

Health Care Utilization by Children With Chronic Illnesses: A Comparison of Medicaid and Employer-insured Managed Care

Deborah Shatin, PhD*; Regina Levin, MPH*; Henry T. Ireys, PhD‡; and Virginia Haller, MD§

ABSTRACT. *Objectives.* This study compared utilization of health care services by children with chronic conditions who were insured by either Medicaid or an employer group in 1992 and 1993. Five chronic conditions were selected to illustrate patterns of service use: asthma, attention deficit disorder, diabetes, epilepsy, and sickle cell anemia.

Methodology. Administrative databases were used to develop estimates of health services utilization for children <18 years of age with the five selected conditions, who had been enrolled for at least 6 continuous months. All claims for a child identified with one of these five conditions were included in the analysis, including claims for diagnoses and procedures not directly related to the primary diagnosis. Estimates were derived for eight services (eg, hospital admissions, emergency department (ED), home health). Data were used from two Independent Practice Association model health plans in two states. Differences across the states were controlled by selecting one Medicaid and one employer-insured program from each of the two plans in both states. Regional variation was controlled for because both health plans were located in one geographical region. In each case, physicians were paid on a fee-for-service basis, with generally open access to specialists rather than primary care gatekeeper models of delivery: *t* tests were used to compare service use rates between Medicaid and employer-insured populations.

Results. A total of 8668 children across all health plan groups had at least one of the selected conditions. Because Medicaid enrolled-children tended to be younger, analyses were adjusted for age. In both systems, a greater percentage of Medicaid children had these five study conditions (5%) compared with employer-insured children (3%), suggesting that the Medicaid population was sicker. Mean length of enrollment during the 2-year study was longer for children in employer-insured programs. Children with chronic conditions enrolled in Medicaid managed care generally used services at a higher rate compared with children with similar conditions enrolled in employer-insured managed care. The extent of the increased use varied by condition, by ser-

vice type, and by plan. Children with any of the chronic conditions studied had from 2 to almost 5 times more ED visits if they were enrolled in Medicaid than if they were enrolled in employer-based managed care, depending on the specific condition. In one of the two plans, Medicaid-enrolled children had more outpatient services, laboratory services, and radiography services than their counterparts in employer-based managed care. The same pattern of use was found for home health services (except for children with diabetes) and for office visits (except for children with sickle cell). The results show higher use of all services by children with asthma and diabetes in Medicaid managed care compared with employer-based managed care. In contrast, the pattern is mixed for children with epilepsy and sickle cell. The sample size of children with these conditions was smaller than with the three other conditions, which may account, in part, for a varied pattern of results. The pattern of use for attention deficit hyperactivity disorder (ADHD) was generally different from the other conditions. Children with ADHD in employer-based managed care had more hospital admissions, hospital days, and office visits than their counterparts in Medicaid managed care. In contrast, Medicaid-enrolled children with ADHD had more ED visits, laboratory services, outpatient hospital visits, and radiography services. Other than ED visits, the differences in service use between Medicaid and employer-insured children with ADHD were minimal. Of note, the pattern for ADHD is the same for most services for Plans A and B (excluding home health visits). This utilization pattern may reflect service use for comorbid conditions. Part of this difference may be explained by differences in Medicaid eligibility criteria used by the two plans. Medicaid eligibility regarding level of poverty was more stringent in Plan A than in Plan B. Plan A showed consistently high service utilization for Medicaid children compared with employer-insured children; Plan B showed less consistency. There are several patterns of utilization common to all disease and insurance groups. The majority of care seems to be delivered in physicians' offices, rather than in other locations. When comparing the differences by disease categories, asthma shows more statistically significant differences in utilization between Medicaid and commercially-insured children than the other conditions. Asthma is the most prevalent condition of these five, which increases the power to detect statistical significance for this defined population. These results show the importance of evaluating conditions other than asthma, because utilization comparisons for different services may vary depending on the condition studied.

Conclusion. This study of children with selected chronic health conditions indicates that: 1) a higher percentage of children enrolled in Medicaid managed care (5%) have these conditions compared with children enrolled in employer-insured managed care programs (3%); 2) on average, children with chronic health conditions who are enrolled in Medicaid managed care use more

From the *Center for Health Care Policy and Evaluation, United Health-Care, Minneapolis, Minnesota; ‡Department of Maternal and Child Health, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Maryland; and the §Ohio Department of Health, Columbus, Ohio.

Virginia Haller, MD, was formerly at United HealthCare of Ohio.

Earlier versions of this article were presented at the Minnesota Health Services Research Conference, February 24, 1997 and the American Association of Health Plans/Agency for Health Care Policy and Research Bridges Conference, April 3, 1997.

Received for publication Oct 2, 1997; accepted May 19, 1998.

Reprint requests to (D.S.) PO Box 1459, MN008-W109, Minneapolis, MN 55440-1459.

