

Ambulatory practice variation in Maryland: Implications for Medicaid cost management

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Simulation modeling with data from the Maryland Medicaid Management Information System has provided an opportunity to examine policy options and assess their likely impact on savings before program decisions were made. Analysis of a large sample of the Maryland Aid to Families with Dependent Children (AFDC) Medicaid subpopulation confirms that a significant difference in

utilization and cost to Medicaid exists between usual sources of care for AFDC clients even after controlling for patient demographics and case-mix differences. Findings indicate that savings from reduced use of hospital outpatient departments may offset increases of as much as 40–50 percent in physician fees under certain assumptions.

Introduction

Findings from analysis of Medicaid utilization and payments for the Maryland Medicaid Aid to Families with Dependent Children (AFDC) population suggest that Medicaid could save money by reducing the use of hospital clinics as a usual care source and increasing the use of community-based providers. These findings raised the question, "What would be the financial impact if it were possible to accomplish such a change?" and led to a series of simulations designed to answer this question. Using simulation modeling, assumptions regarding fee increases as well as provider and recipient behavior were varied to see how alternative scenarios would affect the "bottom line," e.g., savings or loss to the Medicaid program. In this article, we review our initial research and present the results of simulation modeling. We also discuss issues for consideration and describe policy decisions made by the Maryland Medicaid program, based in part on these analyses.

Background

Small-area variation in hospitalization rates has been well documented (Wennberg, 1984, 1987) and there is evidence that neither variation in the appropriateness of care (Chassin et al., 1987) nor in illness rates (Wennberg, 1987) explains all of these differences. Other factors, including characteristics of the providers and population, will have to be evaluated as potential sources of variation.

Previous studies have suggested that outpatient departments can represent a costly source of care for the Medicaid program (Gold, 1979; Lion and Altman, 1982; McDevitt and Dutton, 1989). Our efforts to extend this work among Maryland Medicaid providers found major differences in utilization and payments associated with different provider settings. Our research focuses on characteristics of provider settings and their contribution

to variations in Medicaid utilization and cost for the Maryland AFDC population.

In Table 1, differences in utilization and payments per user per year by usual source of care for Maryland Medicaid users in the AFDC eligibility category are shown. The raw means in this table for total average annual payments per user show that individuals using outpatient departments as a usual source of care and persons for whom a usual source of care could not be determined ("undetermined") have the highest average annual costs per person when compared with people using other provider types. The total average annual payment for outpatient department users (\$1,583) is more than double that for individuals using office-based physicians (\$654). This high cost for outpatient department users is consistent with the high raw means for the ambulatory and inpatient components. Outpatient department users have the highest average payment per ambulatory visit (\$77). This is more than double the average payment per ambulatory visit for office-based physician users (\$34). In addition, outpatient users have the highest probability of having a hospital admission (24.0 percent compared with 9.0 percent for office-based physician users).

Analysis of Baltimore City AFDC users found that differences in patient case mix could explain much of the difference in utilization and cost to Medicaid associated with provider type. Findings from Baltimore City users suggest that case-mix adjustments would reduce the differences in Table 1 in total annual payments per user between outpatient departments and office-based physicians or community health centers by 40 to 50 percent, but that differences would remain statistically significant ($p < .001$). Differences in the probability of an inpatient admission between outpatient users and users of office-based physician or community health centers would be reduced by nearly 50 percent but would also remain statistically significant ($p < .001$) (Stuart, 1988; Stuart and Steinwachs, 1990).

After controlling for differences in patient age, race, sex, previous Medicaid enrollment, and case mix, users of outpatient departments in Baltimore City have total annual Medicaid payments that are 61 percent higher per user per year than users of office-based physicians. A major factor in the higher cost to Medicaid is the higher probability of inpatient admissions associated with outpatient departments. Even after case-mix adjustments, the probability of an inpatient admission in a given year

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Table 1
Means for utilization and payments per user per year for a 50-percent sample of the Medicaid population
continuously enrolled in Aid to Families with Dependent Children, by usual source of care:
Maryland, fiscal year 1987

Usual source of care	Total payments	Ambulatory visits	Ambulatory payments	Ambulatory payments per visit ^{1,2}	Percent admitted to hospital	Inpatient days ³	Inpatient payments ³	Inpatient payments per day ^{2,3}
Office-based physician	\$654	6.4	\$403	\$34	9.0	5.2	\$2,797	\$489
Community health center	662	5.4	415	54	11.0	4.0	2,258	423
Outpatient department	1,583	7.2	752	77	24.0	5.3	3,417	694
Children and youth clinic	595	5.4	359	67	8.2	4.9	2,890	444
Emergency room	596	3.6	336	47	9.9	4.9	2,633	531
Undetermined	1,215	7.9	656	51	16.4	5.9	3,397	472

¹Ambulatory payments per visit include payments for all ambulatory services including visits, laboratory, X-ray, pharmacy, and other ambulatory services in the numerator, with ambulatory visits alone in the denominator.

²Regression adjusted for patient demographic characteristics (age, race, sex), previous enrollment, and morbidity (ambulatory diagnosis groups).

³Inpatient means for users with inpatient admissions.

NOTES: Individuals were assigned to the provider who provided more than 50 percent of their ambulatory care. Individuals in the "Undetermined" category had no such provider. Percents may not add to 100.00 because of rounding. There were 49,796 ambulatory care users included in the sample.

SOURCE: State of Maryland Department of Health and Mental Hygiene: Data from the Maryland Medicaid Management Information System; data developed by the Policy and Health Statistics Administration.

for users of outpatient departments is almost twice that for users of office-based physicians (18 percent for outpatient department users compared with 10 percent for users of office-based physicians) (Stuart, 1988; Stuart and Steinwachs, 1990).

