Patterns of Mental Health Utilization and Costs Among Children in a Privately Insured Population

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Objective. To examine trends in mental health service use and cost among privately insured children.

Data Sources. Inpatient and outpatient claims from the MarketScan® database, a collection of health care claims for a national sample of over seven million privately insured individuals. Claims were analyzed for all users of mental health services 17 years of age and under from 1993 to 1996.

Study Design. The proportion of children receiving mental health services and annual costs and treatment days per treated child were compared across diagnostic groups over time.

Principle Findings. The proportion of covered children receiving any mental health services fell substantially (−30.0 percent). Inpatient mental health costs per treated child fell $4,587 (−46.9 percent) during the period, driven by decreases in the number of hospital days per treated child per year (−22.9 percent) and per diem costs (−14.5 percent). Outpatient mental health costs also fell during the period due to a 5.1 percent decline in the number of treatment days and a 25.9 percent fall in costs per day. Children whose primary diagnosis was hyperactivity experienced the largest decrease in inpatient costs per treated patient, those diagnosed with schizophrenia experienced the smallest decrease, and those diagnosed with substance abuse disorders experienced large increases.

Conclusions. Changes in mental health service delivery have resulted in substantially reduced access to mental health care among children and significant declines in service use and costs among those who do receive services.

Key Words. Mental health, children, hospital costs, managed care

Although the effects of managed care on mental health utilization and costs among adults have received considerable attention (Leslie and Rosenheck 1999a, 1999b; Rosenheck, Druss, Stolar, et al. 1999; Goldman, McCulloch, and Sturm 1998; Pincus, Zarin, and West 1996; Mechanic, Schlesinger, and McAlpine 1995), relatively little research exists on the effects on mental health

service use and costs among children (Farmer, Stangl, Burns, et al. 1999; Gresenz, Liu, and Sturm 1998; Padgett, Patrick, Burns, et al. 1993). The goal of managed care is to reduce total health costs by substituting less costly outpatient care for expensive inpatient services (Goldman, McCulloch, and Sturm 1998), using such mechanisms as utilization review, exclusive contracts with selected providers, and risk sharing. However, a previous study of adults found that while inpatient mental health service use and costs have fallen over time, there has not been a corresponding increase in outpatient service use, suggesting that care is reduced across the board (Leslie and Rosenheck 1999b). No research exists studying these trends in children.

Annual inpatient and outpatient mental health costs for a health plan can be thought of as having three components: (1) the number and proportion of covered individuals receiving any care, (2) the total number of treatment days per treated patient per year, and (3) the cost per day of treatment. Decreases in any one or a combination of these factors will result in lower per capita annual costs. Using insurance claims data, we examine each of these components of mental health utilization and costs among children aged 17 and under for both inpatient and outpatient service use to determine how cost reductions have been achieved. We further stratify the analysis by diagnosis and by age group to identify subgroups that have been most affected by the observed changes.

METHODS

Sources of Data

Data for this study come from MEDSTAT's MarketScan® database, which compiles claims information from private health insurance plans of large employers. The data set contains claims information for individuals nationwide who are insured through the benefit plans of large employers. The covered individuals include employees, their dependents, and early retirees of companies who participate in the database. MEDSTAT collects the claims data, standardizes and combines them, and reports back to the firms who

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participate. Information about the firms is unavailable for reasons of confidentiality. The database contains information for over seven million covered lives between 1993 and 1996. These claims data are collected from over 200 different insurance companies, including Blue Cross and Blue Shield plans and third-party administrators. Our sample consists of all individuals in the database aged 17 and under who had a claim for mental health services in any of the years under study ($N = 139{,}806$). We also have supplementary information on the entire enrolled population (age, gender, geographic region, etc.).