PEDIATRICS (ISSN 0031 4005). Copyright © 1998 by the American Academy of Pediatrics.

services than children with similar conditions who are insured through employers; and 3) although utilization rates are generally higher for children enrolled in Medicaid managed care than for children enrolled in employer-based managed care, the differences in rates vary greatly by service, by diagnosis, and by plan. Differences between the children enrolled in Medicaid and children enrolled in employer-based programs were more pronounced in one of the plans we studied compared with the other. Children with chronic conditions in Medicaid managed care have substantially different patterns of service use compared with children with similar conditions in employer-based managed care. This finding has major implications for policy development related to legislative proposals regarding referral practices, quality assurance, and capitation rates. Our results demonstrate the importance of examining a broad spectrum of chronic conditions and services when comparing Medicaid to employer-insured children with special needs. Utilization of several services, including ED, was higher for Medicaid children than for employer-insured children. Further analysis is recommended that controls for breadth-of-benefit package, severity of illness, and age. Also, differences across plans suggest that research at more than one site is critical for comprehensive policy analyses. *Pediatrics* 1998;102(4). URL: <http://www.pediatrics.org/cgi/content/full/102/4/e44>; *Medicaid, children, chronic conditions, utilization, managed care.*

ABBREVIATIONS. HMO, health maintenance organization; FFS, fee-for-service; ED, emergency department; ADD, attention deficit disorder; ADHD, attention deficit hyperactivity disorder; IPA, Independent Practice Association; CPT, current procedural terminology.

With changes in the organization of the United States health care system and a concomitant increase in enrollment in managed care, health services research attention on this form of health care delivery system has accelerated. Approximately 150 million Americans were enrolled in some form of managed care plan in 1994, with an estimated 16.7 million children or 22% of Americans <20 years of age enrolled in health maintenance organizations (HMOs) in 1994.¹ States are increasingly enrolling Medicaid populations in managed care organizations in an attempt to contain costs. As the fastest growing of all federal grant-in-aid programs, the number of Medicaid beneficiaries increased from 22.3 million in 1989 to 32.1 million in 1993, with total expenditures reaching an estimated \$157 billion in 1995, from \$51.3 billion in 1988.²

Numerous studies on managed care have been published, although a limited number focus on children.^{3,4} Valdez et al⁵ reported on a randomized controlled trial that evaluated differences in health care utilization by children between a staff model HMO and cost-sharing fee-for-service (FFS) coverage. The authors concluded that children in FFS plans had fewer medical contacts and fewer preventive services. Another study of low-income children found that an HMO appropriately provided needed services to children with such chronic conditions as diabetes and allergies.⁶ In this randomized controlled trial, prepaid and FFS Medicaid enrollees used the emergency room in a similar manner; however, healthy children in the prepaid plan had fewer acute

care visits whereas those with chronic problems such as allergies had more visits.

Another published study suggested that the probability of seeing a specialist was found to be 30% lower for adults and children in Medicaid managed care as compared with conventional Medicaid, based on Federal demonstration projects in the early 1980s.⁴ This summary of research in the Medicaid managed care setting concluded that the only consistent finding across studies is the reduction of emergency room use by children enrolled in Medicaid managed care and concentration of care among a smaller number of primary care physicians. Changes in hospital use in Medicaid managed care plans were not consistent across summarized studies, with some reporting increases, decreases, or mixed effects. Although research summarized by Hurley and colleagues⁷ did not differentiate visits to primary care physicians from specialists, the authors concluded that Medicaid managed care settings were more likely to report a decrease in physician visits overall. Although one program did report an increase in physician visits, the authors suggest that apparent reductions in other programs may reflect underreporting of physician visits because of data limitations.

Children with chronic health conditions and disabilities represent both high use of services and high cost utilization;^{8,9} these children use medical services at rates that range from 3 to 20 times higher than healthy children, depending on the specific condition. The needs of children with chronic diseases are important to understand as states and employers contract with health plans in an attempt to expand access to coverage and to limit growth in costs of health care. As Newacheck et al¹⁰ summarize, children with chronic conditions that are activity-limiting tend to use both more acute care services as well as more rehabilitative services. Based on a survey of HMOs, Fox et al¹¹ suggest that HMOs may offer both advantages (such as comprehensive benefits) and disadvantages (such as referral restrictions) over FFS plans for children with special needs. Our focus on a number of chronic disease conditions for children is, therefore, of interest to various parties concerned with the care of children, including policy-makers, providers, health care organizations, and family advocacy groups.

From a policy perspective, it is important to know the effects of managed care in comparison to traditional indemnity systems for both Medicaid and employer-insured children with chronic conditions. In practice, the implementation of managed care is likely to move forward whether or not comparative data are available. Therefore, at the very least, research efforts should focus on understanding utilization and outcomes of managed care on poor and non-poor children as a potential way of assessing equity in quality of care.

To date, however, baseline data on service use of children in managed care are generally unavailable, with the possible exception of children with asthma. This study begins to address this problem by describing differences in health care utilization, comparing children with chronic illnesses in Medicaid managed

care and children with similar conditions in commercially-insured managed care. Various components of health care delivery are examined, including inpatient admissions, emergency department (ED) use, home health care, and physician visits. Specific conditions selected for analysis include: asthma, attention deficit disorder (ADD/attention deficit hyperactivity disorder [ADHD]), diabetes, epilepsy, and sickle cell anemia. These conditions were chosen primarily because of their relatively high prevalence.

