

Influence of Medicaid Managed Care Enrollment on Emergency Department Utilization by Children

Kevin J. Dombkowski, DrPH; Rachel Stanley, MD; Sarah J. Clark, MPH

Objective: To explore the association between Medicaid managed care plan enrollment and emergency department (ED) utilization.

Design: Retrospective cohort analysis using administrative claims data.

Participants: A total of 518 982 nondisabled children 1 to 18 years of age who were Medicaid beneficiaries in calendar year 2000.

Main Outcome Measures: Annual visit rates per 1000 member-months and incidence rate ratios for complex and noncomplex ED visits. Medicaid beneficiaries were classified on the basis of months enrolled in managed care. Administrative claims for ED visits were classified as complex or noncomplex on the basis of procedure and diagnostic codes. Multivariate logistic regression models of the incidence rate ratios were used to compare children with varying degrees of enrollment in Medicaid man-

aged care with a reference group consisting of those exclusively enrolled in Medicaid managed care.

Results: Overall, 22% of children receiving Medicaid made 1 or more ED visits in 2000; 77% of ED visits were for noncomplex services. Children who spent less than half of their enrolled months in managed care used complex ED services 37% more frequently ($P < .001$) and noncomplex services 11% more frequently ($P < .001$) than those exclusively enrolled in Medicaid managed care.

Conclusions: Children with all of their Medicaid enrollment in managed care have the lowest ED utilization rates for complex and noncomplex services. These results suggest that reducing delays in managed care plan enrollment may be an effective strategy to reduce ED utilization for this population.

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DURING THE PAST DECADE, emergency department (ED) use has climbed steadily in the United States.^{1,2} Children are frequent users of EDs, with 22% of the nation's ED visits in 2000 being made by children younger than 15 years¹; more than one third of ED visits by children younger than 18 years were covered by Medicaid.³ Recent evidence suggests that the immediacy with which pediatric ED patients should be seen is decreasing; in 1997, 49% of ED visits by children were triaged to be seen within 1 hour, whereas this proportion fell to 38% by 2000.^{1,4} These trends are of particular concern because high ED visit rates suggest inadequate use of primary care services and result in excess health care costs.⁵

During the 1990s, Medicaid managed care programs were implemented nationwide in an effort to curb rising costs and improve access to primary care services. Among the potential benefits of Medicaid managed care is that increased ac-

cess to primary care may help to decrease the historically high rate of ED use for nonurgent care by Medicaid beneficiaries. While most Medicaid beneficiaries are eventually enrolled in a managed care plan, national rates of Medicaid managed care penetration indicate that many are not.^{6,7} For example, Michigan Medicaid beneficiaries living in certain counties are not required to enroll in a managed care plan because of limited availability of plans⁸; in other cases, newly qualified Medicaid beneficiaries may spend several months covered by fee-for-service Medicaid while awaiting enrollment in a plan. Consequently, a Medicaid beneficiary may experience periods of enrollment in fee-for-service as well as in a managed care plan during the course of a year. Various aspects of ED use by children have been considered in previous studies.⁹⁻¹⁶ What little is known about how Medicaid managed care enrollment influences ED utilization by children has been studied only among infants.^{12,17}

From the Child Health Evaluation and Research Unit, Division of General Pediatrics, University of Michigan, Ann Arbor (Drs Dombkowski and Stanley and Ms Clark); and Department of Emergency Medicine, Hurley Medical Center, Flint, Mich (Dr Stanley).

Table 1. Medicaid Beneficiaries 1 to 18 Years of Age

Characteristic	% of Beneficiaries (n = 518 982)
Age, y	
1-4	29.5
5-9	31.1
10-14	24.6
15-18	14.8
Sex	
Male	50.0
Female	50.0
Race	
White	51.3
Black	37.9
Other	8.5
Unknown	2.3
County of residence	
Urban	81.8
Nonurban	18.2
Managed care enrollment	
All months	51.7
Half or more of months	22.3
Less than half of months	26.0

The purpose of this study was to determine the relationship between enrollment in Medicaid managed care and ED utilization by children. This study addresses 2 objectives: first, to characterize the degree of complex and noncomplex ED visits among children receiving Medicaid, and second, to evaluate the extent to which enrollment in Medicaid managed care is associated with ED utilization by children.

METHODS

This study was based on a retrospective analysis of Michigan Medicaid administrative claims data for calendar year 2000 and was approved by the University of Michigan institutional review board.

