

The Cost of Medicaid-Covered Services Provided to Disabled Adults With Neurologic Disorders: Implications for Managed Care

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Abstract

Objectives: To estimate the mean annual per capita cost of care provided to disabled adult Medicaid recipients with neurologic conditions and to compare mean annual costs for disabled adult Medicaid recipients with those of nondisabled adult Medicaid recipients.

Study Design: Medicaid eligibility and claims files for all of calendar year 1993 were obtained from the state of Pennsylvania. Mean annual per capita costs are mean Medicaid expenditures on claims filed for Medicaid-covered services and pharmaceuticals provided in 1993 to full-year eligible Medicaid recipients.

Patients and Methods: Disabled adults aged 18 to 64 years with one or more of several neurologic conditions were identified from medical diagnoses (*International Classification of Diseases, 9th Revision* codes) reported on claims. A comparison group of nondisabled adults was chosen from the Medicaid Eligibility File. Annual costs were estimated for a wide range of specific services as well as for 3 broad service categories.

Results: There were large differences between disabled and nondisabled adults in mean annual per

capita costs of acute care and other medical services (\$4142 vs \$1451), rehabilitation and support services (\$3835 vs \$235), and pharmaceuticals (\$1116 vs \$382). Mean costs also differed significantly among persons with different neurologic conditions. The mean annual per capita cost for all services was \$5368 for adults with epilepsy and \$19,356 for those with a spinal cord injury. All differences are statistically significant ($P < .001$).

Conclusions: States may want to separately capitate rehabilitation and support services given the large differences in the magnitude and relative distribution of costs for disabled and nondisabled Medicaid recipients.

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Combined federal and state spending in fiscal year 1995 on the over 40 million Medicaid recipients in the United States was approximately \$159 billion. That figure was 3 times higher than Medicaid expenditures a decade ago.¹ In part to dampen escalating costs, states have been moving their enrollees from traditional fee-for-service arrangements to managed care plans.² Nationally, 40.1% of Medicaid recipients were enrolled in primary care case management programs or other managed care arrangements in 1996.³ In comparison, only 14.4% of Medicaid recipients were enrolled in managed care arrangements in 1993.

Disabled Medicaid recipients, however, typically have been excluded from mandatory Medicaid managed care programs, especially capitated plans.

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Individuals with serious chronic illnesses pose a challenge to policy makers implementing capitated managed care. A key problem is how to establish capitation rates that encourage providers to enroll and deliver needed services to individuals with above-average care needs. Other challenges include overcoming managed care organizations' inexperience with providing care to individuals who have disabling chronic illnesses and states' inexperience with monitoring the quality of care received by Medicaid recipients in capitated plans.

This research continues efforts to develop capitation rates that encourage managed care plans to enroll disabled Medicaid recipients. Kronick and colleagues^{4,5} developed the Disability Payment System, in which they used Medicaid claims data to create diagnostic categories that substantially increase the ability of states to predict expenditures for disabled Medicaid recipients. However, persons who spent any time in a nursing home or intermediate-care facility for the mentally retarded (ICF-MR) and persons who received any home- and community-based waiver service were excluded from their analyses. Our research included these individuals, and we estimated per capita Medicaid expenditures for the full range of Medicaid-covered services, including the use of nursing homes and ICF-MRs, by disabled Medicaid recipients with a serious neurologic disorder.

Pennsylvania Medicaid Program data for calendar year 1993 were used to estimate the cost of (ie, state expenditures for) covered services used by disabled adults with one or more of several chronic neurologic conditions: cerebral palsy, epilepsy, a head injury, multiple sclerosis, or a spinal cord injury. These conditions were selected because they have the potential to cause similar medical complications and limitations in physical functioning; affect working-age adults, who are an important target population for many Medicaid managed care programs; and occur frequently enough so that a range of services can be analyzed. The study had 2 primary objectives:

- (1) To estimate the mean annual per capita cost of care provided to disabled adult Medicaid recipients with neurologic conditions, and
- (2) To compare mean annual costs for disabled adult Medicaid recipients with those of nondisabled adult Medicaid recipients.

