The Effect of Capitated Financing on Mental Health Services for Children and Youth: The Colorado Experience

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A B S T R A C T

Objectives. This study tested 2 propositions concerning the effect of capitated financing on mental health services for Medicaid-eligible children and youth in Colorado. The first is that capitation reduces costs. The second is that shifting providers from fee-for-service to capitated financing will increase their efforts to prevent illness.

Methods. Interrupted time-series designs were applied to a naturally occurring quasi experiment occasioned by the state of Colorado's reorganization of mental health services financing.

Results. The cost of services was significantly lower in counties with capitated services compared with counties with fee-for-service financing. Findings also suggested that economic incentives may lead to greater efforts at secondary and tertiary prevention.

Conclusions. Policymakers and the public can expect that capitation will reduce the costs of children's mental health services below those likely with fee-for-service financing. Capitation per se, however, may not increase prevention as surely or swiftly as it lowers costs. (*Am J Public Health.* 2000;90:1861–1865)

The financing of mental health services in the United States is changing dramatically. Insurance companies and governments are increasingly adopting "capitated" financing that pays service providers a fixed amount per year for care of each eligible person.[1] Providers receive this fixed amount regardless of how much treatment a patient receives. Approximately 100 million Americans, including children, now receive mental health services under capitated arrangements.[1] Most states use capitated financing for mental health services under Medicaid.[2]

The principal motivation of insurers and governments in adopting capitation has been to control costs. The argument that capitation controls cost, described at length elsewhere,[3] assumes that paying "usual and customary" fees (i.e., fee-for-service financing) encourages providers to increase income by dispensing expensive treatments when less expensive alternatives would be as effective. Capitation supposedly changes incentives because providing the least, rather than the most, costly treatment maximizes income.

Proponents have argued that capitation also motivates mental health professionals to pursue secondary and tertiary prevention (i.e., to detect early manifestations of illness in their patients and to avert the onset of more serious illness). Providers are motivated because of the potential to increase their income under capitation when patients are less, rather than more, ill.

The argument that capitation encourages secondary and tertiary prevention has public health implications. The most obvious is that the community, as well as the provider and patient, benefits from reduced incidence of acute and chronic mental illness. The incentives under capitation could lead to early discovery and treatment of problems in children whose behavior hinders their integration into school and other institutional settings. These problems, if allowed to persist beyond early childhood, are expensive to treat and can lead to low socioeconomic status and the illnesses for which it is a risk factor.[4–6]

At least 4 indicators can suggest that providers of mental health services to children are detecting and treating incipient illness. The first, and most intuitive, indicator is that the number of children in outpatient treatment should increase.

The second indicator is that the number of very young children in treatment should increase. Several disorders that affect school performance can be detected and treated among children younger than 5 years. Capitation presumably encourages providers to seek and treat these disorders early, so that later, less tractable problems that are more expensive to treat are averted. Also, an increase in the number of very young children in treatment is important because it may measure the degree to which capitation affects the mission and culture of provider organizations. Treating children younger than 5 years requires the clinician to work with family or other caregivers.

The third indicator is that the number of children who receive treatment for disruptive behavior should increase. We define disruptive behavior to include the diagnostic categories with codes of 312 and 313 in the American Psychiatric Association's classification system (i.e., *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*).[7] The economic incentives of capitation should motivate providers to detect and treat disruptive behavior in children and youth, because doing so should reduce the likelihood of continued and more serious episodes.

The fourth indicator is that the incidence of psychiatric emergencies among children

and youth should decrease. The incidence of such emergencies is often cited as an indicator of the efficacy of the mental health system.[8] Emergency treatment is, moreover, very expensive. Capitation supposedly provides economic incentives to discover and treat incipient illness before the individual requires treatment for that illness in emergency settings.

Researchers have investigated capitated mental health programs in several states.[9–20] These studies typically report that capitation reduces the use of inpatient treatment and increases the use of outpatient treatment. None of these studies tested hypotheses concerning increased efforts to detect illness.

Fewer studies have been done on the effects of capitation on mental health services for children and youth. We know of 7 studies.[11,21–27] None examined early detection or treatment. Four directly or indirectly measured changing costs. Christianson and colleagues[11] reported that a Utah program reduced inpatient treatment costs during its first year, largely by reducing inpatient admissions. Significant changes in outpatient costs were not evident.