The sample included in our data set was increasingly subject to managed care mechanisms during the period under study. The percentage of the sample enrolled in either a preferred provider organization or a point-of-service plan increased from 32.1 percent in 1993 to 45.6 percent in 1996. Because of its complexity and the fact that a significant proportion of the data describing plan characteristics is missing in 1993, we cannot report precise trends over time for variables like deductibles, copayments, coverage limits, or whether mental health services were carved out. However, of the traditional indemnity plans for which we have limited plan information, 72 percent used either case management or utilization review to control costs, and over 86 percent required precertification for an inpatient admission. Thus, virtually all health plans included in our database used a variety of managed care mechanisms to control costs.

Measures

From the claims data, we constructed variables describing the number of enrolled children receiving any mental health services, the total number of inpatient and outpatient treatment days per treated child during the year, the primary diagnosis, and total costs for each year. We define mental health diagnoses as ICD-9 codes between 290.00 and 319.99. Any claim with a diagnosis within this range of ICD-9 values was considered a mental health claim, regardless of whether care was received from a mental health specialist or in a primary care setting. We measure the cost associated with a claim as the actual paid amount instead of the charges. Since providers rarely receive all of the fees that they charge, the paid amount is a more accurate measure of costs. Paid amounts include patient payments (deductibles or copayments), payments made by the patient's insurance plan, and any payment by other insurance providers (subrogation and Medicare savings). Costs are adjusted for inflation, with all amounts reported in 1993 dollars.

Mental Health Service Use and Cost. We calculate the following measures separately for both inpatient and outpatient mental health service use for each year: (1) the number and percent of enrolled children who received mental

health services, (2) the number of treatment days per treated child per year, (3) the costs per day of treatment, and (4) the total annual costs of services per treated child. For each child, the annual number of inpatient treatment days was calculated by summing the length of stay for each inpatient episode during the year. For the diagnosis-specific measures, total inpatient treatment days were calculated for each diagnostic group separately. Annual inpatient costs were summed in a similar manner, which is consistent with methods used by others (Frank and Brookmeyer 1995). Outpatient treatment days and costs were calculated in a similar manner. Multiple outpatient claims in a single day were counted as one day of treatment.

Diagnostic Groups. To control for diagnosis in examining trends in service use and cost over time, we define seven mental health diagnostic groups for children receiving mental health services (ICD-9 codes in parentheses): (1) Adjustment Reaction (309.00–309.09, 309.11–309.99), (2) Hyperactivity (314.00–314.99), (3) Major Depression/Bipolar Disorder (296.00–296.99), (4) Mild/Moderate Depression (300.40, 300.50, 301.10, 309.10, 311.00), (5) Schizophrenia (295.00–295.99), (6) Substance Abuse (291.00, 292.00, 303.00–305.99), and (7) Other Mental Health (290.00 to 319.99 not elsewhere defined). The Mild/Moderate Depression diagnostic group includes any depression diagnoses not included in Major Depression/Bipolar Disorder. Each patient was assigned to a major diagnostic category for each year in which they received mental health services based on the primary diagnosis in that year. The primary diagnosis was defined as the diagnosis responsible for the majority of mental health services during the year, as measured by the total paid amount. If a child received both inpatient and outpatient services during the year, the primary diagnosis was defined as the diagnosis responsible for the majority of inpatient costs during the year. We tried an alternative definition of the primary diagnosis, defined as the diagnosis associated with the largest number of outpatient visits, and found the two definitions resulted in the same primary diagnosis for 93 percent of the children in the sample. Of the inpatient users included in the Other Mental Health diagnostic group, the most common diagnoses were disturbance of conduct (20.1 percent, ICD-9 codes 312.00 to 312.99) and disturbance of emotions specific to childhood and adolescence (18.2 percent, ICD-9 codes 313.00 to 313.99). For outpatient users, the most common diagnoses included in Other Mental Health were disturbance of emotions specific to childhood and adolescence (29.5 percent, ICD-9 codes 313.00 to 313.99) and neurotic disorders (16.8 percent, ICD-9 codes 300.00 to 300.99 not elsewhere classified).

