

# The Influence of Having an Assigned Medicaid Primary Care Physician on Utilization of Otitis Media-related Services

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**Abstract. Objective.** This study documents the influence of having an assigned Medicaid primary care physician (PCP) on the utilization of otitis media-related services.

**Design/Methods.** This is a retrospective study using the 1991 Colorado Medicaid administrative database that followed 28 844 children <13 years who had at least 1 visit for otitis media.

**Results.** Children continuously enrolled in Medicaid throughout the entire year were >4 times (odds ratio: 4.2 and 4.89, respectively) as likely to always or sometimes have a PCP compared with children who were discontinuously enrolled. The likelihood of ever using the emergency department for an otitis media-related visit was increased by 26% and 50%, respectively, when a child sometimes or never had a PCP compared with always having a PCP. The likelihood of ever filling an antibiotic for otitis media was reduced by 23% and 34%, respectively, when a child sometimes or never had a PCP compared with always having a PCP. The likelihood of ever having otitis media-related surgery was not affected by PCP status, but young children, 13 to 18 months of age, had higher referral rates when they had an assigned PCP.

**Conclusions.** These findings suggest that having an assigned Medicaid PCP influences the utilization patterns of some otitis media-related medical services. *Pediatrics* 1999;104:1192-1197; *Medicaid PCP, utilization, otitis media-related services.*

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ABBREVIATIONS. PCP, primary care physicians; AFDC, Aid to Families With Dependent Children; FPL, federal poverty level; ORs, odds ratios; CIs, 95% confidence intervals.

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According to recent data, approximately 15.8 million or 21.2% of America's children are enrolled in state Medicaid programs and an additional 4.8 million children are eligible for state Medicaid programs but not enrolled.<sup>1</sup> State health policymakers should consider the potential impact of continuous 12-month enrollment periods and providing adequate reimbursement levels to ensure the widespread participation of primary care physicians (PCPs) on the delivery of medical services.

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This is especially relevant as states expand Medicaid managed care and Title XXI programs. Monthly recertification of Medicaid eligibility leads to frequent shifts on and off the program that may undermine the delivery of cost-effective, quality care. A national survey reported that children enrolled in Medicaid during their first 3 years of life are more than 3 times more likely to have a gap in insurance coverage than children enrolled in commercial employer-financed insurance programs.<sup>2</sup> Having a gap in coverage is likely to interrupt the establishment and maintenance of a regular source of primary care. Children without an identifiable primary care physician are less likely to be completely immunized, have lower rates of preventive visits for well child care and higher visit rates for illness, and have more frequent emergency department visits.<sup>3-5</sup> However, limited data are available describing the influence of having an assigned managed care PCP on medical and surgical service utilization for specific pediatric conditions.

The high utilization of medical and surgical services associated with the management of otitis media makes this condition a good marker for assessing how providing 12 months of continuous Medicaid enrollment and having an assigned primary care physician influence utilization of emergency department services, antibiotic therapies, and surgical referrals. The impact of having an assigned PCP could be evaluated in Colorado because, in 1991, approximately half of the children enrolled in the fee-for-service Medicaid program were not assigned to a PCP according to data provided by the Medicaid Program. The Medicaid beneficiary selected a PCP from a list of available physicians willing to accept new children into the primary care case management Medicaid program. After the family selected a physician, the state Medicaid office notified the physician that the child was being added to the physician's PCP panel. In return for a monthly case management fee for the child, the PCP agreed to provide primary care to the child, have 24-hour, 7-day a week telephone availability, and approve all emergency department visits. In 1992 there were 2006 Medicaid PCPs in Colorado, with 9 of 63 counties having no PCP participation.<sup>6</sup> In many areas of the state, families could not find PCPs willing to accept new Medicaid patients into their PCP panels. Limited participation in the Medicaid program's primary

care case management program was caused by concerns about low reimbursement and burdensome administrative systems.<sup>7</sup> When children did not have an assigned PCP, their family had to seek primary care from public health nursing clinics, hospital clinics, emergency departments, and PCPs willing to schedule sick child visits. Although children with an assigned PCP were therefore more likely to have better continuity of care, this study did not attempt to document actual differences in continuity between children with and without an assigned PCP.