The results provide new information on the relative cost of medical and supportive services used by disabled and nondisabled Medicaid recipients and highlight the challenge of including chronically ill individuals in capitated plans.

...METHODS ...

Before recently enacted changes, Medicaid coverage was mandatory for certain "categorically needy" groups, including persons receiving federal cash benefits under the Supplemental Security Income Program or Aid to Families with Dependent Children. In 1993, the Pennsylvania Medicaid Program covered the "mandatory services" that all state Medicaid programs must offer to recipients who are classified as categorically needy. These individuals also had 18 "optional services" covered. We limited our analysis to individuals who were categorically needy throughout 1993 because the medically needy program in Pennsylvania covered fewer optional services. Within the categorically needy group, persons who met the Social Security Administration definition of disability at any point in 1993 were identified. All other persons were classified as nondisabled.

Pennsylvania Medicaid claims files include records for all covered services provided to Medicaid recipients and submitted to Medicaid by providers. The Inpatient Facility Claims File contains claims from hospitals, nursing homes, and other residential care facilities. The Physician and Outpatient Claims File contains claims for physician and outpatient services provided to Pennsylvania Medicaid enrollees. The Drug Claims File contains claims for pharmaceutical prescriptions reimbursed by the Pennsylvania Medicaid Program.

The analytic file of disabled enrollees was created by first identifying all disabled persons with a claim reporting a primary or secondary diagnosis (based on *International Classification of Diseases, 9th Revision, Clinical Modification* [ICD-9-CM] codes) of cerebral palsy, epilepsy, a head injury, multiple sclerosis, or a spinal cord injury in 1993. Persons who were diagnosed with more than one of these conditions were treated as a distinct group, so in total, 6 mutually exclusive neurologic groups were created. The first step in the creation of the comparison group was to draw a 5% random sample of nondisabled persons from the Pennsylvania Medicaid Eligibility File. A sample was selected because of the very large number of nondisabled adults on the file.

The next step was to exclude from both the disabled and nondisabled analytic files persons who met any of the following criteria: missing or invalid unique identification number or inconsistent demographic data; age less than 18 years on January 1, 1993; age more than 64 years on December 31,

1993; enrollee in a health maintenance or health-insuring organization at any time in 1993; Pennsylvania State Blind Pension Program or Medically Needy Program beneficiary at any point in 1993; any insurance other than Medicaid; and a diagnosis of either mental illness or mental retardation.

The insurance exclusion was necessary because our intent in this research was to estimate the cost of the full range of healthcare services used by Medicaid recipients. Medicaid is always the payer of last resort, and individuals with some other form of insurance might use services that would not be captured in the Medicaid claims files because they are covered by another insurer. Persons diagnosed with some form of psychosis (ie, ICD-9-CM diagnosis codes 290-299) or mental retardation (ie, ICD-9-CM diagnosis codes 317-319) were excluded because they tend to use a distinct set of services (eg, psychiatric partial hospitalization, ICF-MRs) and may be enrolled only in capitated plans that specialize in their care.

The number of persons excluded for each of the reasons specified above is sensitive to the order in which the exclusions occurred because some individuals met more than one of the exclusion criteria. Persons with insurance other than Medicaid were excluded relatively early in the process and represent a large share of those excluded. There were 4829 persons excluded from the disabled cohort and 3100 excluded from the nondisabled cohort because they had some type of insurance other than Medicaid or Medicare. In addition, another 3226 persons in both files were excluded because they had Medicare coverage. Also excluded were 1854 persons from the disabled cohort and 381 from the nondisabled cohort with a diagnosis of mental illness or mental retardation. A total of 74 persons in the disabled cohort and 1482 in the nondisabled cohort were excluded because they were eligible for Medicaid benefits as a result of their expenditures for medical care (ie, they were medically needy and not categorically eligible for Medicaid). Finally, 24 individuals were excluded because they had missing or invalid unique identification numbers or inconsistent demographic data.