The source of data for this study was the Maryland Medicaid Management Information System (MMIS). In Maryland, the Medicaid program has been building person-based analytic files with MMIS data since 1985. These files merge information from Medicaid provider, eligibility, and claims payment history files to create utilization and payment summaries for all individuals for a given fiscal year.

The MMIS includes a complete record of paid claims for all services covered by Medicaid. For individuals who meet eligibility criteria, Medicaid provides coverage for ambulatory and inpatient services, including laboratory tests and drugs, as well as a variety of other services, such as medically necessary transportation, vision and dental care, supplies, and equipment. Thus, MMIS can provide a comprehensive picture of utilization and payments for enrollees over the period of enrollment.

Measurement issues

To be considered an "ambulatory care user" in this study, enrollees had to have had at least one ambulatory visit during the study period to an ambulatory care provider—that is, a hospital outpatient department or emergency room, an office-based physician, a community health center, or a children and youth clinic. Children and youth clinics, like community health centers, are clinics that receive Federal funding to provide care for the medically indigent. These clinics are typically located in medically underserved geographic areas where they provide services to Medicaid recipients.

The "usual source of care" is defined for this study as the provider with the majority of ambulatory visits. Provider types include those identified in the preceding paragraph. In addition, if no single provider had more than 50 percent of an individual's visits, the individual is classified as having an "undetermined" source of care.

Local health departments were not considered a "usual source of care," because in Maryland they do not provide acute care.

Consideration was given to assignment of people with just one visit and people who had two visits with one each to two different providers. Only 15 percent of users had one visit, and it was decided to assign them to the single provider they used. Individuals in the second group were assigned to the "undetermined" category because no single provider had the majority of visits.

One of the limitations of Medicaid claims data is that ambulatory care delivered in different settings is billed using different types of codes. For office-based physicians, ambulatory visits are billed using *Current Procedural Terminology (CPT), 4th Edition*. These codes specify whether the visit is for a new or previous patient, the level of visit, and whether it was for well care or treatment. In addition, each procedure performed is billed using a specific code.

For ambulatory care delivered in hospital outpatient and emergency departments, Medicaid can be billed for both a facility fee and a physician fee. However, analysis of Maryland data indicates that the physician component is not consistently billed. To obtain as accurate a count of visits as possible and to avoid the possibility of double counting, only the facility claims were used in this study to count outpatient and emergency department visits. Because the level of detail available for physician services is not reflected in facility claims for outpatient and emergency department visits, it is not possible to determine the level of visit or physician specialty for services provided in hospital settings. In addition, most procedures are bundled in the hospital setting. Individual procedures are not itemized on hospital claims but are submitted as groups or bundles of services performed. Although this would not affect the visit count, it can affect measurement of payments. To obtain a comparable as well as comprehensive picture of ambulatory payments for patients of each provider type, total ambulatory payments were broadly defined to include payments for all ambulatory services reimbursed by Medicaid. In 1987, approximately 44 percent of total ambulatory payments

were for visits; 31 percent for laboratory, X-ray, and other procedures associated with ambulatory care; 16 percent for pharmacy; 4 percent for vision, dental, and hearing services; and 5 percent for other ambulatory services.

In analysis of provider practice variation in Baltimore City, the statistical significance of differences among provider types has been tested using least-squares regressions (*F*-statistic). Case-mix differences are measured in these regression models as in the simulation models using ambulatory diagnosis groups (ADGs). ADGs are the morbidity measure used in ambulatory care groupings (ACGs), a case-mix system recently developed at the Johns Hopkins University Health Services Research and Development Center. In developing ADGs, each of approximately 6,000 ICD-9-CM codes has been assigned to 1 of 34 clusters, based on type of condition (acute, self-limited, likely to recur, or chronic); role of specialty care (primarily primary care or a specialty diagnosis); and severity (clinically severe or less severe with regard to its command of resources). The ADG system was developed and tested using data from four health maintenance organizations (HMOs), as well as the Maryland Medicaid AFDC population. The extent to which the morbidity categories were statistically independent of each other was determined through patient-level analysis of the correlation coefficients for each pair of diagnostic categories. The correlation coefficients were quite low, suggesting that the categories were measuring relatively independent morbidity-related attributes. (Starfield et al., to be published; Weiner et al., 1989). Using the Maryland Medicaid AFDC population, Weiner et al. (1989) found that, in regression models that included independent variables of patient age, sex, and ADG dummies (i.e., yes or no for each ADG), 48 percent of variation in ambulatory visits and 42 percent of variation in ambulatory charges could be accounted for.

By using ADGs, it is possible to adjust statistically for differences among providers for the total burden of patient morbidity as reflected in ICD-9-CM codes over a given time period. In addition to ADGs, regression models in this study include independent variables for patient demographic characteristics (age, sex, race) and previous enrollment. Previous enrollment is defined as a dichotomous variable that identifies whether or not users have been continuously enrolled more than 6 months prior to the study year. In the Baltimore City analysis, regression models also included usual source of care as an independent variable.

Variables that remain unmeasured in these regression equations include severity of illness and patient care-seeking behavior. Two issues that were identified concerning the effects of aggregation on findings were the effects of individuals with extremely high-cost hospitalizations and pregnancies. To test the sensitivity of findings to these populations, in the Baltimore City analysis, regression models that include usual-source-of-care, patient characteristics, previous enrollment, and case-mix variables were repeated. Each time a subset of the population was removed and the results were compared with the original findings. Subpopulations removed for sensitivity testing included high-cost outliers

and users with inpatient claims for delivery and neonatal intensive care.