A further strength of this comparison is the use of comparable administrative claims data for Medicaid and for commercially-insured children in the same two Midwestern states. Controlling for geographical location across these plan settings, this comparison focuses on children with five specific chronic diseases in two different managed care settings (Medicaid and commercial). There are, of course, a number of differences between Medicaid and commercially-insured children. Hughes et al¹² note that Medicaid-insured children have different health care needs deriving in part from "vulnerable, stressful living," greater demand for services, more covered benefits with little or no cost-sharing under Medicaid compared with private insurance, and fluctuating eligibility for Medicaid leading to many breaks in coverage.

Recognizing that children in commercial and in Medicaid health-care delivery systems differ in socioeconomic factors such as family income and education levels, this analysis of specific chronic disease conditions will provide comparative data on utilization of various health care services by these two populations of children. Overall, we hypothesized that service use would be higher for Medicaid-enrolled children with chronic conditions compared with commercially-enrolled children with the same chronic conditions.¹³

PLAN DESCRIPTIONS

In the continuum of types of managed care from staff or group model to open access Independent Practice Association (IPA) model, these plans repre-

sent the latter arrangement. As is typical in an IPA model health plan, the plan contracts with a network of physician/physician practices. The two plans in this study allowed patients to visit any physician in the network and did not require a primary physician gatekeeper or approval to visit specialists. This retrospective study used administrative claims data for two IPA model health plans affiliated with United HealthCare and located in the Midwest. Each managed care plan location provided health care services for both Medicaid and commercially-insured populations. Participating physicians are individual contractors with the health plans rather than being health plan employees. They are paid on a discounted FFS basis. This analysis was based on calendar year 1992 and 1993 data.

Medicaid eligibility is complex, particularly when making comparisons across states with different eligibility requirements. Because this study attempts to compare similar chronically ill children under Medicaid and commercial insurance, only Medicaid recipients up to 18 years old from the Aid to Families with Dependent Children program were included for each of the two sites. Disabled Social Security Income beneficiaries, the institutionalized, and aged were excluded (See Table 1 for plan descriptions). Social Security Income beneficiaries were excluded because they are unlikely to be represented in the commercial population, and were treated differently with regard to managed care initiatives in the two states during the study period. Plan A provided voluntary coverage for Aid to Families with Dependent Children under two eligibility requirements set by the State Medicaid program. Approximately two-thirds of Medicaid members of the plan met the criteria of family income of 33% or less of the Federal poverty guidelines, whereby coverage was provided for all children up to the age of 18. The remaining one third of those enrolled, who were between 33% and 100% of the Federal poverty guidelines, were provided coverage up to age 8. For children <1 year of age, the level of poverty for eligibility was up to 133%. Plan B provided coverage for children <21

TABLE 1. Medicaid and Commercial-managed Care Plan Characteristics: 1992-1993

	Plan A		Plan B	
	Employer-insured	Medicaid	Employer-insured	Medicaid
Start date	1980	1985	1991*	1985
Type of enrollment	Employer sponsored	Voluntary	Employer sponsored	Mandatory
Eligibility categories†	N/A	AFDC/related	N/A	AFDC/related, aged, SNF
% Poverty level for eligibility	N/A	<1, up to 133%; 1-8, up to 100%; 9-18, up to 33%	N/A	<1, up to 275%; 1-5, up to 130%; 6-8, up to 100%; 9-21, up to 80%
Type of Program	Primarily open access	Open access and limited risk contracting (quasi-gatekeeper)	Open access	Open access and risk contracting with urban hospitals
Preexisting condition exclusion	Typically a 3-month waiting period	No	Rarely applied	No
Enrollees ≤18‡	51 156	34 938	101 002	37 822

Abbreviations: AFDC, Aid to Families with Dependent Children; SNF, skilled nursing facility.

* Existed previously under another administrative structure.

† Only AFDC included in analysis.

‡ ≥ 6 months continuous enrollment.

years of age eligible for medical assistance, with the level of poverty required for eligibility dependent on the child's age. Eligibility ranged from <80% of the Federal poverty guidelines for children ages 9 to 21 years, to 275% of the Federal poverty guidelines for children <1 year of age. Managed care was the only option for medical care that was available to those eligible for Medicaid in covered counties of the state. Eligibility requirements did change somewhat during the 2 study years.

Because the benefit structures and cost-sharing were different for Medicaid and commercially-insured members, it was more appropriate to compare health care utilization rather than cost. Unlike commercial plans, which typically charged members a modest per visit copayment for network coverage, Medicaid covered services without deductibles or copayments. As an example, ED visits were free for Medicaid members, but required an ~\$25 copayment for commercial members. Both Medicaid settings required members to use network physicians only: Plan B did not require referral to specialists by a primary care physician. Plan A, as a quasi-gatekeeper model, did not require referral for obstetric/gynecologic, dental, or optometrist services, but did require primary care referrals for other specialists. No financial incentives regarding referrals were made with primary care physicians. Both commercial plans were typically open access models that did not require referral to a specialist by a primary care physician. Commercial plans also offered a point-of-service option, purchased by some (but not all) employers, whereby members could use nonparticipating physicians subject to a deductible and a larger copayment amount.