This study addressed the following 2 hypotheses: 1) children who are continuously enrolled in Medicaid are more likely to have a PCP; and 2) children who always have a PCP are less likely to use the emergency department for otitis media–related services, are more likely to fill antibiotic prescriptions to treat otitis media, and are more likely to be referred for the surgical insertion of ventilating tubes and/or adenoidectomy.

## METHODS

The study population consisted of children <13 years enrolled in Colorado's Medicaid program from January 1 through December 31, 1991. The study population was limited to this age range because these younger children have a much higher incidence of otitis media and limiting the population size greatly facilitated the programming and analysis. During the period of the study, the state's Medicaid recipients obtained services primarily in the fee-for-service environment; the only exception was a small number of recipients (<5%) enrolled in a prepaid health plan in one county on the western slope of the Rocky Mountains. The children enrolled in this managed care organization during the study were excluded because no utilization data were submitted to Medicaid.

Data for the study were obtained from an extract of the Medicaid Medical Events Database and include patient demographic information, provider information, and claims paid by Medicaid for prescriptions, outpatient and emergency department visits, inpatient hospitalizations, radiology services, and laboratory services. Once obtained by the University of Colorado Health Sciences Center, the claims information was reorganized into 4 files according to type of clinical information: diagnoses, procedures, drug fills, and hospital stays. All claims included a unique provider number linking services with a specific provider. When an antibiotic or other drug was prescribed and dispensed (referred to as a "drug fill"), the prescribing physician was identified by the license number, which appears on the claim. In addition, individual patients were followed throughout the study period because of their unique Medicaid recipient identification numbers that are maintained across periods of enrollment, name changes, and moves to different counties.

Using standard statistical software (SAS, Cary, NC) and artificial intelligence software developed by the research team, all services provided to an individual were extracted from the demographic and claims data files, aggregated, and analyzed as described in previous publications.<sup>8–10</sup> Clinicians documented the accuracy of the computer algorithms used to determine otitis-related diagnoses, antibiotics, ambulatory visits, and surgeries by blindly reviewing profiles of patient data and comparing the raw data to the calculated categories. *International Classification of Diseases, 9th Revision* diagnostic codes identified visits for otitis media. Diagnostic information included in administrative data has been found to have both internal and external validity problems, but various strategies exist to minimize such problems.<sup>11–14</sup> No attempt was made in the study to distinguish chronic from acute designations of otitis because documentation of physicians' coding practices suggests sufficient variability to render such distinctions invalid.<sup>15</sup> Thus, we aggregated otitis diagnostic codes to the third *International Classification of Diseases, 9th Revision* digit. Antibiotics were considered to be prescribed for otitis media only when dispensed

up to 24 hours before or within 48 hours after a diagnosis of otitis media.<sup>16,17</sup> Other data variables used in the study were those subject to federal audit that have been found to be particularly reliable and complete including Current Procedural Terminology procedure codes and demographic information.<sup>18–24</sup>

The patient demographic variables included age, sex, urban-rural residence, ethnicity, and program eligibility category. Residence referred to the first county of residence during the study year, with "urban" defined by the Census Bureau's metropolitan statistical areas. The classification for ethnicity included Caucasian, Hispanic, African-American, Native American, and other. Program eligibility categories included Aid to Families With Dependent Children [AFDC], Blind and Disabled, Foster children, and the federally mandated expansion population. Colorado Medicaid eligibility during this time period was based on the mandatory federal requirements. The mandated expansion population consisted of children whose families had incomes above the AFDC rates but within the federally mandated Medicaid income eligibility levels. In 1991, this mandate required all states to cover children through age 6 years in families up to 133% of the federal poverty level (FPL), children 6 to 10 years up to 100% of the FPL, and children 11 to 21 at the state AFDC level (42% of the FPL for Colorado).

Children were assigned to 1 of 2 Medicaid enrollment categories. Continuously enrolled children were enrolled for the entire study year or were born during the study year and enrolled from birth to the end of the study year; all other children were considered to be discontinuously enrolled. The assignment of a child to a PCP was tracked in the database by the monthly per child case management fee that was paid to the physician. Children were assigned to 1 of 3 PCP categories: "never" when the child had no recorded PCP during any of the months of Medicaid enrollment during the study period; "sometimes" when the child had a PCP for only some of the months of enrollment; or "always" when the child had a designated PCP for each month of enrollment during the study period.