STUDY POPULATION

Several inclusion and exclusion criteria were applied to derive our study sample. A total of 768 303 children 18 years and younger were enrolled in the Michigan Medicaid program for at least 1 month during 2000. We included nondisabled children 1 to 18 years of age, excluding infants (n = 56 229) and disabled children (n = 44 676). Disability status was determined from each child's Medicaid program of enrollment. We included only beneficiaries for whom complete administrative claims were available so that the analysis would accurately reflect ED utilization rates; consequently, children who were covered by one or more other sources of health insurance in addition to Medicaid were excluded (n = 75 998), as were children from Medicaid health plans reporting incomplete administrative claims data (n = 72 418). In total, the study sample consisted of 518 982 children (67.5% of the initial population).

OUTCOMES MEASURED

The outcome of interest was the rate of ED utilization per 1000 member-months for complex, noncomplex, and all ED visits. In addition, incidence rate ratios for complex and noncomplex ED visits were computed to assess the relative mag-

nitude of ED utilization rates between groups of children. All ED claims for the study subjects were identified on the basis of *Current Procedural Terminology (CPT)* procedure code.¹⁸ Duplicate ED claims were removed to specify unique occurrences of ED visits for each child. Inpatient claims were linked with ED claims to identify ED visits that resulted in an inpatient admission.

Each ED visit was classified as being complex or noncomplex on the basis of a combination of *CPT* procedure codes and *International Classification of Diseases, Ninth Revision, Clinical Modification*, diagnosis codes. The ED visits were classified as complex if (1) the ED visit led to an inpatient admission; (2) the *CPT* code reflected the 2 highest levels of ED visit complexity (99284 or 99285); or (3) the *CPT* code reflected moderate complexity (99283), but the diagnosis code suggested a more serious condition (eg, poisoning, serious fractures, open wounds, hemorrhages, or asthma) based on a review by an emergency medicine specialist (R.S.). All remaining claims with moderate complexity (99283) were classified as noncomplex, as were claims for the 2 lowest levels of ED visit complexity (99281 and 99282). This method was conservative with respect to assignment of visits as being noncomplex, ie, the approach classified some ED claims as being complex on the basis of diagnosis that otherwise would have been considered noncomplex solely on the basis of procedure code.

Demographic and Medicaid program enrollment data included age, sex, race, county of residence, and enrollment type (managed care or fee-for-service) for each month during 2000. With these data, each child was classified according to total months of Medicaid enrollment into 1 of 3 mutually exclusive categories: all enrolled months in managed care, half or more (but not all) enrolled months in managed care, or less than half of enrolled months in managed care. The county of beneficiary residence was classified as being urban or nonurban on the basis of presence of a metropolitan statistical area, as defined by the US Census Bureau.¹⁹

STATISTICAL ANALYSIS

Univariate descriptive statistics were computed, and bivariate analyses were performed to assess the association between demographic factors and managed care enrollment. The χ^2 tests were conducted to assess the relative strength of the association between managed care enrollment and demographic factors. Multivariate regression models were used to estimate incidence rate ratios and 95% confidence intervals that measure the relative magnitude of ED utilization rates, controlling for age, sex, race, urban counties, and duration of Medicaid enrollment. The incidence rate ratios compare children with varying degrees of enrollment in Medicaid managed care with a reference group consisting of those exclusively enrolled in Medicaid managed care. All statistical analyses were conducted with SAS version 8.11 software (SAS Institute Inc, Cary, NC).

RESULTS

Demographic characteristics of the 518 982 Medicaid beneficiaries are presented in **Table 1**. Age, sex, race, and urban county of residence distributions mirrored the distribution of the overall Medicaid population in Michigan. Slightly more than half of our study subjects had all enrolled months in a Medicaid managed care plan during 2000; of the remaining children, similar proportions had half or more months, or less than half of enrolled months, in managed care. Medicaid managed care enrollment was found to be significantly associated with

age, race, and urban counties of residence (**Table 2**). The youngest children (1-4 years of age) and the oldest (15-18 years of age) had the highest proportion of enrollees with less than half of enrolled months in Medicaid managed care, while black children and those living in urban counties had the greatest proportion of children with all months enrolled in Medicaid managed care ($P<.001$).