The combined files contained the universe of disabled adults with the neurologic conditions studied and a sample of nondisabled adults eligible for Medicaid in Pennsylvania for the entire calendar year of 1993, except for individuals meeting one or more of the exclusion criteria above. Each disabled person was assigned a weight of 1 and each nondis-

abled person was assigned a weight of 20 because the disabled group represents a census and the nondisabled group is a 5% sample. Total cost estimates for disabled and nondisabled persons combined are, in all cases, weighted to adjust for the differential sampling.

Description of Service Categories

The claims for the persons studied were separated into 3 broad service categories: (1) acute care and other medical services, (2) rehabilitation and support services, and (3) pharmaceuticals. These categories and all the specific utilization groups described below are mutually exclusive. That is, a given claim appears in only a single service category. To create these service groups, we first identified acute care and other services traditionally viewed as "medical" care. The remaining claims were then distributed among 10 categories that we refer to collectively as rehabilitation and support services. Pharmaceuticals were treated as a third broad category.

Acute care and medical service claims were assigned to 1 of 5 categories:

1. Hospital stays (ie, inpatient services billed by acute care hospitals);
2. Services provided by physicians regardless of location (ie, in an office, hospital inpatient unit, emergency room, a patient's home, or other location);
3. Outpatient hospital and emergency room visits (ie, outpatient department, special treatment room, or emergency room services billed by general hospitals);
4. Services provided by independent treatment centers (eg, independent laboratories, renal dialysis centers); and
5. Other acute care and medical services (eg, ambulance services).

Rehabilitation and support service claims were assigned to 1 of 10 categories:

1. Nursing facility stays (ie, inpatient services billed by private and public nursing facilities);
2. Rehabilitation and psychiatric hospital stays (ie, inpatient services billed by rehabilitation and psychiatric hospitals);
3. Durable medical equipment, medical supplies, orthotic devices, and prosthetic devices;
4. Home healthcare;
5. Rehabilitation, psychiatric, and other ambulatory rehabilitation support services (eg, physical therapy delivered by independent providers, outpatient

- psychiatric care, outpatient rehabilitation hospital services);
6. Psychiatric partial hospitalization;
 7. Case management (ie, case management services for Medicaid enrollees);
 8. Outpatient drug and alcohol abuse services;
 9. ICF-MR stays; and
 10. Other rehabilitation and support services.

Costs in this analysis represent the amount reimbursed by the Pennsylvania Medicaid Program in calendar year 1993. Therefore, costs are those incurred by the Medicaid program (ie, not the providers' costs). Because we are primarily interested in the relative difference in the magnitude and distribution of costs for different groups of Medicaid recipients, we did not adjust the 1993 cost figures to reflect current dollars.

Differences in patient characteristics and mean costs among the groups studied were tested for statistical significance. A chi-square statistic was used

to test differences in proportions, and a 2-tailed *t* test was used to test differences in mean costs between all disabled adults combined and nondisabled adults. A similar approach was used to test the significance of differences in proportions and means among the 6 neurologic groups. All differences discussed in the text are significant at the $P < .05$ level unless otherwise indicated.

...RESULTS...

Epilepsy was by far the most common diagnosis among disabled adults with a neurologic disorder. Individuals with epilepsy represented 44.5% of the disabled cohort ($n = 1327$). In contrast, persons with a spinal cord injury represented only 4.9% of the disabled group ($n = 146$). Among the 177 persons with more than one neurologic condition, 29.9% had both a head injury and an epilepsy diagnosis, 24.3% had both cerebral palsy and epilepsy, 10.2% had spinal cord and head injury diagnoses, and another 10.2% had multiple sclerosis and epilepsy. Other combinations of neurologic diagnoses occurred less frequently (data not shown).

The distribution of age, sex, and race varied substantially among disabled adults with different diagnoses (Table 1). Mean age ranged from 31.5 years for adults with cerebral palsy to 44.8 years for persons with multiple sclerosis. (The median age is similar to the mean age.) The percentage of disabled adults who were female was in the 40% range except for the epilepsy group (53.5% were female) and those with multiple sclerosis (88.3% were female). Half or more of the members of all groups were white. The percentages ranged from 50.7% of the spinal cord injury group to 81.2% of the multiple sclerosis group.