Outliers, defined as users in the 99th percentile for total payments, were people who had total payments in excess of \$22,338 for the study year. This threshold was selected to remove people with extraordinarily high costs, those generally considered "catastrophic." The concern was that ADGs would not be sensitive to extreme morbidity, and that values for these people could disproportionately affect the means for utilization and payments. When outliers were excluded, the direction and significance of results were unchanged for all care sources for total payments, ambulatory visits, payments per visit, and probability of admission—the variables most critical to the simulation modeling.

The second concern was with the effect of users with pregnancies and neonatal intensive care on probability of admission and total Medicaid payments. Pregnant women disproportionately use outpatient departments for prenatal care, and it is not uncommon for neonatal intensive care graduates to be followed in hospital outpatient department clinics. Because an office-based physician may diagnose a woman as pregnant but refer her to an outpatient department for prenatal care, ADGs that rely on diagnosis codes cannot completely control for the effects of pregnancy. To test the sensitivity of findings to pregnancy and high-cost newborns, users with neonatal intensive care and pregnancy were removed from the study population, and the same series of regressions were repeated.

Approximately 40 percent of the difference in probability of admission between users of office-based physicians and users of outpatient departments was eliminated when users with pregnancy and neonatal intensive care were removed, but differences remained statistically significant at $p < .001$. Differences in total Medicaid payments between users of office-based physicians and users of outpatient departments were reduced from \$442 per user per year to \$319 per user per year but remained statistically significant at $p < .001$ (Stuart, 1988).

In a study of this nature, one expects to detect statistical significance because of the large number of subjects. The policy relevance of even relatively small differences in mean values between categories can nonetheless have a substantial impact on the bottom line, e.g., Medicaid payments. Consequently, simulation models were estimated that allowed these differences to be accurately determined, using the full population as well as a subset of the population that excluded users with pregnancies and other selected conditions.

Simulation modeling

The potential for reducing costs to the Medicaid program by directing enrollees to less costly providers can be tested, in part, by simulating alternative policies. Simulation modeling was used here to estimate the impact on potential savings of different sets of assumptions regarding physician fee increases and enrollee choice of provider. The simulation models were developed using a 50-percent sample (49,796 individuals) of all Medicaid

ambulatory care users in Maryland in the AFDC eligibility category who were continuously enrolled from July 1, 1986 to June 30, 1987. Differences in utilization and payments between continuously enrolled and non-continuously enrolled users, as well as other eligibility categories, are a subject of continuing investigation.

Through simulation modeling, savings or losses under alternative scenarios are estimated by calculating utilization and payments using the demographic, enrollment, and ADG values for users, entered in the regression model for alternative provider types. For each independent variable, the regression coefficient estimates the contribution to utilization and costs for an individual who uses a given provider type, controlling for all other independent variables in the regression model. Implicit in this approach is the assumption that differences in utilization among users of different care sources are a function of provider practice patterns rather than unmeasured differences in severity of illness or patient care-seeking behavior.

Variables used to measure utilization include ambulatory visits, probability of an inpatient admission, and inpatient days. Total payments, total ambulatory payments, and total inpatient payments were selected to provide a comprehensive picture of Medicaid payments. Total Medicaid payments equal the sum of total inpatient payments and total ambulatory payments. As noted earlier, ambulatory payments as defined in this study include payments for ambulatory visits, laboratory, X-ray, and other ambulatory services covered by Medicaid. Inpatient payments are a function of the probability of admission, as well as the average number of days and average cost per day for inpatient users.

Model development

To build the simulation model, a five-part model was estimated. This resulted in 30 separate least-squares regressions—1 for each of 5 utilization and payment variables for users of each of 6 different provider types. Each regression model includes independent variables for patient demographic characteristics, previous enrollment, and case mix. In addition, models for ambulatory payments and inpatient payments include an independent variable for the unit of service (e.g., visits or days). Measurement of independent variables in the regression equations is further detailed in Table 2.

The reason for estimating 30 regression equations was to be able to examine changes in volume and payments per unit of service for each usual source of care. If interest were restricted to total Medicaid payments, simplified reduced-form regression models would be sufficient.

The functional form of the equation used to estimate total payments per person per year in the simulation model is:

$$\text{Total annual Medicaid payments} = \sum_{u=1}^6 \sum_{j=1}^{n_u} T_{u,j}$$

Table 2
Measurement of independent variables included in regression models

Patient characteristics

Age:

- 1- 2 years
- 3- 5 years
- 6-11 years
- 12-17 years
- 18-22 years
- 23-44 years (reference category)
- 45 years or over

Sex:

- Female
- Male (reference category)

Race:

- White
- Black (reference category)
- Other

Previous enrollment

- Less than 6 months
- Greater than 6 months (reference category)

Case mix—Ambulatory diagnostic groups (ADGs)

- ADG 1 Time limited: Minor
- ADG 2 Time limited: Minor—primary infections
- ADG 3 Time limited: Major
- ADG 4 Time limited: Major—primary infections
- ADG 5 Allergies
- ADG 6 Asthma
- ADG 7 Likely to recur: Discrete
- ADG 8 Likely to recur: Discrete—primary infections
- ADG 9 Likely to recur: Progressive
- ADG 10 Chronic medical: Stable
- ADG 11 Chronic medical: Unstable
- ADG 12 Chronic specialty: Stable, orthopedic
- ADG 13 Chronic specialty: Stable, otolaryngology
- ADG 14 Chronic specialty: Stable, ophthalmology
- ADG 15 Chronic specialty: Stable, other
- ADG 16 Chronic specialty: Unstable, orthopedic
- ADG 17 Chronic specialty: Unstable, otolaryngology
- ADG 18 Chronic specialty: Unstable, ophthalmology
- ADG 19 Chronic specialty: Unstable, other
- ADG 20 Dermatologic
- ADG 21 Injuries: Adverse effects/Minor
- ADG 22 Injuries: Adverse effects/Major
- ADG 23 Psychosocial: Major
- ADG 24 Psychosocial: Other
- ADG 25 Psychophysiological
- ADG 26 Signs/symptoms: Minor
- ADG 27 Signs/symptoms: Uncertain
- ADG 28 Signs/symptoms: Major
- ADG 29 Discretionary
- ADG 30 See and reassure
- ADG 31 Preventive/administrative
- ADG 32 Malignancy
- ADG 33 Pregnancy
- ADG 34 Dental
- ADG 99 All other