Overall, 22% of the study population had at least one ED visit in 2000. **Table 3** summarizes the complex and noncomplex ED visits and utilization rates, overall and by managed care enrollment duration. Most (77%) of the 178 360 total ED visits were for noncomplex services. Rates (per 1000 member-months) for complex, noncomplex, and total ED visits were lowest for children with all of their enrolled months in managed care, and highest for children who spent less than half of their enrolled months in managed care. The utilization rates for noncomplex ED visits were approximately 3 times greater than rates for complex visits, irrespective of managed care duration.

Incidence rate ratios for ED visits by age, sex, race, geographic area, and managed care enrollment status were estimated by means of multivariate regression models (**Table 4**). Male sex and patient age of 1 to 4 years were positively associated with complex and noncomplex ED

visits. In contrast, white race and nonurban location were associated with decreased complex ED visit rates and increased noncomplex rates. After controlling for age, sex, race, and urban counties, there were significant differences in ED rates by managed care enrollment status. Children with all of their enrolled months in managed care had the lowest complex and noncomplex ED visit rates, while children with less than half of their enrollment in managed care had the highest ED visit rates. Children with less than half of their enrollment in Medicaid managed care made complex ED visits 37% more frequently and noncomplex visits 11% more frequently than their counterparts enrolled exclusively in managed care plans ($P<.001$).

COMMENT

Our findings demonstrate that ED utilization rates vary substantially between children receiving Medicaid with varying degrees of managed care enrollment compared with those exclusively enrolled in managed care, controlling for demographic differences between those groups. We found that children exclusively enrolled in Medicaid managed care had the lowest ED utilization for both complex and noncomplex visits, while those with no or little Medicaid managed care enrollment had the highest rates. These findings suggest the important role Medicaid managed care can potentially play in reducing ED visits and underscore the importance of recognizing the heterogeneity that may exist within a Medicaid population with respect to managed care enrollment. During the course of a year, a Medicaid beneficiary may be enrolled entirely in a managed care or fee-for-service plan or may have some combination of enrollment; we found that those enrolled entirely in managed care had the lowest rates of ED use.

Other evidence suggesting the influence of managed care on ED utilization can be gathered indirectly from studies that examined the influence of having a regular source of care on ED visits, since having a regular source of care for preventive and sick visits is central to managed care. A study of rural adolescents found that the absence of a regular source of care for preventive and sick visits was associated with an increased likelihood of ED visits,²⁰ while findings from another study suggest that lower continuity of care with an individual physician is associated with increased ED utilization.⁹ Among Medicaid beneficiaries, poor continuity of care was found to be associated with increased likelihood of an ED visit by children.²¹

Table 2. Managed Care Enrollment by Beneficiary Characteristics

Characteristic	Annual Enrollment in Managed Care, % of All Beneficiaries		
	Less Than Half of Months	Half or More of Months	All Months
Age, y			
1-4	27.5	24.0	48.5
5-9	23.2	22.2	54.7
10-14	23.9	21.3	54.8
15-18	33.0	20.7	46.3
Sex			
Male	26.1	22.3	51.6
Female	26.0	22.3	51.7
Race			
White	27.6	22.5	50.0
Black	19.8	23.3	56.9
Other	40.8	17.2	42.0
Unknown	41.2	20.2	38.6
County of residence			
Urban	24.6	22.9	52.5
Nonurban	32.5	19.6	47.9

Table 3. Emergency Department Utilization by Managed Care Enrollment Duration

Annual Enrollment in Managed Care	No. of Beneficiaries	Beneficiary Member-mo, ×1000	Emergency Department Utilization					
			No. of Visits			Rate/1000 Member-mo		
			Complex	Noncomplex	Total	Complex	Noncomplex	Total
Less than half of months	135 296	926	9882	27 855	37 737	10.68	30.10	40.77
Half or more months	115 599	1222	11 230	36 008	47 238	9.19	29.48	38.64
All months	268 087	2820	20 579	72 806	93 385	7.30	25.81	33.11
Total, All Beneficiaries	518 982	4968	41 691	136 669	178 360	8.39	27.51	35.90