Disabled adults as a whole were similar to nondisabled adults in the relative distribution of demographic characteristics, except for sex (Table 1). A little more than half of the disabled adults were female versus nearly two thirds of nondisabled adults (54.7% vs 64.2%).

The costs of acute care and other medical services are reported in Table

Table 1. Characteristics of the Study Population*

Population	No.	Percent		Age, y	
		Female	White	Mean	Median
Neurologic group[†]					
Cerebral palsy	438	46.6	77.4	31.5	29
Epilepsy	1327	53.5	65.7	38.0	37
Head injury	545	47.5	56.5	40.7	40
Multiple sclerosis	351	88.3	81.2	44.8	45
Spinal cord injury	146	41.8	50.7	41.6	41
Multiple conditions	177	49.2	66.1	36.7	35
All disabled adults [‡]	2984	54.7	66.9	38.4	37
Nondisabled adults [‡]	3348	64.2	63.2	37.8	36
All adults	6332	63.8	63.4	37.9	37

*Estimates for all adults (ie, disabled and nondisabled adults combined) were weighted to adjust for different rates of sampling. See the Methods section for details on who was included in the study population.

[†]Differences among the 6 neurologic groups in percent female, percent white, and mean age are all statistically significant at $P < .001$.

[‡]Difference between all disabled adults and nondisabled adults in percent female and percent white are statistically significant at $P < .001$. The difference in mean age is not statistically significant at the $P = .05$ level.

2. The mean cost of these services in 1993 was \$4142 for disabled and \$1451 for nondisabled persons, respectively. This represents nearly a 3-fold difference. In terms of individual services, disabled persons' mean costs were approximately 2 to 5 times higher than nondisabled persons' mean costs. For example, mean costs for acute care hospital stays were roughly 3 times higher for disabled adults than for nondisabled adults (\$3077 vs \$949, respectively).

The percent distribution of acute care and other medical service costs is relatively similar for disabled and nondisabled persons. For both groups, the most expensive service was acute care hospital stays. This service accounted for 74.3% of the cost of all acute care/medical services among disabled persons and 65.4% among nondisabled adults.

The costs of rehabilitation and support services are reported in Table 3. The difference in the overall mean costs of these services for disabled and nondisabled persons is even greater than that for acute care/medical services. Among disabled Medicaid recipients, the mean per capita cost for rehabilitation and support services was \$3835 compared with \$235 for nondisabled persons, an over 16-fold difference. Except for the costs of outpatient drug and alcohol abuse services (which were significantly greater for nondisabled persons) and ICF-MR stays (these stays were rare, and costs were not significantly different between the 2 groups), the mean costs for disabled individuals were anywhere from 3 times (psychiatric partial hospitalization) to about 42 times (nursing facility stays) higher than the mean costs for nondisabled individuals.

The percent distribution of rehabilitation and support service costs differs substantially between disabled and nondisabled adults. Nursing facility costs represent almost 70% of the total rehabilitation and support services costs for disabled Medicaid recipients. The next largest category, rehabilitation

and psychiatric hospital stays, accounted for only 11.8% of this group's total costs. For nondisabled adults, nursing facility costs and rehabilitation and psychiatric hospital stays accounted for 26.8% and 26%, respectively, of the total costs. The next highest costs for nondisabled adults were in the areas of home healthcare (9.8%); durable medical equipment, prosthetics, orthotics, and medical supplies (8.9%); and outpatient drug and alcohol abuse services (8.5%).

The mean per capita cost for each broad category of service, including the cost of pharmaceuticals, is reported in Table 4. The mean cost of all Medicaid-covered services for disabled recipients is 4.4 times the cost for nondisabled recipients (\$9093 vs \$2068). The mean cost of pharmaceuticals, like acute care/medical and rehabilitation and support services, also are substantially larger for the disabled group compared with the nondisabled group (\$1116

Table 2. Mean Costs of Acute Care and Other Medical Services and Percent Distribution of Costs*