Other Patient Characteristics. Other independent variables of interest include patient demographic characteristics (age and gender) and two measures of illness severity: the number of different diagnoses in the year and whether the child is dually diagnosed. Patient age is grouped into three levels: age 6 and under, 7 to 12, and 13 to 17. The number of different diagnoses includes all diagnoses, not just those for mental health. Finally, children were defined as dually diagnosed if they had a primary or secondary diagnosis of substance abuse in the same year in which they had a non-substance-abuse mental health diagnosis.

Analysis

Data analysis proceeded in several steps. First, the proportion of children who had claims for inpatient mental health services, outpatient mental health services, and any mental health services was determined for each year. Next, average annual inpatient mental health costs and treatment days were analyzed to determine how these variables changed during the four years under study and what components of costs were driving the change. We ran separate regressions in which the dependent variables were the annual number of treatment days, paid amounts, and cost per day of treatment and the independent variables included year, age group, gender, diagnosis, and whether the child was dually diagnosed. Because the dependent variables are not normally distributed, we conducted a log transformation of these variables. We calculated adjusted means of the log-transformed dependent variables by calculating fitted values evaluated at the mean values of the independent variables. These adjusted means were retransformed from the log scale using the smearing technique (Duan 1982; Duan et al. 1983). We performed the same analyses for outpatient service use among children who used outpatient mental health services.

Finally, we stratified the above analyses by primary diagnostic group and by age group to determine whether these populations were differentially affected by the change in treatment days and costs. We used t-tests of differences in means to determine whether differences within diagnostic groups and age groups over time were significant.

RESULTS

Sample Characteristics

Table 1 reports characteristics of mental health users in our sample for 1993 and 1996. Since trends over time were roughly linear, we report results

Table 1: Demographic and Clinical Characteristics of Mental Health Users. MarketScan®—Ages 0 to 17

	1993						1996						Change in proportion of users					
	Inpatient Users		Outpatient Users		All MH Users		Inpatient Users		Outpatient Users		All MH Users		Inpatient Users		Outpatient Users		All MH Users	
Variable	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	%	p	%	p	%	p
Gender																		
Male	1,808	50.1%	26,982	60.6%	27,346	60.4%	1,132	51.5%	18,657	60.9%	19,108	60.8%	2.79%	.469	0.56%	.349	0.63%	.288
Female	1,802	49.9%	17,571	39.4%	17,937	39.6%	1,067	48.5%	11,978	39.1%	12,335	39.2%	−2.79%		−0.86%		−0.96%	
Age																		
Under 7	150	4.2%	6,033	13.5%	6,117	13.5%	40	1.8%	3,583	11.7%	3,609	11.5%	−56.22%	.002	−13.63%	.001	−15.03%	.001
7 to 12	483	13.4%	17,784	39.9%	17,877	39.5%	286	13.0%	11,804	38.5%	11,928	37.9%	−2.79%		−3.47%		−3.91%	
13 to 17	2,977	82.5%	20,736	46.5%	21,289	47.0%	1,873	85.2%	15,248	49.8%	15,906	50.6%	3.29%		6.94%		7.60%	
Diagnostic group																		
Adjustment Reaction	368	10.2%	11,790	26.5%	11,881	26.2%	131	6.0%	7,164	23.4%	7,213	22.9%	−41.56%	.001	−11.63%	.001	−12.57%	.001
Mild/Moderate Depression	416	11.5%	4,176	9.4%	4,258	9.4%	283	12.9%	2,845	9.3%	2,932	9.3%	11.68%		−0.92%		−0.83%	
Hyperactivity	114	3.2%	10,792	24.2%	10,803	23.9%	89	4.0%	9,415	30.7%	9,454	30.1%	28.16%		26.88%		26.03%	
Major Depression/Bipolar	1,643	45.5%	3,488	7.8%	3,739	8.3%	1,006	45.7%	2,153	7.0%	2,517	8.0%	0.52%		−10.23%		−3.05%	
Other Mental Health	686	19.0%	13,203	29.6%	13,399	29.6%	396	18.0%	8,057	26.3%	8,227	26.2%	−5.23%		−11.25%		−11.57%	
Substance Abuse	341	9.4%	1,016	2.3%	1,111	2.5%	268	12.2%	954	3.1%	1,042	3.3%	29.02%		36.56%		35.07%	
Schizophrenia	42	1.2%	88	0.2%	92	0.2%	26	1.2%	47	0.2%	58	0.2%	1.63%		−22.33%		−9.21%	
Dual diagnosis																		
Yes	312	8.6%	495	1.1%	533	1.2%	249	11.3%	429	1.4%	510	1.6%	31.02%	.01	26.04%	.001	37.80%	.001
No	3,298	91.4%	44,058	98.9%	44,750	98.8%	1,950	88.7%	30,206	98.6%	30,933	98.4%	−2.93%		−0.29%		−0.45%	