METHODS

Description of Administrative Database

An administrative claims database was used for secondary analysis of health care utilization by children with five selected chronic diseases in two Medicaid and commercial sites. Both settings used claims forms for billing purposes. Adjudicated, or paid, claims are copied to longitudinal physician and facility databases for purposes of reporting and research. Using encrypted member identifiers to link these databases, longitudinal records of health care services provided to individual plan members are formed. Physician claims contain up to four diagnosis codes, while facility claims have up to five diagnosis codes per claim for the years included in the analysis. For this study, any diagnosis with the chronic disease of interest was included. Patient diagnoses are represented by the *International Classification of Diseases 9th Revision Clinical Modification*¹⁴ (ICD-9-CM) diagnosis codes and procedures by the *Physicians' Current Procedural Terminology, CPT 1994*¹⁵ (CPT) codes on provider claims. Claims data files are also linked via an encrypted identifier to demographic information (date of birth, gender), as well as to provider files that include primary care or specialty area. The automated claims databases originate as individual claims submitted by health care providers for payment for services rendered to members. Thus, the database is likely to represent a substantially complete description of services received by members in the health plans.

Selection of Study Population

Participants selected for inclusion in this study were 18 years of age or less, calculated at January 1, 1992 or date of first enrollment (whichever occurred first). Children were required to have been enrolled in their health plan for a minimum of 6 continuous months between January 1, 1992 and December 31, 1993. This

enabled each child to have had an opportunity for some utilization, yet also permitted a degree of transience in health plan membership, as often occurs in Medicaid insurance products. The number of children that met these criteria across all sites was 224 918.

Selection of Chronic Disease Conditions and Identification of Children

To determine the most prevalent chronic conditions among Medicaid and commercially-insured children, claims were aggregated into clinical categories. A clinical classification system developed by the federal Agency for Health Care Policy and Research to evaluate patterns of hospital utilization and cost was used to facilitate the aggregation of claims by clinical condition or procedure.¹⁶ The Agency for Health Care Policy and Research diagnosis classification system is based on ICD-9 codes and the procedure classification system is based on CPT codes.

The most frequently occurring chronic conditions were examined for appropriateness of inclusion in this study. Criteria for appropriateness included relative homogeneity in the clinical condition and low susceptibility to the limitations of administrative data. Through this process, five conditions were selected for evaluation: ADD/ADHD, asthma, diabetes, epilepsy, and sickle cell anemia. Although epilepsy and sickle cell anemia have very low prevalences, they were included because of the chronicity and severity of these conditions.

Rigorous disease identification algorithms were then created. To be identified as having a disease, a child had to have at least two claims more than 30 days apart. These claims had to have been submitted by a physician or hospital, excluding radiologist, laboratory, or pharmacy. This process increased the ability to eliminate both rule out diagnoses and coding errors. A previous study of the concordance between administrative data and medical records found that such an approach yielded a high true-positive rate of matching for a similar algorithm directed at identifying hypertension patients.¹⁷ The ICD-9 codes used to identify the five conditions for this study are: ADD/ADHD, 314–314.9; asthma, 493–493.91 and 491–491.9; diabetes, 250–250.93 and 251.0; epilepsy, 345–345.91; and sickle cell anemia, 282–282.9.

Study Eligibility

Because this study presents the results for each of the conditions separately, children with more than one condition were excluded from the analysis. However, for those children with one of the five conditions, all health care services during the study period were included in the analysis. All claims for a child identified with one of these five conditions were included in the analysis, including claims for diagnoses and procedures not directly related to the primary diagnosis. Only 2% of the eligible children had more than one of the five listed conditions. This decision was made for a number of reasons. Allocating utilization to the appropriate condition in cases in which there were multiple conditions was not possible. There is also the potential for an interaction between the number of chronic conditions and utilization. Children with two chronic conditions may use more than two times the health care resources than those with one condition.¹⁸ The presence of multiple combinations of comorbidities makes utilization analyses especially difficult. For example, it is possible that a child with diabetes and asthma may use many more resources than a child with ADD/ADHD and asthma. It is also not clear what comorbidities should be controlled for, or whether the conditions examined in this study capture the key comorbidities. Because this study does not attempt to examine or compensate for these potential effects, children with only one of these five conditions were included in the analysis.

In addition to removing children with more than one condition, we also removed a total of 9 children who were considered statistical outliers because of a very high use of provider services. This was defined as more than 100 encounters with a provider specialty during the 2 years of the study. The standard deviation ranged from ~14 to 23 for the number of visits to all physicians, with outliers removed. In several cases, these children also had more than one condition, and would have been excluded using that criteria as well.

Definitions of Utilization Variables

The variables analyzed to evaluate utilization were defined using standard administrative claims database fields. Any utilization of service was included in the analysis, whether or not it was related to the diagnosis of interest. Hospital admissions were defined as the number of unique admissions to inpatient hospitals. Office visits were defined as the number of evaluation and management CPT codes pertaining to outpatient care. Several methods were used to ensure an accurate count of utilization and to eliminate the potential problem of multiple claims for the same visit: ED visits, home health visits, and outpatient hospital visits were limited to a maximum of one visit per facility per day; all claims from providers were limited to a maximum of one visit per individual provider per day; and outpatient laboratory and radiography were limited to a maximum of one CPT code per day.