Service	Mean Cost ± SE, \$ (Percent Distribution) [†]		
	Disabled (n = 2984)	Nondisabled (n = 3348)	All Adults (n = 6332)
Acute care hospital stays	3077 ± 154 (74.3)	949 ± 68 (65.4)	1040 ± 53 (66.5)
Physician visits	500 ± 14 (12.1)	240 ± 8 (16.5)	251 ± 6 (16.0)
Hospital outpatient and emergency room visits	320 ± 8 (7.7)	164 ± 6 (11.3)	171 ± 4 (10.9)
Independent treatment center services	174 ± 20 (4.2)	84 ± 6 (5.8)	87 ± 5 (5.6)
Other acute care/ medical services	71 ± 4 (1.7)	14 ± 2 (1.0)	16 ± 1 (1.0)
All acute care/ medical services	4142 ± 172 (100)	1451 ± 76 (100)	1565 ± 60 (100)

Estimates for all adults were weighted to adjust for different rates of sampling.

*See the Methods section for a description of the service categories.

[†]Differences in mean costs between disabled and nondisabled adults are all significant at $P < .001$.

Table 3. Mean Costs of Rehabilitation and Support Services and Percent Distribution of Costs*

Service	Mean Cost ± SE, \$ (Percent Distribution) [†]		
	Disabled (n = 2984)	Nondisabled (n = 3348)	All Adults (n = 6332)
Nursing facility stays	2670 ± 190 (69.6)	63 ± 23 (26.8)	174 ± 32 (44.8)
Rehabilitation and psychiatric hospital stays	454 ± 78 (11.8)	61 ± 11 (26.0)	78 ± 14 (20.1)
Durable medical equipment, prosthetics, orthotics, and medical supplies	273 ± 19 (7.1)	21 ± 4 (8.9)	32 ± 4 (8.2)
Home healthcare	256 ± 56 (6.7)	23 ± 7 (9.8)	33 ± 9 (8.5)
Rehabilitation, psychiatric, and other ambulatory support services	55 ± 11 (1.4)	11 ± 1 (4.7)	12 ± 2 (3.1)
Psychiatric partial hospitalization	30 ± 7 (0.7)	10 ± 3 (4.3)	11 ± 2 (2.8)
Case management	17 ± 4 (0.4)	3 ± 1 (1.3)	4 ± 1 (1.0)
Outpatient drug and alcohol abuse services	11 ± 2 (0.3)	20 ± 3 (8.5)	19 ± 2 (4.9)
ICF-MR stays	11 ± 11 (0.3)	15 ± 15 (6.4)	15 ± 11 (3.9)
Other rehabilitation and support services	57 ± 44 (1.5)	8 ± 1 (3.4)	10 ± 6 (2.6)
All rehabilitation and support services	3835 ± 221 (99.8)	235 ± 31 (100.1)	388 ± 40 (99.9)

ICF-MR = intermediate care facility for the mentally retarded.

*See the Methods section for a description of the service categories. Estimates for all adults were weighted to adjust for different rates of sampling. Percentages do not total 100.0 due to rounding.

[†]Differences in mean costs between disabled and nondisabled adults are all significant at $P < .001$ except for differences in the cost of ICF-MR stays and other rehabilitation and support services, which are not significant at the $P = .05$ level.

Table 4. Mean Costs by Broad Service Category and Percent Distribution of Costs*

Service Category	Mean Cost ± SE, \$ (Percent Distribution) [†]		
	Disabled (n = 2984)	Nondisabled (n = 3348)	All Adults (n = 6332)
All acute care/medical services	4142 ± 172 (45.6)	1451 ± 76 (70.2)	1565 ± 60 (66.1)
Rehabilitation and support services	3835 ± 221 (42.2)	235 ± 31 (11.4)	388 ± 40 (16.4)
Pharmaceuticals	1116 ± 25 (12.3)	382 ± 14 (18.5)	413 ± 11 (17.5)
All services	9093 (100.1)	2068 (100.1)	2366 (100.0)

*Percentages may not total 100 due to rounding.

[†]Differences in mean costs between disabled and nondisabled adults for both acute and rehabilitation services are significant at $P < .001$.

vs \$382). The percent distribution for the 2 groups differs strikingly. Acute care/medical costs and rehabilitation costs account for roughly the same percentage of total costs for the disabled (45.6% and 42.2%, respectively). In contrast, acute care/medical services accounted for 70.2% and rehabilitation and support services for 11.4% of total costs for nondisabled persons.