only for 1993 and 1996. For each year, we report the number of children receiving inpatient care, outpatient care, and any mental health care by gender, age group, diagnostic group, and dual diagnosis status. The majority of children receiving outpatient mental health care were male (60.6 percent in 1993), whereas inpatient users were more evenly divided across gender. Children between 13 and 17 years of age represented the majority of mental health users, especially inpatient service users. Over time, the proportion of mental health users under age 7 decreased substantially. The proportion of mental health users between 7 and 12 years of age fell slightly between 1993 and 1996, while the proportion of mental health users aged 13 to 17 increased during this period. The most common primary mental health diagnoses among inpatient users were Major Depression/Bipolar Disorder (45.5 percent in 1993), Other Mental Health (19.0 percent in 1993), and Mild/Moderate Depression (11.5 percent in 1993). Among outpatient users, the most common primary diagnoses were Other Mental Health (29.6 percent in 1993), Adjustment Reaction (26.5 percent in 1993), and Hyperactivity (24.2 percent in 1993). The proportion of patients who were dually diagnosed was higher among inpatient users than outpatient users (8.6 percent versus 1.1 percent in 1993), but for both groups this proportion grew over time.

Access

Table 2 reports enrollment and mental health utilization statistics for 1993 and 1996. The number of children enrolled in health plans that are included in the database remained fairly constant over the period, falling only 0.88 percent. However, the number of children receiving any mental health services as a percentage of covered children fell substantially from 4.3 percent in 1993 to 3.0 percent in 1996 (a decline of 13,840 children, or 30.0 percent). The decline was larger for inpatient care, which fell 38.6 percent (from 0.34 percent in 1993 to 0.21 percent in 1996, a decline of 1,411 children), than for outpatient

Table 2: Enrollment and Utilization. MarketScan®—Ages 0 to 17

	Covered	*Inpatient Users*		*Outpatient Users*		*All Users*	
Year	*Lives*	*N*	*%*	*N*	*%*	*N*	*%*
1993	1,054,076	3,610	0.34%	44,553	4.23%	45,283	4.30%
1994	1,129,720	4,298	0.38%	45,946	4.07%	47,526	4.21%
1995	1,013,509	3,720	0.37%	57,676	5.69%	58,270	5.75%
1996	1,044,843	2,199	0.21%	30,635	2.93%	31,443	3.01%
Change, 1993 to 1996	−0.88%	−39.09%	−38.55%	−31.24%	−30.63%	−30.56%	−29.95%

care, which fell 30.6 percent (from 4.2 percent in 1993 to 2.93 percent in 1996, a decline of 13,918 children).

Trends in Inpatient Mental Health Service Use and Costs

Table 3 reports results for inpatient service use and costs. Overall, costs per treated inpatient decreased by $4,587 (46.9 percent) from 1993 to 1996. The decrease was primarily driven by a decrease in the number of bed days of care per treated child, which fell 29.2 percent during the period, although cost per day of care also declined 14.5 percent. Children included in the Hyperactivity diagnostic group experienced the largest decline in inpatient costs per treated child, which were primarily driven by decreases in inpatient bed days. Children diagnosed with Schizophrenia experienced the smallest decline in inpatient costs per treated patient, which was primarily driven by a 27.1 percent decline in the cost per day of treatment. Children diagnosed with Substance Abuse experienced an increase in both bed days of care and cost per day. With the exception of the Schizophrenia diagnostic group, changes in bed days of care, cost per day, and cost per treated child were significant for each of the diagnostic groups.

