t are interactions of the capitation model and post-capitation period and u_{it} is an error term. The estimated coefficients of c_1t and c_2t will provide the magnitude of possible cost differences between each capitated model and the FFS model (control) after the implementation of capitation.

The general regression model described above must be adjusted for the presence of individuals with no service costs in a given period. A two-step regression procedure is applied. In the first step, the dependent variable for each service category is transformed to a binary variable with unit value if any utilization (and thus costs) are indicated in a period. Such binary dependent variables are developed for each of the three service categories: total, inpatient and outpatient. Due to the small sample size for state hospital users by area state hospital and local inpatient services are combined in this preliminary analysis. This limited dependent variable model is estimated using logistic regression. The estimated coefficients of variables c_1t and c_2t then indicate the relative probabilities of service use after capitation among the alternative payment systems.

In the second step, observations (individual i in period t) are dropped if there are no costs. Ordinary least-squares regression is then applied to this observation set with the dependent variable equal to the logarithm of service costs for each service category. The logarithmic transformation of the dependent variable adjusts for the typical positive skewness of service cost distributions. The estimated coefficients of c_1t and c_2t then provide the magnitude of cost differences among the capitation models in relation to the FFS area after capitation, if any services were used. In considering the full effects of capitation, both the probability of service use and relative costs of users need to be considered. Conditional probabilities of any service use and total service cost per user are estimated from the regression model results and used to calculate estimated total service cost per person as reported below.

A related general regression model is applied to investigate changes in outcome measures that have multiple ranked categorical or continuously scaled responses. This model uses the pre–post change in outcomes as the dependent variable, as follows:

$$\Delta\text{outcome}_i = f(\text{outcome}_{i,t-1},\ c_1,\ c_2,\ s,\ u_i)$$

$\Delta\text{outcome}_i$ reflects outcome measures for the change between the post and pre-capitation periods, respectively. The pre-capitation period outcome measure for each individual is applied as an independent variable to control for regression to the mean over time. This model is applied to most outcomes using ordinary least-squares regression with the estimated coefficients of c_1 and c_2 representing the magnitude of outcome change across the alternative models.

Results

Characteristics of the Sample

The socio-demographic characteristics of the sample are found in **Table 1**. A majority of the sample described themselves as White or Caucasian; 4.3–13.7 percent as Black or African American; 8.5–16.2 percent as Hispanic; 0–2.1 percent Asian/Pacific Islander; 3.2–4.5 percent Native

Table 1. Socio-demographic characteristics of sample for each group

Characteristic	FFS % ($N = 146$)	Model I % ($N = 188$)	Model II % ($N = 179$)	X^2 df p <
Gender				
male	46.6	47.9	48.0	0.08
female	53.4	52.1	52.0	2
				0.96
Ethnicity				
White	57.5	74.5	68.7	25.19
Black	13.7	4.3	6.1	10
Hispanic	13.7	8.5	16.2	0.005
Asian/Pacific	2.1	1.1	0.0	
Native American	4.1	3.2	4.5	
other	8.9	8.5	4.5	
Age				
18–35	37.3	41.9	32.2	13.25
36–50	44.8	35.8	38.6	6
51–65	9.7	18.4	19.9	0.039
65+	8.2	3.9	9.4	
Diagnosis				
schizophrenic	75.7	64.7	68.5	3.72
bipolar	24.3	35.3	31.5	2
				0.156
High-cost client	34.2	30.9	33.0	3.95
				4
				0.41

American. Approximately 75 percent of the sample were between 18 and 50 years of age (range of 70.8–82.1 percent). Approximately six percent of the sample were 65 or older (range was 3.9–9.4). According to the Medicaid claims data and shadow claims (source of diagnosis), the majority of the sample were diagnosed as having schizophrenia (64.7–75.7%). Bipolar disorder represented 24.5–35.3 percent of the sample. We expected and found that almost one-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. Chi-square tests on the distributions across the three service areas indicate that the ethnicity and age distributions are significantly different ($p = 0.05$ and 0.04, respectively).