Burns et al.[21] estimated the effect of capitation on the shift from inpatient to outpatient expenditures in North Carolina. They reported that over a 5-year period, Medicaid capitation significantly shifted inpatient to outpatient expenditures, with more youth served statewide at a lower per-user cost.

Burns and colleagues[22] also studied an initiative that contracted mental health services for military personnel and their dependents to a single provider for a lump sum. Forty-four percent of the plan's beneficiaries were children. Outpatient treatment of children increased significantly, and inpatient admissions declined dramatically. The study showed savings of about 31% below expected costs, mostly from reduced inpatient care.

Norton and colleagues[24] used patient records to test the hypothesis that Medicaid capitation caused providers to shift mental health patients into medical services that were not capitated. They found no evidence of such shifting for patients younger than 18 years, although evidence showed that adults who were disabled owing to severe mental illness were shifted.

The existing literature suggests that capitation reduces the overall cost of children's mental health services by reducing the number of patients in inpatient treatment. The evidence is contradictory on how use of outpatient treatment is affected. The literature does not address whether capitation induces early detection and treatment.

The Colorado Capitation Demonstration Project

Concerned by rising costs in its Medicaid program, the Colorado legislature passed House Bill 92-1306 in 1992. The legislation required the state mental health authority to design and evaluate demonstration projects in which services would be financed on a prepaid, capitated basis.

Before the demonstration project, Colorado's public mental health system consisted of 17 community mental health centers, 4 specialty clinics, and 2 state hospitals. To participate in the demonstration project, 14 community mental health centers reorganized themselves into 7 new entities called mental health assessment and service agencies. Four of these newly formed agencies continued to operate independently on a not-for-profit basis. Three entered a joint venture with a for-profit corporation that provided administrative and inpatient services. The 3 remaining community mental health centers were not part of the demonstration project and continued to operate on a fee-for-service basis.

Both groups of capitated mental health assessment and service agencies were required to provide, either directly or through subcontract, an array of services and to coordinate efforts with school districts and human services agencies, including those concerned with child welfare and juvenile justice. The Mental Health Authority recommended, but did not require, that the capitated agencies provide children's services, including respite care, family preservation, and interventions targeting infants.

The not-for-profit mental health assessment and service agencies began operating on August 1, 1995. The for-profit agencies started on September 1, 1995.

Mental health assessment and service agencies were initially paid a capitated rate based on historical patterns of utilization in the regions they served. The payment was made prospectively each month, with subsequent adjustment to correct to actual enrollment. Mental health assessment and service agencies are at full financial risk. They do not pay, however, for psychotropic medication or for mental health care provided in residential child care facilities.

The not-for-profit agencies were allowed to accumulate saved resources. These resources could be used to enhance programs for any patients, including those not covered by the capitation contracts (i.e., other than Medicaid patients). The for-profit firms were allowed to disperse their savings however they chose, but savings could not exceed 5% of the contract value. Savings beyond 5% had to be used to enhance patient services.

Surveys of the community mental health centers were conducted before and after the start of capitation to gauge staff perception of changes in preventive and early intervention program services offered to children.[28,29] Nearly all of the agencies reported starting specialized early intervention services that focused on school-aged youth. Four of the capitated agencies reported developing early detection policies.

All of the capitated agencies reported that they provided extended services, including family support, respite care, mentoring, and home-based care. The most commonly cited attributes of these services included parental involvement in treatment planning, race/ethnicity-specific interventions, treatment outcomes tracking, extension of case management beyond the end of treatment, and maintaining the same clinicians and case managers throughout treatment.

We used the Colorado experience to test 8 hypotheses implied by the above discussion.

1. The total cost of treating persons younger than 18 years decreases after capitation.

2. The total cost of inpatient treatment decreases after capitation.

3. The total cost of outpatient treatment increases after capitation.

4. The number of persons younger than 18 years in inpatient treatment declines after capitation.

5. The number of persons younger than 18 years in outpatient treatment increases after capitation.

6. The number of persons younger than 5 years in treatment increases after capitation.

7. The number of disruptive children in treatment increases after capitation.

8. The number of persons younger than 18 years treated in emergency rooms decreases after capitation.

The hypotheses were tested separately in the for-profit and not-for-profit areas. The fee-for-service area was used, as described below, as a comparison population.