Trends in Outpatient Mental Health Service Use and Costs

Table 4 shows trends in outpatient mental health service use and costs. Costs per treated child fell during the period, but by a smaller percentage than inpatient costs. Declines in outpatient costs per treated child were primarily driven by declines in the cost per treatment day, which fell 25.9 percent. The annual number of treatment days also fell slightly (−5.1 percent). Declines in each component of outpatient cost were largest for children in the Schizophrenia diagnostic group. Children in the Substance Abuse diagnostic group experienced an increase in the number of outpatient treatment days, but a corresponding decline in the cost per day of treatment resulted in an insignificant decrease in the cost per treated child.

Trends by Age Group

Tables 5 and 6 show the trends in inpatient and outpatient mental health service use and cost by age group, respectively. Trends by age group follow the same pattern as overall trends in that reductions in inpatient costs per treated child are primarily driven by reductions in number of bed days of care, with slightly smaller declines in the costs per day. Similarly, outpatient cost reductions are primarily driven by declines in the costs per day of treatment,

Table 3: Inpatient Mental Health Utilization and Costs. MarketScan®—Ages 0 to 17

Variable	*1993*	*1996*	*Change, 1993–96* %	t	*df*	p
Inpatient days	18.37 (17.85)	13.00 (12.53)	−29.2%	−15.49	75186	.0001
Adjustment Reaction	15.82 (17.68)	11.83 (13.35)	−25.2%	−2.66	18952	.008
Mild/Moderate Depression	21.91 (19.65)	13.17 (11.51)	−39.9%	−8.40	7019	.0001
Hyperactivity	29.32 (27.67)	13.13 (11.43)	−55.2%	−6.39	20205	.0001
Major Depression	23.70 (20.45)	14.33 (12.28)	−39.5%	−16.40	5639	.0001
Other Mental Health	19.58 (22.68)	16.01 (18.60)	−18.2%	−3.25	21258	.0012
Substance Abuse	10.47 (9.58)	19.58 (20.80)	87.0%	9.16	1968	.0001
Schizophrenia	23.10 (14.32)	25.28 (17.61)	9.4%	0.63	133	.5294
Inpatient costs/day	$537.11 ($370.58)	$459.04 ($295.78)	−14.5%	−10.50	75186	.0001
Adjustment Reaction	$518.60 ($410.98)	$380.83 ($259.84)	−26.6%	−4.05	18952	.0001
Mild/Moderate Depression	$646.25 ($430.25)	$507.67 ($290.33)	−21.4%	−5.90	7019	.0001
Hyperactivity	$625.61 ($419.48)	$458.06 ($260.67)	−26.8%	−4.07	20205	.0001
Major Depression	$663.29 ($355.13)	$565.46 ($296.12)	−14.7%	−9.12	5639	.0001
Other Mental Health	$615.93 ($550.17)	$471.44 ($423.69)	−23.5%	−5.51	21258	.0001
Substance Abuse	$349.05 ($239.19)	$416.32 ($292.29)	19.3%	3.98	1968	.0001
Schizophrenia	$634.17 ($431.69)	$462.54 ($159.44)	−27.1%	−2.20	133	.031
Inpatient costs/treated patient	$9,772 ($12,360)	$5,185 ($5,985)	−46.9%	−20.39	75186	.0001
Adjustment Reaction	$9,256 ($14,964)	$4,282 ($6,157)	−53.7%	−4.17	18952	.0001
Mild/Moderate Depression	$13,054 ($14,887)	$6,053 ($6,299)	−53.6%	−9.31	7019	.0001
Hyperactivity	$16,804 ($19,970)	$5,471 ($5,535)	−67.4%	−6.41	20205	.0001
Major Depression	$14,708 ($15,003)	$7,086 ($6,780)	−51.8%	−18.92	5639	.0001
Other Mental Health	$12,435 ($19,571)	$6,545 ($32,994)	−47.4%	−4.50	21258	.0001
Substance Abuse	$3,224 ($3,598)	$6,083 ($6,569)	88.7%	8.72	1968	.0001
Schizophrenia	$13,089 ($9,570)	$12,302 ($10,542)	−6.0%	−0.36	133	.7202