In assessing antibiotic use and otitis-related surgery, we calculated incidence density rates per child-months or child-years to account for varying Medicaid enrollment periods. A multivariate analysis was performed on the study population with a diagnosis of otitis media using 3 dependent outcome variables: 1) any emergency department use for an otitis media–related visit; 2) ever filling an antibiotic for otitis media; and 3) ever having an otitis media–related surgery (defined as ventilating tubes and/or adenoidectomy). The independent variables in addition to PCP status included: age, ethnicity, residence, eligibility category, enrollment category, and the frequency of otitis media–related office visits per enrolled month. As a first step, univariate analyses were performed using  $\chi^2$  tests. Logistic regression analyses were performed to obtain adjusted odds ratios (ORs) for each outcome. The analyses were stratified by enrollment to assess the independent variables on only children with 12 months of continuous enrollment. Potential interactions were assessed for having a PCP and type of enrollment (ie, always continuous, always discontinuous, some continuous, some discontinuous, never continuous, and never discontinuous). Point estimates of the adjusted ORs and the 95% confidence intervals (CIs) were calculated.

## RESULTS

### **Hypothesis 1: Children who are continuously enrolled in Medicaid are more likely to have an assigned PCP.**

During 1991, 131 179 children <13 years were enrolled in the Colorado Medicaid program and 28% always had a PCP, 31% sometimes had a PCP, and 41% never had a PCP. Twenty-two percent of these children had a diagnosis of otitis media during the year. Among these 28 844 children with otitis media, 34% always had a PCP, 36% sometimes had a PCP, and 30% never had a PCP. The proportion of children who always or sometimes had a PCP was higher in children with otitis (34%

and 36%, respectively) compared with all Medicaid children (26% and 30%, respectively) ( $P < .01$ ). Table 1 displays the PCP assignment status of Medicaid children with otitis media according to their sociodemographic characteristics. Children who were discontinuously enrolled, <18 months old, Native American, eligible under the federally mandated Medicaid expansion or foster care, and residing in rural areas were less likely to always have a PCP. It was striking that 82% of children in foster care never had a PCP. Alternatively, children who were age 3 and older, Hispanic, eligible under the AFDC category, and residing in urban areas were more likely to always have a PCP. These differences were all statically significant ( $P < .01$ ) because of the large sample size. The multivariate analysis of children with otitis media that adjusted for eligibility category, ethnicity, and residence found that children continuously enrolled in Medicaid throughout the entire year were more than 4 times (OR: 4.2; [95% CI: 3.90–4.53] and 4.89 [95% CI: 4.52–5.29], respectively) as likely to always or sometimes have a PCP to compared with children who were discontinuously enrolled.

**Hypothesis 2: Children who always have an assigned PCP are less likely to use the emergency department for otitis media-related services, are more likely to fill antibiotic prescriptions to treat otitis media, and are more likely to be referred for the surgical insertion of ventilating tubes or adenoidectomy.**

### Emergency Department Use

The multivariate analysis shown in Table 2 assessed the influence of having an assigned PCP on the likelihood of any emergency department use related to otitis media after adjusting for the enrollment category, ethnicity, and frequency of otitis media-related office visits. The likelihood of ever using the emergency department for an otitis media-related visit was increased by 26% and 50% when a child sometimes or never had an assigned PCP compared with always having an assigned PCP. The likelihood of ever using the emergency department was also increased when the child was African-American, Hispanic, or Native American compared with Caucasian.

### Antibiotic Usage

The incidence density rates of otitis media-related antibiotic fills per child-month enrolled in Medicaid were consistently higher when children always had an assigned PCP for all ages. The largest differences were noted during the second year of life, when otitis media episodes were most common. During this age the number of antibiotic fills for otitis media per child-month were 20% to 25% higher when children always had an assigned PCP (.223 fills/child-month) compared with sometimes (.181 fills/child-month) or never having a PCP (.179 fills/child-month).