RESULTS

Description of Populations

A total of 8668 children in all plans combined had at least one of the selected conditions. A description of the eligible populations is provided in Table 2. The Medicaid-enrolled children were younger ($P < .01$). They also had fewer months enrolled on average than commercially-insured children ($P < .01$). Both Medicaid populations had a larger percentage of children with these chronic conditions than the commercial populations ($P < .01$).

Table 3 describes the 8510 children with one of the five conditions included in the analysis for this study. Again, children enrolled in Medicaid are significantly younger than children enrolled in commercial insurance ($P < .01$). The median and mean number of enrolled months were lower for the Medicaid members ($P < .01$).

Table 4 describes the children in each of the 5 disease categories. When stratified by disease, the differences in age and enrollment patterns remain. The greatest difference in age is among children with asthma. Children with epilepsy also have a significant difference in age when comparing insurance products. Additional analyses are adjusted for age. The percent of females with ADD/ADHD is low,

TABLE 2. Description of Eligible Study Populations

	Plan A		Plan B	
	Employer-insured	Medicaid	Employer-insured	Medicaid
Total number of eligible participants	1625	1829	3204	2010
Percent of children with chronic conditions	3.2%‡	5.2%	3.2%‡	5.3%
Age in years	9.1‡	5.5	8.6‡	5.9
% female	32.6%	35.6%	36.6%	38.8%
Mean number of enrolled months	20.3‡	18.3	20.6‡	18.8
Number with 1 condition	1597	1794	3142	1984
Number with 2 conditions	27	35	61	26
Number with 3 conditions	1	0	1	0

* P value between .05 and .1.

† P value between .01 and .05.

‡ P value between .0000 and .01.

TABLE 3. Description of Children Included in Study Analysis

	Plan A		Plan B	
	Employer-insured	Medicaid	Employer-insured	Medicaid
Number	1596	1794	3138	1982
Age in years	9.1‡	5.5	8.6‡	5.9
% female	32.6%*	35.7%	36.8%	38.8%
Mean number of enrolled months	20.3‡	18.3	20.6‡	18.8
Median months enrolled	24	20	24	21

* P value between .05 and .1.

† P value between .01 and .05.

‡ P value between .0000 and .01.

TABLE 4. Description of Age, Gender, and Enrollment by Disease

	Plan A		Plan B	
	Employer-insured	Medicaid	Employer-insured	Medicaid
ADD/ADHD				
Number	642	440	841	307
Age in years	9.4	7.4	9.1	8.1
% female	18%	21%	17%	14%
Mean number of enrolled months	20	18	20.5	18.4
Asthma				
Number	829	1267	1944	1570
Age in years	8.5	4.8	8.3	5.5
% female	42%	40%	43%	43%
Mean number of enrolled months	20.5	18.4	20.7	18.9
Diabetes				
Number	67	26	153	26
Age in years	12.3	11.9	10.9	9
% female	52%	42%	52%	42%
Mean number of enrolled months	19.9	17.5	20.2	18.6
Epilepsy				
Number	50	26	187	53
Age in years	9.3	4.7	9	6.2
% female	38%	42%	51%	40%
Mean number of enrolled months	19.5	17.3	20.3	18.6
Sickle cell anemia				
Number	8	35	13	26
Age in years	6.8	5.2	4.6	2
% female	38%	49%	62%	46%
Mean number of enrolled months	19.5	16.8	19.4	17.8

Abbreviations: ADD, attention deficit disorder; ADHD, attention deficit hyperactivity disorder.

which is generally consistent with other information on the distribution of gender for this condition.¹⁹

Comparison of Utilization of Health Care Services

As Tables 5A and 5B illustrate, children with chronic conditions enrolled in Medicaid managed care generally used services at a higher rate compared with children with similar conditions enrolled in employer-insured managed care. The extent of the increased use varied by condition, by service type, and by plan. Tables 5A and 5B for Plans A and B,

TABLE 5A. Utilization Rates/1000, Adjusted for Age, Plan A

	Employer-insured	Medicaid	% Increase/Decrease*
Asthma			
Hospital admission	11.43	51.99§	355
ED visits	40.47	219.30§	442
Home health	8.39	53.81§	541
Hospital days	43.45	187.67§	332
Laboratory services	154.59	309.70§	100
Office visits	470.47	598.05§	27
Outpatient hospital visits	61.29	98.49§	61
Radiography services	84.95	188.03§	121
Diabetes			
Hospital admission	27.77	58.53§	111
ED visits	27.52	158.22§	475
Home health	75.50	29.30	(158)
Hospital days	125.46	221.70	77
Laboratory services	240.91	687.34§	185
Office visits	405.00	461.62	14
Outpatient hospital visits	148.50	222.33	50
Radiography services	50.82	181.16†	256
Epilepsy			
Hospital admission	24.02	104.83§	336
ED visits	56.92	236.17§	315
Home health	19.23	212.50†	1005
Hospital days	107.91	580.07§	439
Laboratory services	379.48	530.26	40
Office visits	566.07	817.23†	44
Outpatient hospital visits	274.46	305.59	11
Radiography services	134.53	337.35§	151
Sickle cell anemia			
Hospital admission	44.64	81.11	82
ED visits	29.76	130.89†	340
Home health	0	15.76	—
Hospital days	148.81	338.82	128
Laboratory services	264.88	506.23	91
Office visits	482.57	351.70	(37)
Outpatient hospital visits	295.92	320.56	8
Radiography services	85.88	116.01	35
ADD/ADHD			
Hospital admission	5.25	4.13	(27)
ED visits	22.69	72.85§	221
Home health	5.65	0.99§	(471)
Hospital days	49.45	31.55	(57)
Laboratory services	135.04	232.37§	72
Office visits	303.68	440.57§	45
Outpatient hospital visits	48.73	94.61§	94
Radiography services	47.27	71.02§	50

Abbreviation: ED, emergency department.