Note: Adjusted for age, gender, number of different diagnoses, and whether patient is dually diagnosed. Standard deviation reported in parentheses.

Table 4: Outpatient Mental Health Utilization and Costs. MarketScan®—Ages 0 to 17

Variable	*1993*	*1996*	*Change, 1993–96* %	t	*df*	p
Outpatient days	6.88 (7.11)	6.53 (6.60)	−5.1%	−8.82	5807	.0001
Adjustment Reaction	7.40 (7.42)	7.05 (6.83)	−4.7%	−4.02	497	.0001
Mild/Moderate Depression	8.79 (9.34)	8.04 (8.50)	−8.5%	−4.37	697	.0001
Hyperactivity	5.04 (4.71)	4.56 (4.19)	−9.5%	−10.36	201	.0001
Major Depression	10.84 (11.99)	10.27 (11.09)	−5.3%	−2.23	2647	.0255
Other Mental Health	7.73 (8.45)	7.58 (8.27)	−1.9%	−1.57	1080	.1169
Substance Abuse	5.41 (5.96)	6.49 (7.36)	20.0%	4.87	607	.0001
Schizophrenia	12.30 (15.84)	9.94 (12.29)	−19.2%	−1.02	66	.31
Outpatient costs/day	$138.20 ($101.76)	$102.47 ($68.88)	−25.9%	−69.35	5807	.0001
Adjustment Reaction	$128.69 ($75.89)	$92.09 ($44.42)	−28.4%	−46.75	497	.0001
Mild/Moderate Depression	$145.22 ($99.94)	$104.75 ($65.71)	−27.9%	−24.30	697	.0001
Hyperactivity	$100.23 ($72.24)	$75.60 ($48.42)	−24.6%	−38.03	201	.0001
Major Depression	$223.54 ($193.59)	$136.47 ($100.07)	−39.0%	−24.27	2647	.0001
Other Mental Health	$152.90 ($119.58)	$120.07 ($90.74)	−21.5%	−26.72	1080	.0001
Substance Abuse	$300.63 ($378.51)	$247.48 ($299.32)	−17.7%	−4.65	607	.0001
Schizophrenia	$176.43 ($166.72)	$80.31 ($57.10)	−54.5%	−4.40	66	.0001
Outpatient costs/treated patient	$983 ($1,324)	$737 ($970)	−25.0%	−36.04	5807	.0001
Adjustment Reaction	$910 ($1,045)	$652 ($709)	−28.4%	−23.21	497	.0001
Mild/Moderate Depression	$1,263 ($1,654)	$896 ($1,190)	−29.1%	−13.03	697	.0001
Hyperactivity	$589 ($798)	$417 ($537)	−29.2%	−24.01	201	.0001
Major Depression	$2,754 ($4,178)	$1,718 ($2,444)	−37.6%	−13.12	2647	.0001
Other Mental Health	$1,171 ($1,653)	$971 ($1,392)	−17.1%	−11.39	1080	.0001
Substance Abuse	$1,409 ($2,496)	$1,352 ($2,340)	−4.0%	−0.71	607	.4802
Schizophrenia	$2,407 ($4,328)	$1,137 ($1,852)	−52.8%	−2.20	66	.0293

Note: Adjusted for age, gender, number of different diagnoses, and whether patient is dually diagnosed. Standard deviation reported in parentheses.