Service Costs

Table 2 presents descriptive statistics on the cost data by service region and service type for the pre- and post-capitation periods. Total costs per person vary across regions. Prior to capitation average total costs per person for the two capitation regions and the FFS region ranged from $4086 to 7253, and from $3581 to 5475 after implementation of capitation. These apparent differences and changes across models in average per person costs could be due to three factors: (i) changes in the number of users within the group, (ii) changes in the amount of use and (iii) changes in the types of service used. Alternatively, they may be artifacts of individual sample subject or general sample variation in these periods. To correctly identify these three effects when comparing the different programs, the two-step regression technique described above is used. Given the small number of state hospital stays and the moderate sample size, state hospital and other inpatient costs and use are pooled into a 'total inpatient' category for the purposes of the regression analysis.

Table 3 presents results of the two-part model for (total) inpatient, outpatient and total service costs and utilization. For the logistic regressions on probability of use (column one), the exponentiated logistic coefficient estimates or odds ratios are reported along with their respective 95 percent confidence intervals. The odds ratios indicate the relative impact of the effect of each independent variable on the probability of use. Odds ratios greater than one indicate a positive effect, while those less than one indicate a negative effect. For the OLS regression on user costs (column two), the typical unstandardized coefficient estimates are reported along with their respective 95 per cent confidence limits.

The two-part analysis of (total) inpatient cost and use in **Table 3** indicates that model I had a statistically significant lower probability of inpatient use ($p = 0.06$) than the other two areas prior to capitation. After capitation, these differences are no longer apparent. Since neither the secular trend (coefficient of the 'post' variable) nor the post-capitation probabilities (coefficients of the model interaction variables) is statistically significant, one would conclude that pre-capitation probability of use profiles are unchanged after capitation. Given the large and negative coefficient of the 'post' variable (–0.55, $p = 0.12$), the consistent reduction

Table 2. Pre- and post-capitation costs per person

Region	Service type	Sample *N*	Pre-capitation ($)			Post-capitation ($)		
			Mean	Std dev	Median	Mean	Std dev	Median
FFS	Total inpatient	146	3373	12 171	0	2319	10 929	0
	Outpatient	146	2048	4 304	709	2135	4342	1014
	Total service	146	5421	13 982	1034	4454	12 543	834
Model I	Total inpatient	188	1146	5400	0	711	7110	0
	Outpatient	188	2940	6387	1154	4086	8263	1362
	Total service	188	4086	8542	1269	4797	11 275	1405
Model II	Total inpatient	179	4869	14 549	0	1416	6087	0
	Outpatient	179	2385	3851	967	2164	4797	655
	Total service	179	7253	14 851	1394	3581	8000	734

in inpatient users in the sample data and their small proportion within the total sample, it would appear likely that all areas had reduced probabilities of inpatient use after capitation. However, this initial two-period analysis may not have the power to detect this change at commonly accepted levels of statistical significance. On the cost side, the inpatient user costs are lower and stastistically significant for model I ($p = 0.06$) and model II ($p = 0.04$) in comparison to FFS after capitation. No statistically significant differences in initial conditions nor a secular trend are apparent.

The second part of **Table 3** refers to the analyses of outpatient cost and use. Statistically significant reductions in the probability of outpatient use for models I and II are apparent post-capitation ($p = 0.05$ and 0.03, respectively). While the probability of outpatient use decreases in the post-capitation period for both model I and model II in comparison to the FFS area, model I has a statistically significant higher initial probability of outpatient use ($p = 0.01$). Among the outpatient users, there are statistically significant differences among the average user costs for the three programs initially. Pre-capitation outpatient costs for model I and model II are higher than the FFS area ($p = 0.005$ and 0.08, respectively), although higher for model I than model II. There are no statistically significant differences among the model cost profiles after capitation.

The total cost and use analyses are presented in the third part of **Table 3**. There are significant differences and lower odds of using any mental health services among model I and model II consumers during the post-capitation period as compared to FFS patients ($p = 0.06$ and 0.04, respectively). However, pre-capitation probability of use for model I is higher ($p = 0.01$) than either FFS or model II subjects. Among these users (consumers incurring any costs) there are no significant differences for model I following capitation. Initial toal user costs are higher than FFS ($p = 0.015$) for model II, but lower ($p = 0.10$) following capitation in comparison to the other two models.

These preliminary findings indicate that for this sample of severely mentally ill individuals there are consistent reductions in inpatient user costs and probability of outpatient use under capitation in the short term. Combining all services, there are also consistent reductions in the probability of use after capitation. Notably, while reductions in probability of use occur consistently in both models after capitation, model I had significantly higher initial probability of use for any service. Post-capitation differences also are noted. Only model II showed a statistically significant decrease in post-capitation overall user costs, although they were also higher than either model I or FFS initially.