Usual source of care¹

- Outpatient department (reference category)
- Emergency room
- Mixed outpatient and emergency clinics
- Office-based practice
- Community health center
- Children and youth clinic
- Undetermined

¹Independent variables used in regressions only for the Baltimore City analysis. In the simulation model, the "mixed outpatient and emergency clinics" users were combined with outpatient users, reducing to six the number of usual-source-of-care categories. Separate regressions were then run for each usual source of care type.

SOURCE: Stuart, M.: Maryland Department of Health and Mental Hygiene, Baltimore, Maryland, 1988.

where

total annual Medicaid payments for users of each provider type ($T_{u,j}$) = $A_{u,j} + P_{u,j} I_{u,j}$, and

$u = 1, \dots, 6$, identifying type of usual source of care (provider type);

$j = 1, \dots, n$, identifying the Medicaid eligible (user); and

n_u = number of users.

Regression models were estimated for the following dependent variables:

Annual ambulatory payments ($A_{u,j}$) = $F(C, E, M, V_{u,j})$;

Annual ambulatory visits ($V_{u,j}$) = $F(C, E, M)$;

Annual probability of admission ($P_{u,j}$) = $F(C, E, M)$;

Annual inpatient payments ($I_{u,j}$) = $F(C, E, M, D_{u,j})$;

Annual inpatient days ($D_{u,j}$) = $F(C, E, M)$;

where

C = patient characteristics of age, sex, and race;

E = previous Medicaid enrollment;

M = case mix measured with ambulatory diagnosis groups (ADG);

$V_{u,j}$ = regression-estimated annual ambulatory visits; and

$D_{u,j}$ = regression-estimated annual inpatient days.

Description of user types

Although the focus for simulation modeling is on enrollees who have actually used ambulatory care, it is important to see how these individuals fit into the larger Medicaid AFDC population, which includes non-users. In Table 3, the percentage distribution of Medicaid enrollees by user type is shown. Of the AFDC population in Maryland, 60.8 percent can be characterized as "ambulatory care users." Another 13.6 percent can be characterized as "other service users." Other service users have had no visits to an ambulatory care provider but may have used services at a local health department (such as a mental health clinic) or may have had at least one of the following services: laboratory, vision, dental, pharmacy, or inpatient. Finally, HMO users constitute 18.2 percent of the AFDC population in Maryland, and 7.4 percent of AFDC enrollees use no services at all.

For ambulatory care users, hospital outpatient departments and emergency rooms are the usual source of care for 15.7 and 12.8 percent, respectively. Office-based physicians, community health centers, and children and youth clinics are the usual source of care for 40.4, 4.5, and 3.2 percent of ambulatory care users. Finally, 23.4 percent of ambulatory care users do not have more than 50 percent of their visits to a single provider and were classified as "undetermined." Typically, users classified as "undetermined" use multiple office-based physicians or an office-based physician in conjunction with a hospital clinic.

In Table 4, the percentage distribution of Medicaid user types by age, sex, and race is shown. For each of these characteristics, differences among user-type categories are statistically significant ($p < .001$). Compared with other user types, ambulatory care users

Table 3

Frequency and percent distribution of a 50-percent sample of the Medicaid population continuously enrolled in Aid to Families with Dependent Children, by user type: Maryland, fiscal year 1987

Individuals	Number	Percent
All persons	81,913	100.0
Ambulatory care users by usual source of care: ¹		
Office-based physician	49,796	60.8
Outpatient department	20,112	40.4
Emergency room	7,813	15.7
Community health centers	6,388	12.8
Children and youth clinics	2,229	4.5
Undetermined	1,589	3.2
	11,665	23.4
Non-users ²	6,037	7.4
Health maintenance organization users	14,899	18.2
Other service users ³	11,181	13.6

¹Individuals were assigned to the provider who provided more than 50 percent of their ambulatory care. Individuals in the "Undetermined" category had no such provider.

²Individuals with eligibility and no utilization.

³Individuals not having ambulatory visits but receiving at least one of the following services: inpatient, laboratory, vision, dental, or pharmacy.

NOTE: Percents may not add to 100.00 because of rounding.

SOURCE: State of Maryland Department of Health and Mental Hygiene: Data from the Maryland Medicaid Management Information System; data developed by the Policy and Health Statistics Administration.

and HMO users are more likely to be children age 2 or over. Compared with ambulatory care users, HMO users, other service users, and non-users are more likely to be 6-11 years old (19.4 versus 25.2 percent, 27.7, and 29.5 percent, respectively). Non-users are more likely to be male, compared with other user categories. HMO users are much more likely to be black people than is the ambulatory care users group. This, in part, reflects the geographic distribution of the HMOs. In Maryland, HMOs that serve the Medicaid population are located primarily in areas in which the population is predominately black.