* This column presents the percentage increase in service utilization for Medicaid children compared to employer-insured children; a decrease, or lower utilization rate for Medicaid, is shown by parentheses.

† P value between .05 and .1.

‡ P value between .01 and .05.

§ P value between .0000 and .01.

respectively, provide the utilization rate/1000 adjusted for age using an analysis of variance model, and also indicate whether the rate is higher for Medicaid children or employer-insured children (decrease in Medicaid relative to employer-insured is indicated by parentheses) along with the percentage difference for the higher utilization.

In Plan A (Table 5A) children with any of the chronic conditions studied had from 2 to almost 5 times more emergency room visits if they were enrolled in Medicaid than if they were enrolled in

TABLE 5B. Utilization Rates/1000, Adjusted for Age, Plan B

	Employer-insured	Medicaid	% Increase/Decrease*
Asthma			
Hospital admission	10.98	30.52§	178
ED visits	38.08	184.77§	385
Home health	35.97	83.37§	132
Hospital days	40.48	119.37§	195
Laboratory services	301.98	305.87	1
Office visits	604.64	635.36	5
Outpatient hospital visits	74.94	154.65§	106
Radiography services	112.49	141.90§	26
Diabetes			
Hospital admission	18.99	38.27†	102
ED visits	28.03	57.26†	104
Home health	73.75	176.09†	139
Hospital days	68.35	215.50§	215
Laboratory services	615.10	712.28	16
Office visits	463.09	585.49	26
Outpatient hospital visits	119.74	202.15	69
Radiography services	70.56	191.10†	171
Epilepsy			
Hospital admission	29.72	41.88	41
ED visits	58.47	167.90§	187
Home health	143.70	131.88	(9)
Hospital days	305.02	385.43	27
Laboratory services	531.82	423.02	(26)
Office visits	573.42	528.05	(9)
Outpatient hospital visits	324.44	229.18	(42)
Radiography services	173.45	186.87	8
Sickle cell anemia			
Hospital admission	96.80	52.00	(86)
ED visits	27.50	140.33†	410
Home health	79.13	889.29	1024
Hospital days	414.09	162.47	(155)
Laboratory services	560.57	239.39†	(134)
Office visits	757.42	537.17	(41)
Outpatient hospital visits	492.07	255.64	(93)
Radiography services	148.69	72.63	(105)
ADD/ADHD			
Hospital admission	4.90	2.64	(86)
ED visits	18.94	53.57§	183
Home health	8.11	10.14	24
Hospital days	57.73	37.38	(54)
Laboratory services	221.01	234.78	6
Office visits	386.10	392.82	2
Outpatient hospital visits	70.24	70.71	1
Radiography services	51.68	51.84	.3

Abbreviations: ED, emergency department; ADD, attention deficit disorder.

* This column presents the percentage increase in service utilization for Medicaid children compared to employer-insured children; a decrease, or lower utilization rate for Medicaid, is shown by parentheses.

† P value between .05 and .1.

‡ P value between .01 and .05.

§ P value between .0000 and .01.

employer-based managed care, depending on the specific condition. The Medicaid-enrolled children in Plan A had more outpatient services, laboratory services, and radiography services than their counterparts in employer-based managed care. The same pattern of use was found for home health services (except for children with diabetes) and for office visits (except for children with sickle cell). For Plan B (Table 5B), the results show higher use of all services by children with asthma and diabetes in Medicaid

managed care compared with employer-based managed care. In contrast, the pattern is mixed for children with epilepsy and sickle cell. These conditions had smaller numbers than the three other conditions, which may in part account for a varied pattern. Again, however, ED visits were higher for Medicaid children with these two conditions.

The pattern of use for ADHD was generally different from the other conditions. Children with ADHD in employer-based managed care had more hospital admissions, hospital days, and office visits than their counterparts in Medicaid managed care. In contrast, Medicaid-enrolled children with ADHD had more ED visits, laboratory services, outpatient hospital visits, and radiography services, although, other than ED visits, the differences in service use between Medicaid and employer-insured children was minimal. Of note, the pattern for ADHD is the same for most services for Plans A and B (excluding home health visits). This utilization pattern may reflect service use for comorbid conditions. Overall, considering all conditions, Plan A showed consistently higher service utilization for Medicaid children than employer-insured children, whereas Plan B showed less consistency in this pattern across conditions and service types.