Table 4 presents the estimated conditional probabilities of any service use, total service cost per user and the product—estimated total cost per person. The estimates are derived using the regression coefficients while holding sample socio-demographic characteristics at their sample means. Estimates of the logged total service cost per user are transformed using Duan's smearing technique.[19] Estimated total cost per person for model I suggests virtually no change from the pre- to post-capitation period, but a possible slight decline relative to the FFS (which increases slightly). Model II had the highest pre-capitation and the lowest post-capitation estimated cost per person. While the pre–post changes in estimated costs per person are consistent with the results of the two-part analyses of cost and use, they should be viewed in light of the modest proportion of variance explained by the total-cost model.

Outcomes

Examination of pre-measures of outcomes across capitated areas suggest that samples drawn from the FFS, model I and model II areas were comparable in severity of psychiatric symptoms, functioning, quality of life and health status. Pre–post changes for each outcome measure were examined individually using ordinary least-squares regression. Models included socio-demographic factors (age, gender and ethnicity), whether they were 'high cost' or 'low cost' prior to capitation, and their utilization pattern (no utilization in the nine months pre-capitation, no service utilization in the

Table 3. Two-part model analysis of inpatient and outpatient costs and total service costs

	Use (Logit)			Cost (OLS)		
	Odds ratio	95% CI		Estimated coefficient	95% CI	
		Upper	Lower		Upper	Lower
Inpatient costs						
Post	0.57	1.16	0.29	–0.01	0.76	–0.77
Model I	0.53*	1.03	0.27	–0.43	0.31	–1.17
Model II	1.22	2.18	0.68	0.09	0.74	–0.55
Model I—post	0.82	2.43	0.28	–1.19*	0.02	–2.41
Model II—post	0.96	2.38	0.38	–1.04**	–0.04	–2.04
Age	0.96	2.38	0.38	–0.04	0.04	–0.12
Age^2	1.00	1.00	1.00	0.05×10^{-2}	0.14×10^{-2}	0.04×10^{-2}
Male	1.25	1.86	0.84	0.14	0.57	–0.30
Non-White	1.07	1.62	0.71	0.04	0.50	–0.41
High cost	0.74	1.14	0.47	–0.10	0.40	–0.61
Low cost	0.34***	0.60	0.19	–0.24	0.40	–0.87
Intercept	—	—	—	10.21***	11.96	8.46
χ^2	42.93***					
Reg. F				2.73***		
Adj. R^2				0.14		
Outpatient costs						
Post	1.42	2.64	0.76	0.20	0.53	–0.13
Model I	2.24***	4.21	1.19	0.45***	0.76	0.14
Model II	1.36	2.46	0.76	0.28	0.60	–0.03
Model I—post	0.42**	1.00	0.17	0.03×10^{-1}	0.44	–0.44
Model II—post	0.39**	0.89	0.17	–0.23	0.22	–0.67
Age	1.06	1.12	0.99	–0.03	0.01	–0.06
Age^2	1.00	1.00	1.00	0.02×10^{-2}	0.06×10^{-2}	0.02×10^{-2}
Male	1.26	1.78	0.89	0.02	0.21	–0.16
Non-White	1.19	1.74	0.82	0.03×10^{-1}	0.19	–0.19
High cost	3.13***	5.08	1.93	1.03***	1.24	0.81
Low cost	0.88	1.31	0.59	–0.29**	–0.05	–0.52
Intercept	—	—	—	7.22***	8.05	6.39
χ^2	50.90***					
Reg. F				16.01***		
Adj. R^2				0.16		
Total service costs						
Post	1.36	2.54	0.72	0.01	0.40	–0.37
Model I	2.30**	4.39	1.20	0.20	0.56	–0.17
Model II	1.47	2.71	0.80	0.46***	0.83	0.09
Model I—post	0.43*	1.04	0.18	0.04	0.55	–0.47
Model II—post	0.42**	0.97	0.18	–0.44*	0.08	–0.96
Age	1.05	1.12	0.98	–0.04*	0.01	–0.08
Age^2	1.00	1.00	1.00	0.00	0.00	0.00
Male	1.48**	2.12	1.04	0.11	0.33	–0.10
Non-White	1.25	1.84	0.85	0.02	0.24	–0.20
High cost	3.29***	5.52	1.97	0.75***	1.01	0.50
Low cost	0.78	1.17	0.52	–0.58***	–0.30	–0.85
Intercept	—	—	—	7.95***	8.91	6.99
χ^2	52.20***					
Reg. F				10.65***		
Adj. R^2				0.11		

Note: Deleted categories are female, White, other cost, preperiod, and FFS.
***, **, *, statistically significant at $p < 0.01, 0.05, 0.10$.