Methods

Data

Medicaid fee-for-service claims were used for the precapitation period in the capitated areas and for the entire test period in the fee-for-service area. In the postcapitation period, the capitated agencies reported units of services and expenditures via a "shadow billing" system to the Department of Health and Human Services Mental Health Services agency. These records included age, diagnosis, provider, service type, and costs for all services provided to patients younger than 18 years.

TABLE 1—Weekly Means and SDs (in Parentheses) for Analyzed Variables: Colorado, October 1994–June 1997

| | Fee-for-Service Areas | | Capitated Areas | | | |
| | | | Not-for-Profit | | For-Profit | |
	Weeks 1–45	Weeks 46–143	Weeks 1–43	Weeks 44–143	Weeks 1–47	Weeks 48–143
Total costs, $	430 397 (42 005)	513 084 (37 694)	507 796 (63 527)	534 800 (118 746)	421 705 (46 593)	441 341 (75 813)
Inpatient costs, $	162 641 (35 772)	154 502 (30 489)	186 834 (26 920)	51 717 (39 902)	216 166 (41 318)	111 238 (63 010)
Outpatient costs, $	267 756 (23 462)	358 851 (35 661)	320 962 (51 764)	483 083 (113 573)	205 539 (21 130)	330 102 (58 853)
Inpatients	70 (13)	68 (10)	77 (11)	13 (7)	96 (16)	45 (14)
Outpatients	963 (87)	986 (87)	1 465 (182)	1 140 (198)	1 196 (151)	1 299 (183)
Children <5 y	111 (13)	81 (13)	198 (32)	155 (26)	94 (15)	100 (16)
Disruptive behavior	260 (23)	245 (26)	430 (59)	327 (52)	287 (58)	318 (60)
Emergencies	2.6 (1.9)	1.9 (1.3)	4.8 (2.9)	4.5 (2.1)	7.9 (2.9)	7.6 (2.8)

Intuition might suggest that shadow billing underestimates costs because of the lack of incentive to keep records that do not affect payment. Shadow billing, however, was used by the state of Colorado to adjust capitation rates. The state studied the shadow billing system and found that it was accurate.

Our hypotheses specify total, rather than per-patient, cost of services. This specification flows from the fact that capitation, although paid on a per-enrollee basis, is intended to control the total cost of providing mental health services.

The service regions were similar in many ways. Median household incomes in 1989 for the fee-for-service, not-for-profit, and for-profit sites were $24 000, $36 000, and $24 000, respectively. The 1992 population, in the same order, was 767 279, 1 616 683, and 1 080 712 persons. Nonfederal, active physicians in 1990 numbered 112, 116, and 96 per 100 000 population in the 3 regions. All 3 areas included counties that were sparsely populated (i.e., fewer than 5000 residents) as well as urban counties (i.e., greater than 400 000 residents).

Eight time series of 143 weeks (i.e., October 2, 1994, through June 28, 1997) were created for each area. The weekly means and SDs of these variables are shown in Table 1.

Data Analyses

Our analyses were in the tradition of the interrupted time-series quasi experiment.[30] The null hypothesis for such tests is that the post-intervention values of the dependent variable are not different from the values expected from the preintervention series. Arriving at the values expected from the preintervention series is complicated by the fact that time series often show autocorrelation, including trends, cycles, and the tendency to remain elevated or depressed after high or low values. This problem is typically solved through the purely empiric approach of identifying the autocorrelation and expressing it as an effect of earlier values of the dependent variable itself.

The Colorado experience allowed us to go beyond the purely empiric approach. The fact that the intervention was implemented in a subset of counties allowed us to measure the dependent variables in the fee-for-service counties and to use the series as control variables in the test equation. This provides the benefit of the purely empiric approach in that it removes any autocorrelation in the dependent variable that was induced by forces also at work in the fee-for-service counties. The approach has the added benefit of controlling for third variables that show no autocorrelation and affect capitated and fee-for-service areas. Such a third variable could induce a type I error if it shifted coincident with an intervention.

Our tests proceeded through the following steps:

1. We subjected all dependent variables to the augmented Dickey-Fuller test[31] to determine whether any required differencing to remove secular trends or deterministic cycles.