User characteristics by source of care

In Table 5, one can see the percentage distribution of ambulatory care users under the status quo, according to their usual source of care, by age, sex, and race. The distribution of age, sex, and race varies significantly among usual-source-of-care provider types ($p < .001$). Within each of the usual-source-of-care categories, more than one-half of the individuals are under the age of 23. The exception to this is the children and youth clinics, in which 99.8 percent of users are under the age of 23.

The proportion of males to females in each of the usual-source-of-care categories is similar to that for all ambulatory care users (32.9 to 67.1 percent). However, of the children and youth clinic users, there is a slightly higher proportion of males (43.6 percent) as a result of the small proportion of adults using this provider type (almost all AFDC enrollees over age 21 are female). AFDC users whose usual source of care is a hospital outpatient department, community health center, or children and youth clinics, are predominately black

Table 4

Frequency and percent distribution of a 50-percent sample of the Medicaid population continuously enrolled in Aid to Families with Dependent Children, by age, sex, and race: Maryland, fiscal year 1987

Characteristics	Total	Ambulatory care users ¹	Non-users ²	Health maintenance organization users	Other service users ³	Chi-square level of significance
All persons	81,913	49,796	6,037	14,899	11,181	
Age in years						
All ages	100.0	100.0	100.0	100.0	100.0	
Under 1	0.5	0.6	0.1	0.4	0.2	$\chi^2 = 2,229.36$
1-2	10.5	12.1	4.5	11.1	5.5	
3-5	15.0	15.2	11.2	17.6	12.7	$p < .001$
6-11	22.4	19.4	29.5	25.2	27.7	
12-17	15.4	13.9	22.6	12.9	21.3	
18-22	7.7	8.0	7.3	7.7	7.1	
23-44	26.5	28.2	22.8	24.1	23.8	
45 or over	2.1	2.5	2.0	1.1	1.6	
Sex						
Total	100.0	100.0	100.0	100.0	100.0	$\chi^2 = 248.56$
Male	34.3	32.9	42.6	34.4	36.2	$p < .001$
Female	65.7	67.1	57.4	65.6	63.8	
Race						
Total	100.0	100.0	100.0	100.0	100.0	$\chi^2 = 3,935.70$
Black	72.9	66.0	76.0	91.5	76.9	$p < .001$
White	25.8	32.4	22.4	8.3	21.9	
Other	1.3	1.6	1.6	0.3	1.1	

¹Individuals with one or more ambulatory visits.

²Individuals with eligibility and no utilization.

³Individuals not having ambulatory visits but receiving at least one of the following services: inpatient, laboratory, vision, dental, or pharmacy.

NOTE: Percents may not add to 100.00 because of rounding.

SOURCE: State of Maryland Department of Health and Mental Hygiene: Data from the Maryland Medicaid Management Information System; data developed by the Policy and Health Statistics Administration.

Table 5

Percent distribution of ambulatory care users according to usual source of care for a 50-percent sample of the Medicaid population continuously enrolled in Aid to Families with Dependent Children, by age, sex, and race: Maryland, fiscal year 1987

Characteristics	Usual source of care						Chi-square level of significance
	Children and youth clinic	Outpatient department	Emergency room	Community health center	Office-based physician	Undetermined	
Age in years							
All ages	100.0	100.0	100.0	100.0	100.0	100.0	
Under 1	1.6	0.9	0.4	1.0	0.6	0.4	$\chi^2 = 2,473.35$
1-2	27.2	11.9	10.9	17.1	12.4	9.4	
3-5	26.0	11.9	14.7	16.9	16.3	14.0	$p < .001$
6-11	23.9	14.5	22.8	17.6	21.8	16.6	
12-17	18.1	11.4	17.3	13.1	14.2	13.0	
18-22	3.0	12.4	8.5	8.3	5.8	9.1	
23-44	0.1	34.7	24.4	23.9	25.5	35.3	
45 or over	0	2.4	1.1	2.1	3.4	2.2	
Sex							
Total	100.0	100.0	100.0	100.0	100.0	100.0	$\chi^2 = 425.49$
Male	43.6	27.1	39.1	31.3	34.8	29.1	$p < .001$
Female	56.4	72.9	60.9	68.7	65.2	70.9	
Race							
Total	100.0	100.0	100.0	100.0	100.0	100.0	$\chi^2 = 3,211.31$
Black	94.5	83.9	70.9	85.8	56.2	60.6	$p < .001$
White	5.3	15.6	28.5	13.7	41.3	37.6	
Other	0.2	0.6	0.6	0.5	2.5	1.8	

NOTES: Individuals were assigned to the provider who provided more than 50 percent of their ambulatory care. Individuals in the "Undetermined" category had no such provider. Percents may not add to 100.00 because of rounding. There were 49,796 ambulatory care users included in the sample.

SOURCE: State of Maryland Department of Health and Mental Hygiene: Data from the Maryland Medicaid Management Information System; data developed by the Policy and Health Statistics Administration.

Table 6

Means for utilization and payments per year for outpatient department (OPD) users and diverted OPD users and estimated Medicaid savings (loss) for alternative scenarios for a 50-percent sample of the Medicaid population continuously enrolled in Aid to Families with Dependent Children: Maryland, fiscal year 1987

Scenarios	Ambulatory visits	Ambulatory payments per visit ^{1,2}	Percent admitted to hospital	Inpatient payments per day ^{2,3}	Inpatient days ³	Percent savings (loss)
A Status quo	7.2	\$77	24.4	\$694	5.3	—
B Divert all OPD users to office-based physicians at current average ambulatory payment per visit for physician users	6.3	34	15.3	489	5.0	11.3
C Divert all OPD users to office-based physicians and increase the average ambulatory payment per physician visit to the break-even point (\$64)	6.3	64	15.3	489	5.0	0
D Divert all OPD users to office-based physicians and increase the average ambulatory payment per visit for all physician users to the OPD level	6.3	77	15.3	489	5.0	(5.3)
E Leave OPD users in the OPD, but reduce the average ambulatory payment per visit to the physician level (\$34) for all OPD users	7.2	34	24.4	694	5.3	5.2

¹Ambulatory payments per visit include payments for all ambulatory services including visits, ancillaries, and pharmacy in the numerator, with ambulatory visits alone in the denominator.