Table 4. ED Visit Incidence Rates, Multivariate Models

Beneficiary Characteristic	Incidence Rate Ratio (95% Confidence Interval)		
	Complex ED Visits	Noncomplex ED Visits	All ED Visits
Age, y			
5-9	0.30 (0.30-0.31)	0.48 (0.47-0.48)	0.43 (0.43-0.44)
10-14	0.29 (0.29-0.30)	0.42 (0.41-0.42)	0.39 (0.38-0.39)
15-20	0.73 (0.72-0.75)	0.58 (0.57-0.59)	0.62 (0.61-0.63)
1-4	Reference	Reference	Reference
Sex			
Female	0.97 (0.96-0.98)	0.98 (0.97-0.99)	0.97 (0.97-0.98)
Male	Reference	Reference	Reference
Race			
Black	0.92 (0.89-0.94)	0.86 (0.84-0.88)	0.87 (0.86-0.89)
Other	1.19 (1.17-1.21)	0.93 (0.92-0.94)	0.99 (0.98-1.00)
Unknown	1.00 (0.96-1.04)	0.61 (0.58-0.64)	0.70 (0.67-0.73)
White	Reference	Reference	Reference
County of residence			
Urban	1.18 (1.15-1.20)	0.92 (0.91-0.93)	0.97 (0.96-0.98)
Nonurban	Reference	Reference	Reference
Managed care enrollment			
Less than half of months	1.37 (1.35-1.39)	1.11 (1.09-1.12)	1.17 (1.15-1.18)
Half or more of months	1.19 (1.17-1.21)	1.09 (1.08-1.11)	1.12 (1.10-1.13)
All months	Reference	Reference	Reference

Abbreviation: ED, emergency department.

What This Study Adds

Little is known about how enrollment in Medicaid managed care may influence ED utilization by children. Previous research has provided some preliminary perspectives on the potential influences, but those studies have been based on populations that are limited in scope, either to a specific community, to users of federally qualified health centers, or to infants. Others have examined characteristics such as the effects of having a regular physician, or how continuity of care may influence ED utilization by children. The findings of this study demonstrate that substantial differences in ED utilization exist between children enrolled in Medicaid managed care vs those in fee-for-service Medicaid. We find that children exclusively enrolled in managed care had the lowest rates of ED use, and even small portions of annual enrollment in fee-for-service Medicaid have higher complex and noncomplex ED use. Our findings suggest that prompt enrollment of newly qualified Medicaid beneficiaries in a managed care plan may be an effective strategy to minimize unnecessary ED visits.

Overall, we found that 22% of children receiving Medicaid made at least 1 ED visit annually, which is somewhat lower than the 29% national average for children receiving Medicaid. Frequency of ED use was found to be somewhat lower than national averages, with 9% of the study population having 2 or more ED visits, compared with 13% of children receiving Medicaid nationally.²² Our findings that young and black children have the highest rates of ED use are consistent with nationally representative rates of ED use.²²

We found that the ED utilization rate for children exclusively enrolled in Medicaid managed care was

equivalent to 40 visits per 100 person-years (1 ED visit per 1000 person-months=1.2 ED visits per 100 person-years), which is roughly equivalent to the national ED utilization rate of 39 visits per 100 person-years for all children.¹ However, we would expect that our observed ED visit rate would compare more favorably with the national ED visit rate specifically for children receiving Medicaid (which is not published), since national ED rates for Medicaid recipients of all ages are higher than those of all other payer groups.³ In contrast, we found that children with less than half of their enrollment in Medicaid managed care made ED visits more frequently, at a rate equivalent to 49 visits per 100 persons per year.

This study had some limitations. Our results are based on administrative claims data that are subject to the completeness and accuracy of coding on ED claims and in Medicaid enrollment files. The completeness and accuracy of these data were extensively reviewed to minimize the influence of incomplete ED claims. In addition, our study did not include children younger than 1 year or those with disabilities. Each ED visit was classified as complex or noncomplex according to administrative data and thus cannot approximate clinical decision making. Finally, our study was based on Medicaid managed care enrollment status, but the extent to which children had a regular source of care or continuity of care could not be determined from these data.

CONCLUSIONS

In this sample of Michigan Medicaid beneficiaries, children enrolled exclusively in Medicaid managed care had lower ED utilization than their counterparts with some

period of fee-for-service enrollment. This finding speaks to the importance of timely enrollment into a Medicaid managed care plan. In addition, our findings indicate that most Medicaid ED visits by children are for noncomplex services, suggesting that many ED visits could potentially be treated in a primary care setting.

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Corresponding author: Kevin J. Dombkowski, DrPH, Division of General Pediatrics, University of Michigan, 300 N Ingalls, Room 6C11, Ann Arbor, MI 48109-0456 (e-mail: kjd@med.umich.edu).

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