Table 5: Inpatient Mental Health Utilization and Costs. MarketScan®—Ages 0 to 17

Variable	*1993*	*1996*	*Change, 1993–96* %	t	*df*	p
Inpatient bed days						
Age 0–6	12.04	8.89	−26.2%	−1.57	188	.1183
	(12.48)	(10.78)				
Age 7–12	18.00	13.92	−22.7%	−4.18	767	.0001
	(17.50)	(12.89)				
Age 13–17	21.31	13.70	−35.7%	−18.07	4848	.0001
	(20.40)	(13.21)				
Inpatient costs/day						
Age 0–6	$557.62	$443.69	−20.4%	−1.03	188	.305
	($720.25)	($442.76)				
Age 7–12	$617.98	$435.53	−29.5%	−7.61	767	.0001
	($443.10)	($284.59)				
Age 13–17	$571.43	$461.43	−19.2%	−14.02	4848	.0001
	($358.72)	($292.71)				
Inpatient costs/treated patient						
Age 0–6	$8,393	$3,642	−56.6%	−2.04	188	.0432
	($15,571)	($6,413)				
Age 7–12	$10,340	$5,566	−46.2%	−6.94	767	.0001
	($13,300)	($6,419)				
Age 13–17	$11,681	$5,450	−53.3%	−22.97	4848	.0001
	($13,921)	($6,205)				

Note: Adjusted for gender, diagnosis, number of different diagnoses, and whether the patient is dually diagnosed. Standard deviation reported in parentheses.

with much smaller declines in the number of days of care. However, the declines tend to be larger for older children. Inpatient bed days per treated child fell only 26.2 percent (not significant) among children aged 0 to 6, but fell 35.7 percent for children aged 13 to 17 ($p < .0001$). Although decreases in outpatient costs per treated child were significant for all age groups, the decline was much larger among 13 to 17 year olds (28.5 percent) than among children aged 6 and under (16.2 percent).

DISCUSSION

We found that the proportion of enrolled children who received care fell 30 percent during the period, and that this decrease was accompanied by reductions in both treatment intensity and unit cost.

Table 6: Outpatient Mental Health Utilization and Costs. MarketScan®—Ages 0 to 17

Variable	*1993*	*1996*	*Change, 1993–96*			
			%	t	*df*	p
Outpatient days						
Age 0–6	5.61	5.60	−0.2%	−0.14	9614	.8865
	(5.70)	(5.66)				
Age 7–12	6.65	6.52	−2.0%	−2.26	29586	.0237
	(6.65)	(6.39)				
Age 13–17	7.45	6.86	−7.9%	−9.67	35982	.0001
	(7.93)	(7.08)				
Outpatient costs/day						
Age 0–6	$138.62	$105.00	−24.3%	−20.25	9614	.0001
	($109.12)	($77.02)				
Age 7–12	$126.98	$93.65	−26.2%	−46.13	29586	.0001
	($88.97)	($57.74)				
Age 13–17	$144.22	$107.34	−25.6%	−47.53	35982	.0001
	($107.84)	($74.83)				
Outpatient costs/treated patient						
Age 0–6	$801	$671	−16.2%	−7.40	9614	.0001
	($1,106)	($910)				
Age 7–12	$869	$681	−21.6%	−19.72	29586	.0001
	($1,132)	($860)				
Age 13–17	$1,115	$797	−28.5%	−28.94	35982	.0001
	($1,523)	($1,071)				

Note: Adjusted for gender, diagnosis, number of different diagnoses, and whether the patient is dually diagnosed. Standard deviation reported in parentheses.

Among those children who did receive care, we found that inpatient mental health costs per treated child decreased 47 percent and that the decrease was primarily driven by a decline in the annual number of inpatient mental health treatment days per treated child. Further, we found that cost reductions were greatest for those patients diagnosed with Hyperactivity and were smallest for those diagnosed with Schizophrenia. Children in the Substance Abuse diagnostic group actually experienced significant increases in both the number of bed days of care and the cost per day of treatment, especially among teenaged children, reflecting the increased awareness of the problem of substance abuse among children.