²Regression adjusted for patient demographic characteristics (age, race, sex), previous enrollment, and morbidity (ambulatory diagnosis groups).

³Inpatient means for users with inpatient admissions.

NOTES: Individuals were assigned to the provider category who provided more than 50 percent of their ambulatory care. There were 49,796 ambulatory care users included in the sample.

SOURCE: State of Maryland Department of Health and Mental Hygiene: Data from the Maryland Medicaid Management Information System; data developed by the Policy and Health Statistics Administration.

persons (83.9, 85.8, and 94.5 percent, respectively). Of users of office-based physicians, 41.3 percent are white persons.

Simulation results

In Tables 6 and 7, one can see Medicaid savings (loss) estimated through simulation modeling for the status quo (Scenario A) and six alternative scenarios. Scenarios B, C, D, and E illustrate the sensitivity of savings to changes in ambulatory payments per visit. Scenario F illustrates the sensitivity of savings to pregnancy and other selected diagnoses. Finally, Scenario G estimates savings for a “realistic” policy initiative, based on assumptions developed in conjunction with staff from the Maryland Medicaid program.

Effects of ambulatory payments

Scenario B

In Scenario B, savings are estimated as if all current outpatient department users could be shifted from the outpatient department to office-based physicians with no increase in physician reimbursement levels. Under this scenario, the average number of visits per person for

former outpatient users decreases from 7.2 per year to 6.3. The average payment per visit decreases from \$77 to \$34, reflecting the lower average payment per ambulatory visit for office-based physician users compared with hospital outpatient department users. The probability of an inpatient admission drops from 24 percent to 15 percent. A net savings of 11.3 percent is estimated. This scenario estimates the upper limit of savings that could, in theory, be obtained from shifting outpatient department users to office-based physicians. However, in reality, such savings are not realistic, for reasons that are discussed later in this article.

Scenario C

To encourage office-based physicians to increase the number of Medicaid patients in their practices, Medicaid reimbursement levels would have to be increased. To provide perspective on the sensitivity of savings to raising reimbursement levels to private physicians, Scenario C estimates the “break-even point,” or maximum increase in the average payment per visit that could be implemented without a net loss for the Medicaid program. The break-even point is a mean payment of \$64 per ambulatory visit. As has been discussed, the average

Table 7

Impact of selected conditions and recipient choice of utilization, payments, and estimated savings for outpatient department (OPD) and office-based physician users in a 50-percent sample of the Medicaid population continuously enrolled in Aid to Families with Dependent Children: Maryland, fiscal year 1987

Scenarios	Ambulatory visits	Ambulatory payments per visit ^{1,2}	Percent admitted	Inpatient payments per day ^{2,3}	Inpatient days ³
F Selected conditions⁴					
(a) OPD users	10.2	\$77	43.3	\$694	5.0
(b) OPD users diverted to office-based physicians	4.9	34	6.6	489	6.0
(c) Office-based physicians users	6.4	34	9.0	489	5.2
Percent savings (loss)	2.9	—	—	—	—
G Recipient choice⁵					
(a) OPD users	10.2	77	43.3	694	5.0
(b) OPD users diverted to community health centers (CHCs)	4.2	54	6.0	423	4.6
(c) OPD users diverted to office-based physicians	4.9	34	6.6	489	6.0
(d) Office-based physician users	6.4	34	9.0	489	5.2
Percent savings (loss)	6.8	—	—	—	—

¹Ambulatory payments per visit include payments for all ambulatory services including visits, ancillaries, and pharmacy in the numerator, with ambulatory visits alone in the denominator.

²Regression adjusted for patient demographic characteristics (age, race, sex), previous enrollment, and morbidity (ambulatory diagnosis groups).

³Inpatient means for users with inpatient admissions.

⁴Assumes all OPD users with an unstable chronic condition, a major psychosocial condition, a malignancy, or a pregnancy remain in the OPD. All other OPD users (56 percent) are diverted to office-based physicians.

⁵All OPD users with an unstable chronic condition, a major psychosocial condition, a malignancy, or a pregnancy remained OPD users. Of OPD users, 56 percent were diverted to other providers. Diverted OPD users were shifted as follows: 20 percent to CHCs and 80 percent to office-based physicians. All emergency room users were shifted as follows: 25 percent CHCs, 45 percent to office-based physicians, 30 percent to OPDs. All individuals categorized as "Undetermined" were diverted as follows: 10 percent to CHCs, 80 percent to office-based physician, and 10 percent to OPDs.

NOTES: Individuals were assigned to the provider category who provided more than 50 percent of their ambulatory care. Individuals in the "Undetermined" category had no such provider. There were 49,796 ambulatory care users included in the sample.

SOURCE: State of Maryland Department of Health and Mental Hygiene: Data from the Maryland Medicaid Management Information System; data developed by the Policy and Health Statistics Administration.

payment per ambulatory visit includes payments for all ambulatory services in the numerator, with ambulatory visits alone in the denominator. The actual average physician payment per visit under the status quo is approximately \$15. If reality were as simple as Scenario C, average physician payment per visit in Maryland could increase from \$15 to \$45, and overall payments per visit would approach the break-even point of \$64.