Mean per capita cost by broad service category and neurologic group is reported in Table 5. The mean cost for all Medicaid-covered services varied considerably among the neurologic groups. Disabled persons diagnosed with epilepsy, the largest of the neurologic groups, had the lowest overall mean cost (\$5368), while persons with spinal cord injuries, the smallest of the groups, had the highest overall mean cost (\$19,356). Because persons with epilepsy accounted for 44% of the disabled group, their relatively low mean costs had a substantial effect on the overall mean for all disabled persons.

The mean costs of acute care/medical services and rehabilitation and support services also varied widely among the neurologic groups. Among persons diagnosed with cerebral palsy, multiple sclerosis, and a spinal cord injury, the mean rehabilitation costs substantially exceeded the mean acute care costs. In contrast, the reverse was true for persons with epilepsy and head injuries. Mean costs for the 2 broad categories of services were virtually the same for persons with multiple conditions. Costs associated with pharmaceutical use ranged from \$652 for persons with cerebral palsy to \$1442 for persons with a spinal cord injury and, except for acute care/medical services for persons with

epilepsy, were less than the acute care/medical and rehabilitation service costs within each neurologic group. In general, most disabled adults with a neurologic disorder use some acute care/medical and pharmaceutical services. There was more variation in the percentage using rehabilitation and support services, with persons with a spinal cord injury most likely to use these services (76%) and persons with epilepsy least likely (32.4%).

In the aggregate, the total annual cost for the entire disabled cohort for all services was \$27.1 million (data not shown). Of this amount, \$12.4 million can be attributed to acute care and medical services, \$11.4 million to rehabilitation and support services, and \$3.3 million to pharmaceuticals. Total Medicaid expenditures on the adults with neurologic conditions selected for study were a very small fraction (0.5%) of all Pennsylvania Medicaid Program costs in 1993 (\$5613 million according to a Kaiser Commission publication). As noted in the Methods section, however, we excluded a large number of individuals so that our estimates would represent the full cost of services covered by Medicaid. Our purpose was to compare the full cost for an illustrative disabled population with the full cost for a nondisabled population in order to better understand the challenges facing state policy makers, insurers, and providers when disabled individuals are included in capitated managed care plans.

A total of 2235 individuals (1854 disabled and 381 nondisabled adults) were excluded from the study solely because they had a psychosis or

mental retardation diagnosis. If we had included these individuals in our analysis, the overall per capita cost for both groups would have been substantially higher. The main reason for the rise in average cost is the much greater use of rehabilitation and support services among those with a psychosis or mental retardation diagnosis. When the mentally ill and mentally disabled were included, the mean cost of rehabilitation services for disabled persons more than doubled (going from \$3835 to \$9914) and it increased nearly 5-fold for the nondisabled (going from \$235 to \$1130). The cost of ICF-MR stays, which averaged \$11 per disabled recipient without the inclusion of the mentally ill and \$4861 with them, was primarily responsible for the increase. In addition, for disabled adults, the mean cost of rehabilitation and psychiatric hospitals

Table 5. Mean Costs by Broad Service Category and Neurologic Group*

Neurologic Group†	Mean Cost ± SE, \$			
	Acute Care/ Medical Services	Rehabilitation and Support Services	Pharmaceuticals	All Services
Cerebral palsy (n = 438)	1693 ± 210	4897 ± 644	652 ± 47	7242
Percent with use	92	74	86	. . .
Percent distribution of costs	23.4	67.6	9.0	100.0
Epilepsy (n = 1327)	3129 ± 194	1084 ± 144	1155 ± 36	5368
Percent with use	100.0	32.4	98.2	. . .
Percent distribution of costs	58.3	20.2	21.5	100.0
Head injury (n = 545)	7014 ± 624	4385 ± 499	1088 ± 63	12,847
Percent with use	99.6	54.5	89.0	. . .
Percent distribution of costs	56.2	35.1	8.7	100.0
Multiple sclerosis (n = 351)	3776 ± 340	7686 ± 873	1399 ± 87	12,861
Percent with use	99.1	72.6	96.0	. . .
Percent distribution of costs	29.4	59.8	10.9	100.1
Spinal cord injury (n = 146)	7397 ± 975	10,517 ± 2041	1442 ± 136	19,356
Percent with use	99.3	76.0	95.9	. . .
Percent distribution of costs	38.2	54.3	7.4	99.9
Multiple conditions (n = 177)	6988 ± 955	6985 ± 1117	1233 ± 93	15,206
Percent with use	98.8	70.1	97.2	. . .
Percent distribution of costs	46.0	45.9	8.1	100.0
All disabled (n = 2984)	4142 ± 173	3835 ± 221	1116 ± 25	9093
Percent with use	98.5	51.6	94.2	. . .
Percent distribution of costs	45.6	42	12.3	100.1