Table 4. Estimated total cost per person

Estimate	FFS		Model I		Model II	
	Pre	Post	Pre	Post	Pre	Post
Total cost per person ($)	3825	4065	5164	5121	6410	3816
Total cost per user[1] ($)	4641	4705	5643	5942	7340	4790
Total probability of use	0.82	0.86	0.92	0.86	0.87	0.80

[1] The estimated total cost per user is a retransformation of the estimated logarithm of user costs using Duan's[19] smearing estimate method.

nine months post-capitation and no history of service use during the observation period). **Table 5** presents the regression coefficients of the model I and model II main effects variables for each of the 18 individual outcome measure change scores analyzed.

Given the number of individual measures analyzed, the potential for chance results exists. We apply an experimentwise alpha level of five percent to assess whether any implied outcome changes can be identified as non-chance results. The Dunn–Bonferoni correction applied to the five percent experimentwise alpha for 18 measures would require that at least one outcome change be statistically significant at greater than the 0.3 percent level. None of the individual main effect coefficients meet this criterion. Given the statistical criteria applied and the short time frame of these early results, we conclude that no change in clinical outcome during this period is the best overall conclusion.

As noted in **Table 2**, a greater number of consumers in models I and II did not receive services in the post period than in the FFS areas. Individuals who did not receive services in the post period had higher average adequacy of income ($p < 0.05$), but reduced average of daily activities ($p < 0.05$). Again, these individual results do not clearly indicate differences in outcomes for this sub-group.

Discussion

Despite the rapid growth of capitation and initial concerns about alternative payment mechanisms for Medicaid populations, few empirical data are available to evaluate the impact that these state reforms have had on severely mentally ill persons who rely on the Medicaid system for their mental health care. The Colorado Pilot Program provides important data on the effects of such state reforms on a wide range of clinical and economic outcomes. Findings contained in this report are preliminary and based on nine-month economic indicators and selected six-month outcome indicators, and apply specifically to severely mentally ill individuals. Nevertheless, the overall pattern of results in this study suggest that capitation results in short-term cost reductions

Table 5. Pre–post changes in outcomes for model I and model II compared to FFS controlling for socio-demographic characteristics

Outcomes	Model I		Model II	
	Coefficient	S.E.	Coefficient	S.E.
Health status				
Physical functioning	1.35	2.12	1.53	2.12
Bodily pain	–0.79	1.95	–3.32	1.95
General health	1.88	2.01	2.84	2.01
Social functioning	–1.01	2.76	–0.28	2.76
Mental health	–2.24	2.02	0.06	2.02
Vitality	–1.11	2.15	–0.69	2.14
Functional status				
GAF score	0.43	1.23	3.05	1.22
Family contact	–0.22	0.12	–0.15	0.12
Daily activity	-0.21×10^{-1}	0.14×10^{-1}	-0.43×10^{-1}	0.14×10^{-1}
Social contact	0.08	0.08	–0.06	0.08
Mean BPRS	0.02	0.05	–0.06	0.05
Quality of life				
Ever homeless	0.04×10^{-1}	0.02	–0.02	0.02
Housing adequacy	0.01	0.01	0.02	0.01
Finances				
Self-reported income	–16.26	55.29	30.72	55.44
Income inadequacy	–0.02	0.05	0.03	0.05
Average adequacy	0.02	0.05	–0.03	0.05
Average satisfaction	0.02	0.06	–0.06	0.06

without substantial and clear evidence of deterioration in short-term treatment outcomes.

Four findings are of interest. First, we found decreases in inpatient costs. Second, there is a reduction in the number of users post-capitation in both models I and II. Third, preliminary analyses indicate that model II has achieved more savings than model I, in comparison to the FFS control area. Fourth, little change in outcomes was found between the two capitated models and the comparison group.