For outpatient care, costs per treated child fell 25 percent, due mostly to a decline in costs per treatment day, although the number of days of care also fell slightly. Declines were much larger for children diagnosed with Schizophrenia and were smallest for children in the Substance Abuse diagnostic group.

Changes in both inpatient and outpatient mental health service use and costs tended to be larger among children aged 13 to 17.

Health plans have reduced the costs of mental health care in our sample of children primarily by restricting access to care and reducing inpatient costs. When we add inpatient and outpatient costs and consider cost per enrolled child, we find that total mental health costs per *enrolled* child fell 59.6 percent, from $95 to $38, between 1993 and 1996. The proportion of enrolled children who used services declined from 4.3 percent to 3.0 percent (30.0 percent), and total cost per treated child fell from $2,200 to $1,275 (42.0 percent).

As noted previously, a central goal of cost reduction mechanisms is to reduce costs by substituting appropriate, but less costly, outpatient services for more expensive inpatient services. A previous study of mental health service use and costs among adults fails to find evidence of such a substitution (Leslie and Rosenheck 1999b). An examination of outpatient service use and costs among children who receive inpatient care showed that declines in inpatient service use in this subsample are associated with slight increases in the number of outpatient days of care among children (data available on request). A similar result was observed in a sample of veterans (Leslie and Rosenheck 2000), suggesting that the impact of managed care may be less severe for hospitalized populations of special public concern such as children and veterans, but not for adults in general. We do find, however, that the cost per day of outpatient care for children declined among those who were not hospitalized.

Several limitations of this study require comment. First, because we do not have information on appropriateness of care, the quality of treatment, treatment outcomes, or patient satisfaction, we cannot evaluate the effect of the cost reductions on these quality dimensions. Further research is needed to address this issue.

In addition, it is possible that reductions in mental health service use and costs were offset by increases in general medical service use (Rosenheck, Druss, Stolar, et al. 1999). However, an examination of medical care claims for the children in our sample using techniques identical to those used to study mental health claims did not show such an offsetting effect. Among children who had claims for mental health services, average inpatient medical bed days of care fell 11.8 percent and average inpatient medical costs per treated child fell 35.1 percent from 1993 to 1996. Average outpatient medical service use and costs also fell during the period, but by slightly smaller percentages.

We do not control for treatment setting beyond the broad categories of inpatient versus outpatient care. It is possible that observed declines in

costs per day of treatment could be the result of a greater proportion of mental health services being delivered in primary care settings rather than by specialists. However, an examination of the distribution of mental health claims by location of treatment and by provider specialty revealed only small differences over time. In addition, differences that did exist were generally in the direction of more care being delivered in specialty settings in 1996 compared to 1993. This suggests that shifting mental health care into primary care settings is not a likely explanation of the declines in costs per day of treatment.

Finally, we do not have information on out-of-plan use. This can be important for two reasons. First, children often receive care at school. Farmer, Stangl, Burns, et al. (1999) found that over 57 percent of children who used mental health services in their sample received some care from the educational sector, usually a school counselor. Care received in such settings may not be included in our claims database. However, this limitation is perhaps more relevant for older children, and our results show that younger children experienced the largest declines in the proportion of enrollees who receive care. Second, health plans often limit the amount of care covered by the plan, and utilization above this limit may not be included in the claims data. However, these limitations would not affect trends over time unless the amount of care received at school or health plan coverage limits changed substantially over time. We suspect that any increase in the amount of school-based care or decline in coverage limits from 1993 to 1996 would be small and certainly would not completely account for the large declines in service use and costs.

Despite these limitations, it is clear that the proportion of children covered by this national claims database who received mental health services declined substantially between 1993 and 1996, as did both the amount and the cost of care among those who received services. These patterns are justified if we can find evidence that some care given in 1993 was unnecessary. In the absence of such evidence, these data generate concerns about the way in which health insurance plans control mental health service delivery among privately insured children. Further studies are needed to determine the effect of these declines on clinical outcomes.

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