*Percentages may not total 100.0 due to rounding.

†Differences in mean costs among the 6 neurologic groups are all significant at $P < .001$.

jumped 3-fold from \$454 to \$1796. For nondisabled adults, the mean ICF-MR cost increased from \$15 to \$408 and the rehabilitation and psychiatric hospital cost increased over 7-fold from \$61 to \$430. Acute care/medical services and pharmaceutical costs also increased but to a much lesser extent.

... DISCUSSION ...

In this paper we present new evidence on the extent to which the cost of Medicaid services differs for disabled and nondisabled Medicaid recipients. All disabled adults ages 18 through 64 years with one or more of several neurologic disorders were compared with a sample of nondisabled adults. By including persons who were in institutions (eg, nursing homes) or receiving other long-term care services, we were able to estimate the cost of providing the full range of Medicaid-covered services. There was a 4-fold difference in mean per capita annual costs in 1993 between disabled and nondisabled Pennsylvania Medicaid recipients (\$9093 vs \$2068, respectively). When adults who also had severe mental illness or mental retardation were included, mean costs rose substantially to \$15,677 and \$3197, a 5-fold difference between disabled and nondisabled adults.

There also were large differences in the relative distribution of costs between disabled and nondisabled Medicaid recipients. Covered services were grouped into 3 broad categories: (1) acute care/other medical services, (2) rehabilitation and support services, and (3) pharmaceuticals. Costs for disabled adults (excluding those with severe mental illness or mental retardation) were almost evenly divided between acute care/medical services and rehabilitation and support services (the former accounted for 45.6% and the latter for 42.2% of total costs). Pharmaceuticals comprised the balance of total costs (12.3%). The relative distribution was very different for nondisabled adults. Acute care/medical services accounted for the great majority of total costs (70.2%), and pharmaceutical costs were more than those for rehabilitation and support services (18.5% vs 11.4% of total costs, respectively).

These results have important implications for states developing managed care programs for their disabled recipients. Currently, many states are excluding disabled persons who are residents of nursing homes or who require other types of long-term care from mandatory programs.⁶ Our results indicate that this trend will substantially affect

mean costs for the Medicaid-covered services used by disabled persons who *are* included and, therefore, the rate structure for capitated managed care programs. Inpatient nursing facility costs alone accounted for 70% of rehabilitation and support services costs and about 33% of all costs for disabled adults in our study. If persons using nursing facility and long-term care services are excluded from managed care programs, clearly a large proportion of total Medicaid costs will continue to be paid using traditional Medicaid reimbursement methods.

Enrolling individuals who use institutional long-term care in capitated plans is appealing, however, because managed care organizations would have an incentive to keep individuals out of expensive institutions and in the community as long as community care remains a less-expensive and appropriate alternative. For disabled Medicaid recipients who use other long-term care services, managed care organizations provide the advantage of integrated services often provided at a single location. This opportunity for "one-stop shopping" could simplify and improve health and long-term care for the Medicaid population, especially those with a limited ability to travel.^{7,8}

To the extent that managed care organizations are unable or unwilling to provide the full range of Medicaid-covered services, states may want to separately capitate rehabilitation and support services. States then could contract with organizations that have experience providing chronic care services or give disabled individuals cash or vouchers and the authority to arrange their own services.