First, compared to FFS, there is a decrease in inpatient user costs (**Table 2**). This is consistent with other states' experience with capitation. In these studies, most of the savings are accrued during the first year.[5,10] Future analysis will indicate whether Colorado's experience will reflect these trends.

Following capitation, there is a decline in the rate of service use among the severely mentally ill during the first nine months post-capitation in both models I and II. Significantly fewer sample individuals received services in both capitated models than in the FFS comparison (**Table 2**). There are at least two plausible explanations for this second finding. Consistent with incentives due to capitation, service provision may be adjusted to better reflect true need. Alternatively, barriers to access to MHASA services by the severely mentally ill may have increased, the consumers may have lost their Medicaid eligibility or it is also plausible that these consumers are receiving services in other systems, e.g. the criminal justice system. As noted previously, consumers not receiving services in the post-capitation period were measurably different from those served on only two of 18 outcome measures. These results do not identify the reasons for lack of service in this period. There is, however, no clear evidence that these consumers are any worse off for not having received services in the post-capitation observation period.

It is worth noting that the reductions in service use for this sample of the severely mentally ill is not necessarily inconsistent with the increased access goals of capitation. Indeed, to increase overall access, i.e. the proportion of covered individuals who receive services, under capitation, reductions in average user costs must be found. These may result from reduced unit of service costs, substitution to lower cost treatment modalities and/or reductions in the intensity or duration of services in general. A critical research question, addressed directly by this study, is whether and to what extent such changes are apparent under capitation and whether they have an impact on treatment outcomes. We do not address the question of whether overall access increases given the use and cost reductions found for the severely mentally ill.

Third, the apparently higher savings level for model II may either relate to different management and treatment strategies in the two models or may reflect similar incentives of capitation (and/or management styles) applied to different initial conditions. The latter explanation appears to fit the data here best. Interviews with the CMHC administrators and treatment staff do not indicate significant variation in the application of typical 'managed care' procedures or policies. None of the systems have purchased reinsurance. Services management has generally focused on concurrent utilization review, as opposed to pre-authorization. Pre-capitation differences in the service provision choices are apparent between the not-for-profit (model I) and for-profit joint venture (model II) service areas. Initially, model I shows lower inpatient use and higher outpatient use than either model II or the FFS area. Thus, the common reductions among models I and II in inpatient user costs and outpatient use would have larger effects on model II costs since they reduce inpatient costs on a larger base of inpatient users and reduce outpatient use from a lower initial use level.

The finding of 'no change' in the short-term outcomes following capitation in models I and II, compared to the FFS sites, is consistent with the three other studies of capitation that considered outcomes. The first is the Minnesota experience in evaluating a 'carve-in' program that considered outcomes for mentally ill beneficiaries receiving their mental health care in Health Maintenance Organizations. However, disabled participants were discharged from the demonstration project after a year because the largest capitated plan withdrew from the project due to adverse selection. Consequently, only short-term outcomes (6–11 months) could be assessed. Evaluators found that seriously mentally ill beneficiaries enrolled in the capitated payment plan showed no short-term deleterious effects in treatment outcomes.[7]

A five-year evaluation of the project in Rochester, NY, is currently under way. The evaluation is an experimental design that will examine the effect of capitation on client outcomes and cost as measured by the following variables: (i) number of days in the hospital; (ii) psychiatric symptomatology; (iii) level of functioning; (iv) financial and emotional burden to client's family; (v) life satisfaction and (vi) costs.[9,11] Results after two years indicate that clinical outcomes did not differ significantly between experimental and control groups, while services provided to the experimental group were less costly than those provided to the control group, which resulted from reduced hospitalization.[11] An evaluation of the capitation project in Utah is also in progress: preliminary findings indicate cost reductions without poorer outcomes.[5] Taken together these studies suggest that it may be too early to detect changes in outcomes.

The current analysis includes consumers who are receiving mental health services as well as those that are not. Analyses indicate that consumers not receiving services were neither clearly better nor worse off in terms of outcomes than those who did receive services. Thus the findings to date can be construed as a positive outcome, i.e. the capitation program 'did no harm'. While the findings from these early data are consistent with other studies of similar duration, analysis of the complete study data through the second year of capitation can provide more definitive assessment of the impact of mental health capitation in Colorado.

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