A multivariate analysis was conducted in children with a diagnosis of otitis media to assess factors affecting whether a child with an otitis media

**TABLE 1.** Sociodemographic Characteristics of Medicaid Children With Otitis Media According to Their Assignment to a Primary Care Physician

Characteristic	PCP Assignment					
	Always		Sometimes		Never	
	N	%	N	%	N	%
Age						
0–6 mo	30	3	375	40	530	57
7–12 mo	68	2	1686	55	1326	43
13–18 mo	815	22	1657	44	1264	34
19–24 mo	1099	33	1205	37	998	30
25–30 mo	886	34	960	37	729	28
31–36 mo	778	39	706	35	539	27
3–6 y	3889	43	2820	31	2269	25
7–9 y	1265	50	633	25	627	25
10–13 y	875	52	412	24	400	24
Total	9705	34	10 454	36	8682	30
Ethnicity						
Native American	70	28	90	36	88	36
Hispanic	3721	39	3241	34	2527	27
Caucasian	4920	31	6044	38	5055	32
African-American	879	34	907	35	830	32
Other	117	25	172	36	183	39
Eligibility category						
AFDC	8413	39	7970	37	5018	23
Mandated expansion	966	17	2000	35	2766	48
Blind/disabled	327	32	354	35	328	33
Foster care	0	0	124	18	568	82
Residence						
Urban	7914	35	8332	36	6690	29
Rural	1793	30	2122	36	1993	34
Enrollment						
Continuous	8338	41	6683	33	5179	26
Discontinuous	1369	16	3771	44	3504	40

**TABLE 2.** Odds Ratios of Factors Influencing Otitis Media–related Service Utilization Adjusted for Age, Ethnicity, Eligibility Category, Enrollment Category, and the Frequency of Otitis Media–related Office Visits per Enrolled Month

Independent Variable	Any Emergency Department Use	Ever Filling an Antibiotic	Any Otitis Media Surgery
	Adjusted Odds Ratio	Adjusted Odds Ratio	Adjusted Odds Ratio
PCP assignment			
Always	1.00	1.00	1.00
Sometimes	1.26 [1.17–1.36]	.77 [.70–.85]	1.03 [.88–1.22]
Never	1.50 [1.38–1.64]	.66 [.66–.73]	1.08 [.90–1.29]
Enrollment			
Continuous	1.00	1.0	1.00
Discontinuous	.81 [.71–.93]	.54 [.46–.63]	.36 [.25–.51]
Ethnicity			
Caucasian	1.00	1.00	1.00
Hispanic	1.34 [1.26–1.42]	1.20 [1.12–1.28]	.79 [.69–.90]
African-American	1.83 [1.67–2.01]	.85 [.76–.94]	.76 [.60–.97]
Native American	1.28 [1.08–1.52]	.72 [.60–.86]	.88 [.60–1.28]
Otitis visits per enrolled month	2.54 [2.28–2.84]	8.24 [6.84–9.93]	10.88 [9.11–13.0]

diagnosis ever filled an antibiotic for otitis media. Adjusting for discontinuous enrollment, ethnicity, and frequency of otitis media–related visits, the likelihood of ever filling an antibiotic for otitis media was reduced by 23% and 34% when a child sometimes or never had an assigned PCP compared with always having an assigned PCP (Table 2). Residence (urban versus rural) was not included in the final multivariate model because it demonstrated no effect. A multivariate analysis stratified the children by type of enrollment and PCP status so that we could assess the impact of having an assigned PCP on children continuously enrolled in Medicaid throughout the year and determine any interaction between enrollment and PCP status. The ORs for ever filling an antibiotic for otitis media for children continuously enrolled in Medicaid for the entire year with an otitis diagnosis were .77 (95% CI: .70–.85) when a child sometimes and .66 (95% CI: .60–.73) when a child never had an assigned PCP compared with always having an assigned PCP. The data did not suggest any PCP-enrollment interaction on the likelihood of ever filling an antibiotic for treating otitis media.