There are several patterns of utilization common to all disease and insurance groups. The majority of care seems to be delivered in physicians' offices, rather than in other locations. When comparing the differences by disease categories, asthma shows more statistically significant differences in utilization between Medicaid and commercially-insured children than the other conditions. Asthma is the most prevalent condition of these five, which increases the power to detect statistical significance for this defined population. These results show the importance of evaluating conditions other than asthma, because utilization comparisons for different services may vary depending on the condition studied.

We also examined visits to physician specialists for the study population. However, our results must be considered tentative because a full examination of this factor requires information not available for this study. The definition of provider specialty for our analyses was based on the specialty indicated by that provider. Moreover, some pediatric subspecialists do not currently have a designated code in the claims database and would, therefore, default to a pediatrician. This method may underestimate the use of specialists because a physician might designate himself or herself a pediatrician, yet also provide care as a pediatric cardiologist. This bias affects the Medicaid and the employer-insured populations equally. Our analysis indicates that, for both Plan A and Plan B, employer-insured children had more visits to selected specialists than Medicaid-enrolled children.

DISCUSSION

This study of children with selected chronic health conditions indicates that: 1) a higher percentage of children enrolled in Medicaid managed care (5.3%) have these conditions compared with children enrolled in employer-insured managed care programs

(3.2%); 2) on average, children with chronic health conditions who are enrolled in Medicaid managed care use more services than children with similar conditions who are insured through employers; and 3) although utilization rates are generally higher for children enrolled in Medicaid managed care than for children enrolled in employer-based managed care, the differences in rates vary greatly by service, by diagnosis, and by plan.

The differences between the two insured populations were greatest for ED services. Children with chronic health conditions enrolled in Medicaid managed care used up to four times as many ED services as children with similar conditions enrolled in employer-based programs. Historically, Medicaid beneficiaries have used EDs as a primary source of health care.²⁰ Factors that may be contributing to this pattern, such as lack of transportation during normal business hours, geographic location, and family choice, were not examined in this study, and should be considered in future work.

A similar pattern of higher use was found for hospital days for children with asthma, diabetes, or epilepsy; children with these conditions who were enrolled in Medicaid managed care had from 27% to 439% more hospital days than their counterparts in employer-based insurance. Hospital days are important because they are likely to account for a major share of total costs for the care of these children. In addition, home health care was used more frequently by children enrolled in Medicaid compared with employer-based plans. The potential need for greater education of families of Medicaid-enrolled children through home care efforts may explain, in part, this finding.

Differences in utilization rates between the two populations were more evident for children with certain diagnoses than for others. For example, children with asthma who were enrolled in Medicaid managed care consistently used all types of services significantly more than children with asthma who were enrolled in employer-based managed care. In contrast, children with sickle cell anemia enrolled in Medicaid managed care used only some services significantly more than their counterparts in employer-based programs.

Differences between the children enrolled in Medicaid and children enrolled in employer-based programs were more pronounced in one of the plans we studied compared with the other. For example, in Plan A, children with asthma who were enrolled in Medicaid had 355% more admissions to hospitals than children with the same condition who were enrolled in employer-based programs. In contrast, in Plan B, Medicaid-enrolled children with asthma had 178% more hospital admissions compared with children with the same condition in employer-based programs. Part of this difference may be explained by differences in Medicaid eligibility criteria used by the two plans. Medicaid eligibility regarding level of poverty was more stringent in Plan A (up to 133% of poverty) than in Plan B (up to 275% of poverty).

The variation among conditions and plans must be considered carefully in light of the distinct medical

needs of children with different conditions, known variation in practice patterns, and the comparatively small numbers for some of the calculations. Nonetheless, our analyses show clearly that children with chronic conditions who are enrolled in Medicaid managed care use services at higher rates than children with similar conditions in employer-based managed care. Moreover, there are likely to be proportionately more children with chronic conditions in Medicaid than in employer-insured populations. These findings raise important policy implications.

First, the health status of children with chronic conditions in Medicaid may be worse than similar children in employer-insured populations, as studies of poor children would suggest.²¹ Consequently, capitation rates for the two populations may need to be different; at the least, formulas for risk adjustment will have to take into account the key variables that distinguish the two populations. Second, somewhat different guidelines may be needed for evaluating quality of care delivered to the two different populations. For example, the fact that children with chronic conditions in Medicaid use many ED services and are hospitalized longer than their counterparts in employer-based programs suggests that they will require more extensive follow-up care or service coordination efforts. Services that have minimal effects on quality in middle-income populations may have significant effects on quality for children enrolled in Medicaid. Third, current legislative proposals that would prohibit health plans from requiring referrals to specialists may not achieve the same effects among the Medicaid and commercially-insured populations.

This study represents a first step in comparing utilization of health care services by Medicaid and employer-insured children with selected chronic conditions in two different managed care sites. The health plans were located in two Midwestern states, and may not be representative of all managed care plans or of Medicaid programs in other states. These results suggest that utilization varies across commercial health plans and that findings should not be generalized based on only one plan. This analysis aggregated employer groups across each plan for employer-insured children. Future analysis should take the effect of benefit level into account in describing utilization. Benefit structure characteristics, such as the amount of copayment and availability of a point-of-service option, may have different implications for poor and non-poor families of children with special needs. Children in the Medicaid programs may be sicker in general because of various socioeconomic factors. Future studies that control for severity of illness are needed to fully understand the relationship between age, socioeconomic factors, and severity of illness for children with chronic conditions. In addition, future analysis should also focus on visits to specialists by Medicaid and employer-insured children, including specialists that may be based in hospitals.