Scenario D

To illustrate the sensitivity of savings to changes in the level of ambulatory payments per visit, Scenario D is based on the same assumptions as Scenario C, except that the average ambulatory payment per visit is raised even higher, to \$77, which is the average ambulatory payment per visit for outpatient department users under the status quo. In this scenario, as in Scenario C, it is assumed that the higher payment level would be implemented for all users of office-based physicians, regardless of whether they were previously using office-based physicians or the outpatient department. As in Scenario B, it is also assumed that all current outpatient department users could be shifted from the outpatient department to office-based physicians. In Scenario D, the Medicaid program would lose 5.3 percent.

Scenario E

An obvious question at this point is, "What if Medicaid did not divert outpatient department users, but simply lowered payments for ambulatory visits in the hospital setting?" In Scenario E, it is assumed that no outpatient users would be diverted to office-based practices, but that ambulatory payments per visit for outpatient users could be reduced to \$34, the same level paid for visits of users of office-based physicians. Under Scenario E, the Medicaid program would save 5.2 percent.

Reality testing

In reality, it would not be possible for the Maryland Medicaid program to implement Scenarios B, C, D, and E. Scenario E would not be possible because Maryland law mandates that Medicaid pay cost-based reimbursement for ambulatory care delivered in hospital settings. Scenarios B, C, and D are based on the assumption that all outpatient department users could be diverted to office-based physicians. Hospital outpatient departments are the usual source of care for more than one-quarter of the pregnant women in the Maryland AFDC population. In addition, in Baltimore City, hospitals represent a major source of care, especially for people with pregnancy, chronic conditions, psychosocial

problems, and malignancies. Even in conjunction with a substantial physician fee increase, totally eliminating hospital clinics as a source of care could jeopardize access for these high-risk individuals. In light of these considerations, additional scenarios were estimated.

Effects of maintaining access

Because access to care for pregnant Medicaid women is a major concern from a policy perspective, and the sensitivity analysis reported earlier had already identified that pregnancy could influence differences in total Medicaid payments, additional modeling was undertaken to estimate the impact of leaving selected users in the outpatient department. To construct this model, users with ADGs for pregnancy, unstable chronic conditions, major psychosocial problems, and malignancies were removed, and regressions for users of outpatient clinics were repeated for the two subgroups—outpatient users with and without the selected ADGs. The new regression coefficients for these subgroups were then used to expand the simulation model so that users with the selected ADGs could remain in the hospital outpatient department, while others were diverted.

Scenario F

Scenario F assumes all outpatient department users with ambulatory diagnoses for unstable chronic conditions, major psychosocial conditions, malignancies, or pregnancy will remain in the outpatient department. All other outpatient users (56 percent of all outpatient users) are diverted to office-based physicians. In this scenario, the estimated savings drop to 2.9 percent. The average number of ambulatory visits for outpatient users who are diverted to office-based physicians drops to 4.9 and the probability of a hospital admission to 6.6 percent. The average number of ambulatory visits per user per year for outpatient users who remain in the outpatient department increases to 10.2 (from 7.2 in the status quo) and the probability of a hospital admission increases to 43.3 percent (from 24.4 percent in the status quo).

Given the population remaining in the outpatient department, a probability of admission of 43.3 percent might appear low. It should be noted that, although the probability of a hospitalization for pregnancy might be expected to be 100 percent, this is not reflected in the Medicaid ambulatory diagnosis data. Diagnosis codes used for the ADGs are assigned in an ambulatory setting and many do not reach delivery during the study period.

Estimating reality

Although earlier scenarios are useful in providing an understanding of parameters, from the perspective of the Maryland Medicaid program, none represents a realistic policy alternative. In addition to issues that have already been explored (e.g., the sensitivity of findings to physician fee increases and selected diagnoses), the Medicaid program indicated that, to model a real-life policy initiative, other assumptions must be introduced. In particular, any policy initiative would require all

recipients, not just outpatient users, to select (or be assigned) a primary care provider. Furthermore, recipients would be given a choice of providers that would include community health centers and outpatient departments as well as office-based physicians.

Scenario G

To estimate savings for a real-life scenario, a number of assumptions were made regarding recipients' choice of provider. Provider-choice assumptions were made for outpatient department users as well as emergency department users and those for whom no usual source of care could be identified (the "undetermined" users). As in the preceding scenario, it was assumed that 44 percent of AFDC outpatient department users would elect to maintain the outpatient department as their primary provider, and that this would include all current outpatient department users with unstable chronic conditions, major psychosocial problems, malignancies, or pregnancy. Of the remaining outpatient department users, it was assumed that 20 percent would select community health centers and 80 percent would select office-based physicians.

Because, in this policy option, a choice of providers would be required, all emergency department users and those with an undetermined usual source of care were shifted to other providers. It was assumed that 30 percent of emergency department users would select outpatient departments, 25 percent would choose community health centers, and 45 percent would go to office-based physicians. Of users with an undetermined usual source of care, it was assumed that 10 percent would choose community health centers, 80 percent would use office-based physicians, and 10 percent would select outpatient departments as providers. These percentages were selected after consideration of the availability of alternative provider types in the geographic vicinity of outpatient departments and the case mix of patients using each provider type. The assumption that a relatively high percentage of "undetermined" users would select office-based physicians was made based on a review of providers currently used by these enrollees. It was assumed that all current users of community health centers, children and youth clinics, and office-based physicians would remain with these providers.