#### Referral for the Insertion of Ventilating Tubes and/or Adenoidectomy

The multivariate analysis assessed the influence of having an assigned PCP on the likelihood of ever undergoing an otitis media–related surgery (ventilating tubes and or adenoidectomy) for children with a diagnosis of otitis media after adjusting for enrollment category, ethnicity, and frequency of otitis media–related office visits. The likelihood of ever having otitis media–related surgery was similar regardless whether a child always, sometimes, or never had an assigned PCP (Table 2). A multivariate analysis stratified the children by type of enrollment and PCP status so that we could assess the impact of having an assigned PCP on children continuously enrolled in Medicaid throughout the year and determine any interaction between enrollment and PCP status. The likelihood of ever having otitis media–related surgery for children continuously enrolled in Medicaid for the entire year was

1.03 (95% CI: .88–1.22) when a child sometimes and 1.08 (95% CI: .90–1.29) when a child never had an assigned PCP compared with always having an assigned PCP. The data did not suggest any PCP-enrollment interaction. The likelihood of otitis media–related surgery did increase with continuous enrollment, Caucasian ethnicity, and higher frequency of otitis media visits.

Although the likelihood of ever having otitis media–related surgery was not affected by PCP status, having an assigned PCP impacted otitis media–related surgical rates for children continuously and discontinuously enrolled at different ages. As shown in Fig 1, the surgical rates per 1000 child-years for the children age 13 to 18 months and 31 to 36 months were higher when they always had an assigned PCP compared with sometimes or never having an assigned PCP. These data suggest that having an assigned PCP when recurrent otitis media is most common may promote earlier referral for otitis-media related surgery.

#### DISCUSSION

The findings of this study document that being continuously enrolled throughout the year increased the likelihood of always having an assigned PCP and that both the type of enrollment and assignment to a Medicaid PCP independently affected the utilization of medical and surgical otitis media–related services. Potential beneficial effects of having an assigned PCP included an association with decreased emergency department use, increased antibiotic fill rates, and increased referrals for otitis media–related surgery under 18 months. There were no additive interactions noted involving these 2 factors. Because this study did not address the appropriateness of emergency department use, otitis media–related antibiotic use, or referral for surgery with chart reviews using formal evaluative criteria, it is not possible to know the impact of these effects on quality of care.

It is reasonable to assume that having an assigned PCP reduced the need to seek care for otitis media in a hospital emergency department. The reasons that children with an assigned PCP were more