2. We modeled the dependent variable measured in the area with not-for-profit capitation as a function of the same phenomenon measured in the fee-for-service area.

3. We inspected the residuals from step 2 for a mean different from 0 ($P<.05$; 2-tailed test) and for autocorrelation. The equation used in step 2 was expanded to include a constant if a mean was found. We used the strategy attributed to Box et al.[32] to identify and model autocorrelation. The strategy—autoregressive, integrated, moving average modeling—draws from a very large family of models available to empirically specify autocorrelation in time series.

4. We specified the test equation by adding a binary variable for capitation to the equation resulting from steps 1 through 3. We scored the capitation variable as 1 for the weeks in which the capitation reform was in place and as 0 otherwise. The variable was scored 1 only in the week that capitation began if the Dickey-Fuller test indicated that the dependent variable required differencing. Three lags of the binary variable also were tested to ensure that delayed effects were captured.

5. We estimated the equation resulting from step 4 and inspected the error terms for autocorrelation. If any was found, additional autoregressive, integrated, moving average modeling parameters were added to the equation, and the resulting equation was estimated again.

6. We repeated steps 1 through 5 for the for-profit area.

A coefficient statistically different from 0 for the capitation variable or its lags implies a "level shift," or change in the dependent variable that persists through the remainder of the test period. A test for level shifts is consistent with the assumption that capitation has ongoing, rather than temporary, effects.

Results

Costs

As shown in Tables 2 and 3, the hypotheses concerning total costs, the costs of inpatient treatment, and the number of inpatients treated were supported. We found downward shifts in the total costs for all services, the total costs for inpatient care, and the number of inpatients treated in both the not-for-profit and the for-profit capitated areas.

The observed postcapitation values were not necessarily below those of all precapitation weeks. Rather, they were below the values expected from the ongoing experience of the fee-for-service sites and from any precapitation autocorrelation in the dependent variable itself. As shown in Table 1, for example, the average of total costs for all postcapitation weeks was higher than in the preintervention period for both capitated sites. The observed weekly values were, however, significantly lower than expected from their preintervention trend and from the ongoing costs in the fee-for-service area.

TABLE 2—Results for Supported Hypotheses Concerning Cost and Caseload in Areas With Not-for-Profit Capitation: Colorado, October 1994–June 1997

	Hypothesis 1: Shift Down in Total Costs	Hypothesis 2: Shift Down in Inpatient Costs	Hypothesis 4: Shift Down in Inpatients
Capitation at lag 1	−$211 400*	−$134 200*	−49*
Fee-for-service areas	1.069*	0.321*	0.486*
Other parameters	First-order differencing	First-order differencing	First-order differencing
	No constant	No constant	No constant
	Autoregression at lag 1 = 0.4170*	Autoregression at lag 1 = 0.8581*	Autoregression at lag 1 = 0.5480*
	Autoregression at lag 4 = −0.2313*	Autoregression at lag 4 = −0.1114*	Autoregression at lag 4 = −0.1648*
	Autoregression at lag 9 = 0.3048**	Autoregression at lag 13 = 0.4506*	Autoregression at lag 13 = 0.2313*

*P < .01, single-tailed test.

TABLE 3—Results for Supported Hypotheses Concerning Cost and Caseload in Areas With For-Profit Capitation: Colorado, October 1994–June 1997

	Hypothesis 1: Shift Down in Total Costs	Hypothesis 2: Shift Down in Inpatient Costs	Hypothesis 3: Shift Down in Outpatient Costs	Hypothesis 4: Shift Down in Inpatients
Capitation at lag 1	−$178 500*	−$201 200*	$44 577*	−52*
Fee-for-service areas	0.5168*	0.3532*	0.8022*	0.6520*
Other parameters	First-order differencing	First-order differencing	First-order differencing	First-order differencing
	No constant	No constant	No constant	No constant
	Autoregression at lag 5 = −0.6938*	Autoregression at lag 1 = 0.7677*	Autoregression at lag 1 = 0.6470*	Autoregression at lag 1 = 0.4282*
	Moving average at lag 1 = 0.6938*	Autoregression at lag 5 = −0.2697*		

*P < .01, single-tailed test.