This study contributes to a better understanding of the utilization of services by children with chronic conditions, as a special needs population. Focusing

on children with five different chronic conditions, a pattern of greater utilization of services by children in Medicaid than employer-insured children emerges. This difference is especially evident for use of ED departments. The capability to control for severity of illness, given underlying age differences, as well as a greater percentage of children with these conditions in Medicaid compared with employer-insured populations, will begin to explain what factors may account for different utilization rates across these two systems. Greater understanding of the use of specialists at various sites of care will also be important to more accurately compare service utilization by Medicaid children compared with employer-insured children. Analyses for multiple plan sites are also necessary to understand service to this special needs population, because variations across plans were observed even within one region of the country.

As health care systems continue to evolve, community-based general pediatricians are likely to assume a greater role in the care of children with special health care needs. As a consequence, pediatricians will need to understand strategies for assuming risk for delivering care and for negotiating appropriate contracts with managed care organizations. Understanding the pattern of utilization of health care services in different pediatric populations will be essential for practicing pediatricians, whether in the community or in tertiary care settings.

ACKNOWLEDGMENTS

We thank Cathy Halverson, Richard Justman, MD, Douglas McCarthy, and Eileen Peterson for insightful comments on earlier drafts.

REFERENCES

1. Leatherman ST, McCarthy D. Opportunities and challenges for children's health in managed care organizations. In: Stein R, ed. *Health Care for Children: What's Right, What's Wrong, What's Next*. New York, NY: United Hospital Fund; 1997
2. Iglehart JK. Health policy report: Medicaid and managed care. *N Engl J Med*. 1995;332:1727-1731
3. Miller RH, Luft HS. Managed care plan performance since 1980: a literature analysis *JAMA*. 1994;271:1512-1519
4. Freund DA, Lewit EM. Managed care for children and pregnant women: promises and pitfalls. *Health Care Reform*. 1993;3:92-122
5. Valdez RB, Ware JE, Manning WG, et al. Prepaid group practice effects on the utilization of medical services and health outcomes for children: results from a controlled trial. *Pediatrics*. 1989;83:168-180
6. Mauldron J, Leibowitz A, Buchanan JL, Damberg C, McGuigan KA. Rationing or rationalizing children's medical care: comparison of a Medicaid HMO with fee-for-service care. *Am J Public Health*. 1994;84: 899-904
7. Hurley RE, Freund DA, Paul JE. *Managed Care in Medicaid. Lessons for Policy and Program Design*. Ann Arbor, MI: Health Administration Press; 1993
8. Ireys HT, Grason HS, Guyer B. Assuring quality of care for children with special needs in managed care organizations: roles for pediatricians. *Pediatrics*. 1996;8:178-185
9. Neff JM, Anderson G. Protecting children with chronic illness in a competitive marketplace. *JAMA*. 1995;274:1866-1869
10. Newacheck PW, Hughes DC, Stoddard J, Halfon N. Children with chronic illness and Medicaid managed care. *Pediatrics*. 1994;93: 497-500
11. Fox HB, Wicks LB, Newacheck PW. Health maintenance organizations and children with special health needs: a suitable match. *Am J Dis Child*. 1993;147:546-552
12. Hughes DC, Newacheck PW, Stoddard JJ, Halfon N. Medicaid managed care: can it work for children? *Pediatrics*. 1995;95:591-594

13. Aday L, Lee E, Spears B, Chung C, Youssef A, Bloom B. Health insurance and utilization of medical care for children with special health care needs. *Med Care.* 1993;31:1013–1026
14. *International Classification of Diseases 9th Revision Clinical Modification*, 4th ed. Los Angeles, CA: Practice Management Information Corporation; 1994
15. Kirschner CG, Burkett RC, Coy JA, et al. *Physicians' Current Procedural Terminology, CPT 1994*. Chicago, IL: American Medical Association; 1993
16. Elixhauser A, Andrews RM, Fox S. *Clinical Classifications for Health Policy Research: Discharge Statistics by Principal Diagnosis and Procedure (AHCPH Publication No.93–0043)*. Rockville, MD: Public Health Service, Division of Provider Studies Research Note 17, Agency for Health Care Policy and Research; 1993
17. Quam L, Ellis LBM, Venus P, Clouse J, Taylor CT, Leatherman S. Using claims data for epidemiologic research: the concordance of claims-based criteria with the medical record and patient survey for identifying a hypertensive population. *Med Care.* 1993;31:498–506
18. Newacheck PW, Stoddard JJ. Prevalence and impact of multiple childhood chronic illnesses. *J Pediatr.* 1994;124:40–47
19. Hinshaw S. *Attention Deficits and Hyperactivity in Children*. Thousand Oaks, CA: Sage; 1994
20. Peter S, Newacheck P, Halfon N. Access to care for poor children: separate and unequal. *JAMA.* 1992;267:2760–2764
21. Wise P, Meyers A. Poverty and child health. *Pediatr Clin North Am.* 1988;35:1169–1186