## Otitis Media Surgeries by Age and PCP Status

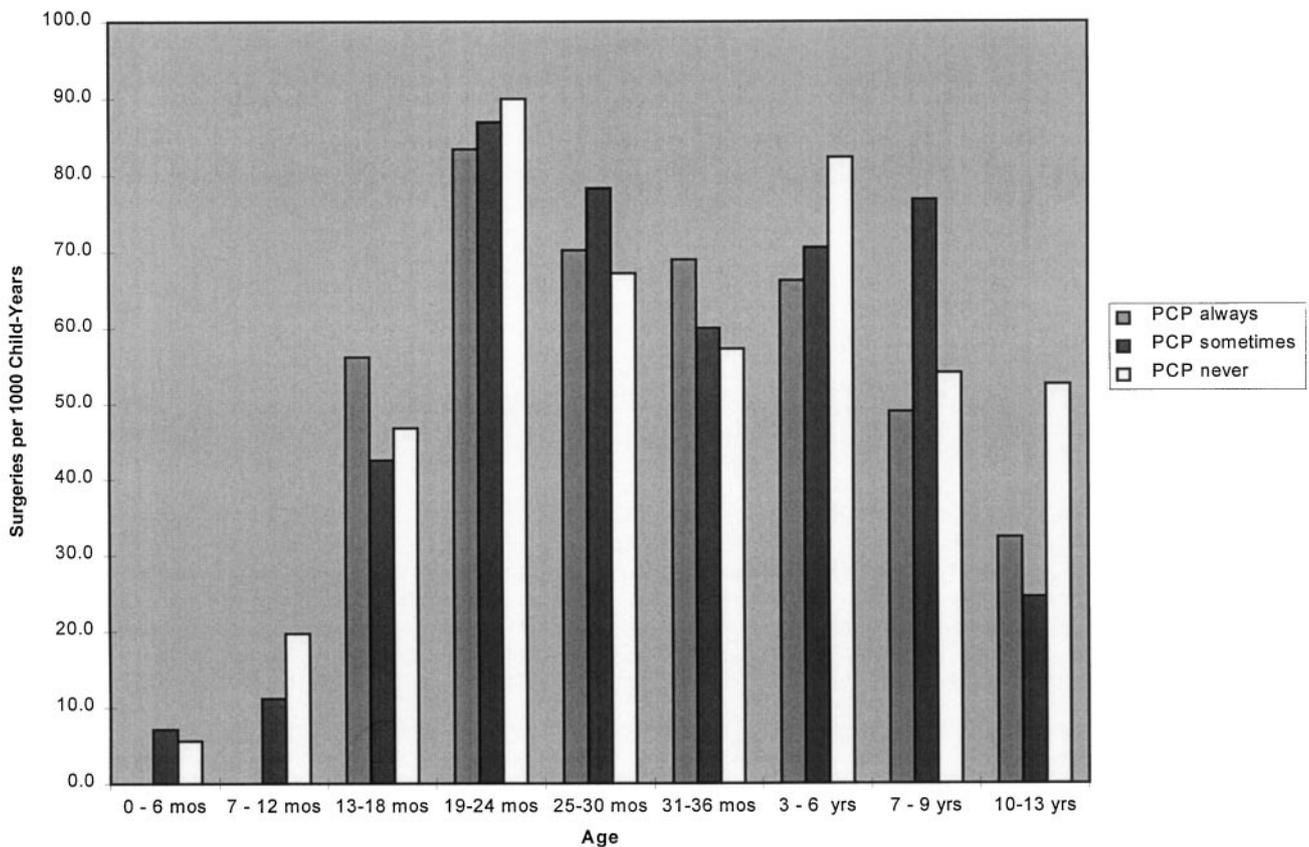


Fig 1. Rates of otitis media–related surgery by age and assignment to PCP.

likely to have an antibiotic fill associated with an otitis media visit are unclear. Compliance may have been better, practice patterns of participating PCPs may have been different, or there may have been coding and billing discrepancies. Finding that otitis media–related surgical rates for 13- to 18-month-olds were higher when a child always had an assigned PCP is important because the optimal time to place ventilating tubes for recurrent or persistent otitis media is early in childhood to enhance language development.<sup>25,26</sup>

This study did not attempt to document the actual amount of continuity achieved by determining the proportion of otitis visits with the same physician for children with and without assigned PCPs. It is possible that the impact would have been different had we documented continuity of care more directly, rather than using assignment to a PCP as a proxy for continuity. Another limitation of the study is the inability to determine PCP status or continuity during periods when children were not enrolled in Medicaid. To deal with this limitation the study population was stratified by type of enrollment so that continuously enrolled children were analyzed, and incidence density rates per child-months of Medicaid enrollment were calculated. Although discontinuously enrolled children had antibiotic fills, emergency department visits and otitis media–related surgeries when not en-

rolled in Medicaid, the aim of this study was to assess the influence of having an assigned PCP on utilization while enrolled in Medicaid.

Fifty percent of children without a diagnosis of otitis media were discontinuously enrolled in Medicaid compared with 30% with otitis media. Children enrolled discontinuously were less likely to have an otitis media–related visit because these children had fewer enrolled months during which they were at risk for developing an infection. This relationship between discontinuous enrollment and reduced time “at risk” for utilization would also affect outcome measures such as ever filling an antibiotic and ever having an emergency department otitis media–related visit. Children enrolled discontinuously would be less likely to ever fill an antibiotic for otitis media or ever use the emergency department because they had less time enrolled in the program. The stratification by enrollment and the multivariate analyses used in this study both compensated for this enrollment effect.

The findings of this study suggest that discontinuous Medicaid enrollment and lack of having an assigned PCP impact otitis media–related emergency department use, antibiotic treatment, and referral for otitis media–related surgical services in young children. It is possible that these measures are markers for other types of medical and surgical services. The findings suggest that implementing

12-month continuous enrollment periods in Medicaid and State Title XXI programs and having PCPs for all children are likely to influence the utilization of both medical and surgical services.

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