In any case, as states shift their Medicaid populations into managed care, they need to assume the role of healthcare purchaser.⁷ To ensure that access to needed services is adequate and that appropriate care is maintained, states will have to evaluate the needs of their Medicaid populations and the capabilities and practices of managed care organizations. As our research has shown, disabled Medicaid recipients use rehabilitation and support services extensively. The quality of these services, including the extent to which they are integrated with routine medical care, should be an important component of states' evaluation plans. Unfortunately, patient-level data and the benchmarks needed to measure the quality of care are not always available for states to assess the needs of their managed care enrollees and the adequacy of the care they receive.^{9,10}

Our results highlight an additional problem that states face. Even among disabled adults expected to have relatively similar medical and functional prob-

lems, there were large differences in the magnitude of costs and their relative distribution. Adults with cerebral palsy, multiple sclerosis, and spinal cord injuries used far more rehabilitation and support services, whereas those with epilepsy and head injuries used more acute care/medical services. Because mean costs are influenced by the prevalence of different conditions, mean costs estimated for a relatively broad group of diagnoses may not accurately reflect the expected cost for neurologic groups within the broad category. In this study, persons with epilepsy, who comprised by far the largest neurologic group, had the lowest mean total cost (\$5368). Individuals with spinal cord injury, the smallest neurologic group, had the highest mean total cost (\$19,356). To ensure that plans make active efforts to enroll all disabled individuals and provide needed care, states may want to limit the financial risk assumed by plans, especially for persons with low-prevalence and potentially high-cost conditions, while rate-setting mechanisms are being refined.

Since 1993, therapeutic advances have been made in the treatment of neurologic disorders, including epilepsy, multiple sclerosis, and spinal cord injury. As is the case with many technological advances in medical care, the introduction of new therapies probably has increased some costs, most likely pharmaceuticals, while possibly reducing the use of medical, rehabilitation, and support services by slowing disease progression or mitigating symptoms. Whatever the specific cost scenario, the large differences observed here suggest that our conclusions would not be changed if more recent data were available for analysis.

Our results show that the cost of providing the full range of Medicaid-covered services to disabled adults is considerably higher than the cost of services provided to nondisabled persons. In addition, mean annual per capita costs vary substantially among adults with different neurologic conditions. Although states and managed care organizations may lack adequate data on utilization and costs, and managed care organizations may have insufficient experience providing the full range of services required, increasing numbers of disabled Medicaid recipients are being enrolled in managed care plans. The ability of states to work with providers to develop fair and equitable capitation strategies will only grow in importance as this movement continues.

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...REFERENCES ...

1. US General Accounting Office. *Medicaid Managed Care: Serving the Disabled Challenges State Programs*. Washington, DC: US General Accounting Office; 1996. Publication HEHS-96-136.
2. Bailit MH. Ominous signs and portents: A purchaser's view of healthcare market trends. *Health Aff* 1997;16(6):85-88.
3. Healthcare Financing Administration. *1996 Medicaid Managed Care Enrollment Report*. Washington, DC: Healthcare Financing Administration, Office of Managed Care; 1996.
4. Kronick R, Dreyfus T, Lee L, Zhou Z. Diagnostic risk adjustment for Medicaid: The disability payment system. *Healthcare Finance Rev* 1996;17(3):7-33.
5. Kronick R, Zhou Z, Dreyfus T. Making risk adjustment work for everyone. *Inquiry* 1995;32:41-55.
6. Bachman S, Burwell B. *Medicaid Carve-Outs: Policy and Programmatic Considerations*. Cambridge, MA: The MEDSTAT Group; 1997.
7. Epstein AM. Medicaid managed care and high quality. *JAMA* 1997;278:1617-1621.
8. Hoffman C, Rice D, Sung HY. Persons with chronic conditions. *JAMA* 1996;276:1473-1479.
9. Buchanan JL, Leibowitz A, Keeseey J, Mann J, Damberg C. *Cost and Use of Capitated Medical Services*. Santa Monica, CA: RAND Corporation; 1992.
10. US General Accounting Office. *Medicaid Managed Care: Challenge of Holding Plans Accountable Requires Greater State Effort*. Washington, DC: US General Accounting Office; 1997. Publication HEHS-97-86.