TABLE 4—Results for Supported Hypotheses[a] Concerning Secondary and Tertiary Prevention: Colorado, October 1994–June 1997

	Hypothesis 5: Shift Up in Children in Outpatient Treatment	Hypothesis 6: Shift Up in Children <5 Years	Hypothesis 7: Shift Up in Disruptive Children	Hypothesis 8: Increase in Emergencies
Capitation at lag 2	82.92*	18.53*	72**	6.66*
Fee-for-service areas	1.574**	0.5843**	1.550**	−0.1186
Other parameters	No differencing	No differencing	First-order differencing	No differencing
	Constant = 335.60**	Constant = 33.8*	No constant	Constant = 7.9*
	Autoregression at lag 1 = 0.5486**	Autoregression at lag 1 = 0.3569**	Moving average at lag 1 = 0.6334**	No autocorrelation
	Autoregression at lag 4 = 0.2700**			

[a]Support found in for-profit area only.
*P < .05, single-tailed test; **P < .01, single-tailed test.

Secondary and Tertiary Prevention

Table 4 shows the results concerning secondary and tertiary prevention. The hypothesized increase in the number of children treated in outpatient settings was observed only in the for-profit area. The hypothesized upward shift in the treatment of children younger than 5 years and in the number of disruptive children treated also was observed only in the for-profit area.

No level shifts in the number of psychiatric emergencies among children occurred.

Emergencies in the area in which services were financed under the for-profit format increased temporarily. The increase appeared 2 weeks after for-profit capitation and ended 6 weeks later.

Discussion

Only a true experiment could yield more certainty than tests based on Colorado's experience with capitated financing. Such an experiment is unlikely because random assignment of children and therapists to different financing schemes has not been ethically or politically acceptable.

Our results concerning costs are consistent with earlier findings[20,21] that capitation slows rising costs by causing the substitution of less expensive for more expensive treatment. Costs in the capitated areas rose less than expected from precapitation trends and from increases in the fee-for-service area. We estimate that capitation reduced total costs in the not-for-profit areas by more than $21 million (i.e., $211 400×100 weeks) and by more than $17

million (i.e., $134\,200 \times 96$ weeks) in the for-profit areas over the postcapitation period in our study. The number of inpatients treated in both capitated systems decreased significantly below that expected from history and from the number served in the fee-for-service area.

As noted earlier in this article, no previous empiric research in the literature has focused on the effect of capitation on secondary and tertiary prevention. Our findings are mixed in that the hypotheses were supported only at the for-profit sites. The number of outpatients served at the for-profit sites increased significantly. Total outpatient costs increased as expected in the for-profit sites but not enough to offset the savings in inpatient costs.

For-profit providers began seeing more very young children than would have been expected from history and from the number seen in the fee-for-service area. The for-profit group also saw more disruptive children.

Contrary to the hypothesized effect of capitation, a temporary increase in emergencies occurred in the for-profit areas. Plausible explanations include that the perception of reduced barriers to access led families to seek emergency treatment for episodes of abnormal behavior that previously would have been tolerated at home. Also, access to inpatient care may have been too severely restricted at the outset of capitation. The former explanation is supported by the fact that access to inpatient care was reduced just as severely in the not-for-profit areas, where no increase in emergencies occurred. Whatever the cause, the effect disappeared within 2 months of capitation.

Our findings suggest that more of the behavior expected under capitation occurred in the for-profit sites than in the not-for-profit sites. This could mean that capitation is most likely to yield public health benefits when managers benefit from cost savings. This inference, however, should be resisted until further research from Colorado and from other localities is available.

In summary, our findings provide strong evidence in support of the economic arguments for capitation. Capitated providers unequivocally reduced costs below those expected from history and from the experience of the fee-for-service areas. Providers reduced costs by reducing inpatient treatment.

We found less support for the secondary and tertiary prevention argument. The public health benefits of capitation appeared only in the for-profit sites. Policymakers and the public should therefore be skeptical of the argument that capitation per se increases prevention as surely or as swiftly as it lowers costs. □

Contributors

R. Catalano analyzed the data and wrote most of the paper. A. Libby contributed text to the "Discussion" and wrote those sections of the paper describing the data. L. Snowden wrote the sections dealing with disruptive behavior and treatment of children younger than 5 years. A. E. Cuellar wrote the summary of previous literature concerned with capitation of children's services as well as the sections describing the Colorado capitation scheme.

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