As indicated in Table 7, the estimated savings for Scenario G under these assumptions are 6.8 percent. Scenario G includes no increase in the average payment per ambulatory visit. The drop in savings from 11.2 percent (Table 6, Scenario B) to 6.8 percent (Table 7, Scenario G) is primarily the result of assumptions that not all outpatient department users will choose to leave the outpatient departments, and that those with the most complex and potentially costly medical problems are most likely to remain outpatient department users. The increase in estimated savings from Scenario F to Scenario G is the result of the diversion of additional users, e.g., those whose usual source of care was "undetermined" or an emergency room, as well as outpatient department users. Additional sensitivity testing was conducted to determine the extent to which savings would be affected by recipient selection of community health centers versus office-based physicians, as well as assumptions regarding

the average number of ambulatory visits per person per year for users diverted to these provider types. Estimated savings were relatively insensitive with regard to changes in assumptions for both of these issues.

Discussion and implications

Physician participation in Medicaid

When the Medicaid program was enacted in 1965, two of its original goals were to provide access to care for persons who would be unable to afford care otherwise and to have this care administered in "the mainstream of American medicine" (Social Security Act, title XIX). This latter goal sought to integrate recipients into the private, office-based network of providers who at that time served the majority of Americans seeking ambulatory health services (Davidson, 1974). By the mid-seventies, increased concern was being raised about growing numbers of physicians who were reducing participation in the program and thereby undercutting the realization of this goal. Studies originating in California showed that 40 percent of participating physicians either had or were going to reduce their involvement in the State's Medicaid program (Jones and Hamburger, 1976; Kushman, 1977). This trend toward reduced involvement was also reported in a number of other States at about the same time (Garner, Liao, and Sharpe, 1979; Massachusetts Medical Society, 1979; Kentucky Legislative Research Commission, 1981).

A number of studies have examined the question of whether raising Medicaid rates to physicians could be expected to increase physician participation. All studies show that "more generous Medicaid payments encourage physicians to see Medicaid patients" (Gabel and Rice, 1985). Findings are inconsistent, however, with regard to the strength of the relationship between a fee increase and an increase in physician participation. One study estimated that the percent of physicians' Medicaid caseload would increase by 70 percent if reimbursements were doubled (Sloan, Cromwell, and Mitchell, 1978). A frequently cited study by Hadley (1979) reported that, over a 4-year period in California, raising rates by 10 percent resulted in 17-percent greater overall participation and a 3-percent increase in Medicaid caseloads among physicians already participating. Likewise, a 10-percent increase in private reimbursement reduced Medicaid participation by 19 percent and average Medicaid caseloads for those participating by almost 12 percent. Recently published research also suggests that, although Medicaid enrollees are just as likely to obtain ambulatory care when physician fees are low, they are more likely to use physician offices relative to hospital outpatient departments when physician fees are higher (Cohen, 1989; Rosenbach, 1989; Long, Settle, and Stuart, 1986).

Quality of care

Concern about the effects of low physician participation center on both questions of equity as well as

the adequacy of care received by the Medicaid population. It has been suggested that primary care is most effective when first contact occurs through a physician office (Starfield, 1979), the point at which most privately insured patients enter the system. Further, it has been suggested that hospital clinics or emergency rooms were designed for other purposes and do not foster continuous and comprehensive care (Davidson, 1978). Concern has also been raised that, especially for children, outpatient departments function as sources of discrete, episodic care, which is not suited to a population in need of comprehensive preventive and primary care services (Kasper, 1987).

Despite these concerns, it is important to recognize that there are pockets of very ill people being served by outpatient departments, and caution must be exercised in assuming that other providers can or would care for these people. This is largely an issue of access. There is no published research that indicates that outcomes for people receiving care in hospital outpatient departments are better or worse than for those using other provider types. Although the relationship between practice variation and outcome is an area of continuing research, in the absence of any evidence to the contrary, it must be assumed that, for the average user, community-based providers offer primary care that is of at least equal quality to that provided in outpatient clinics.

Maryland Access to Care Program

Based in part on these analyses, the Maryland Medicaid program is currently preparing to implement a new initiative known as the Maryland Access to Care Program. The Medicaid program will introduce a series of changes including:

- All enrollees must select a usual-source-of-care provider or else one will be assigned.
- Enrollees will be allowed to select from among a variety of provider types, including outpatient departments, to avoid disruption of established relationships.
- The usual source of care will function as a gatekeeper so that all care will be provided or preauthorized by this provider (except in a true emergency).
- Physician payments will be increased by 40-50 percent.

Conclusion

In Maryland, simulation modeling with data from the State's MMIS has provided an opportunity to examine policy options and assess their impact on potential savings before decisions are made. This project was initiated in the early eighties when a preliminary study confirmed that nationally reported findings regarding utilization and cost differences associated with type of provider were also reflected in Maryland Medicaid data (Sanford and Velnosky, 1981). However, potential case-mix differences among providers were recognized as a major issue in interpretation of these findings. At that time, a decision was made to develop annual person-based analytic files from claims data that would include diagnostic information to examine case-mix differences.

This study confirms that significant differences in utilization and cost to Medicaid exist even after controlling for patient demographic and case-mix differences. Findings suggest that Medicaid could potentially save money and fulfill its original goal of having care administered in "the mainstream of American medicine" by diverting selected users of hospital clinics to community-based providers.

The Maryland Access to Care Program, designed to accomplish these objectives, will provide an opportunity to test exactly this premise. In addition to providing a basis for simulation modeling, Medicaid data provide a capability for ongoing monitoring and surveillance. Because the Access to Care Program represents a significant change in Medicaid policy for Maryland, utilization and expenditures as well as the adequacy of preventive care will be monitored on an ongoing basis. In addition to the bottom line for State policymakers ("Is it saving money and improving care?"), questions of interest include the extent to which physician participation increases in response to the increase in payment levels and whether the program will succeed in shifting patients to community-based providers in light of its "freedom of choice" approach.

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