A Longitudinal Study of Schoolchildren's Experience in the North Carolina Dental Medicaid Program, 1984 Through 1992

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ABSTRACT

Objectives. This evaluation of a state Medicaid dental program describes dental treatment received, relates treatment needed to treatment received, and describes enrollment and use over an 8-year period.

Methods. Three databases were linked: (1) clinical records from a 1986/87 statewide epidemiological survey, providing data on treatment need; (2) Medicaid dental claims from 1984 through 1992, providing data on treatment received; and (3) Medicaid enrollment files from 1984 through 1992.

Results. Half of Medicaid-enrolled children never used dental services. Among users of dental services, 45% and 25% of children needed restorations in primary and permanent teeth, respectively. In this group, 29% had all needs met, 28% had needs partially met, and 43% had no needs met. Forty-six percent of children sought care for only 1 year.

Conclusions. Federal guidelines for dental care are not met in this typical Medicaid population of short-term enrollees who use services sporadically. Programs should aim to increase use and ensure that all needed services, especially preventive procedures such as sealants, can be completed within the short period of time a child attends for care. (*Am J Public Health.* 1998; 88:1669–1673)

The Medicaid program, initiated following federal legislation in 1967, is the largest source of public expenditures for oral health services for children.[1] At present, most states provide very limited dental services to adult Medicaid beneficiaries. All states are required by federal law to provide dental care to children who are enrolled in the Early and Periodic Screening, Diagnosis, and Treatment Program. The intent of the program is to provide dental care to all Medicaid-eligible children from birth to 21 years of age.[2] Federal guidelines outline a "basic set of dental services" that includes an annual dental examination, prophylaxis and fluoride treatment, dental sealants, and those emergency, preventive, and restorative services needed to prevent irreversible damage to the teeth or supporting structures.[3]

Medicaid dental databases rarely have been used for analytic or evaluative research. The few reports available present limited aggregate data on the annual number of recipients, the number of dental procedures, and overall costs of care.[4–7] One study suggested that data are lacking at the national and state levels regarding the oral health status of Medicaid beneficiaries, the actual types of dental services provided, and the adequacy of care received.[8] The most recent study found that only 1 in 5 children eligible for Early and Periodic Screening, Diagnosis, and Treatment Program benefits received the preventive dental services mandated by the program.[9] Inevitably, there will be changes in the provision of Medicaid dentistry over the next few years. Currently, there is little information to guide future policy.

To our knowledge, this is the first study that has used person-level data on oral health status, enrollment, and utilization to follow a population of school-aged children served by the Medicaid dental program. The study spanned 8 fiscal years, from October 1984 to June 1992 (with the first and last years being partial years). The aims of the study were to (1) describe the type and amount of dental care children receive, (2) relate treatment need found by clinical examiners conducting an epidemiological survey to treatment subsequently received through Medicaid, and (3) describe enrollment and use patterns of recipients.

Methods

Study Design

Here we describe a secondary analysis of 3 databases that were linked together for the purposes of this study. The first database was derived from a cross-sectional, statewide epidemiological survey of the oral health status of North Carolina children in kindergarten through grade 12 conducted in 1986/87.[10] The second and third databases were North Carolina Medicaid claims and enrollment files routinely collected during 1984 through 1992 as part of the state's Medicaid Management Information Services.

Oral Health Survey

The oral health survey was based on a probability sample with a stratified cluster design in which the sampling unit was the classroom. The sampling process identified

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335 classrooms, with all students in the selected classrooms (n = 8026) eligible for participation in the study. The survey information used in the present study included name, age, race, gender, residence (urban or rural), parental education, status of primary and permanent dentition at the level of the tooth surface, treatment need, and sealant need. Treatment need was determined with the Dental Restorative Treatment Need Index, in which a treatment code is recorded for each tooth or tooth space.[11] A permanent tooth was determined to need a sealant if an explorer "caught" in the pits and fissures of the biting (occlusal) surface of the tooth without obvious signs of decay.

Medicaid Files

The Medicaid claims file contained information on all dental services reimbursed by Medicaid from 1984 to 1992 for persons under 21 years of age. Information taken from the claims files included the following: (1) 5-digit procedure code identifying a particular dental procedure or service, the tooth and tooth surface(s) treated, and date of treatment; (2) child's name, date of birth, sex, race, and county of residence; and (3) provider's Medicaid identification number and specialty. This file had a yearly average of 126 000 paid claims for 62 000 patients less than 21 years of age and a total of approximately 2.4 million procedures over the duration of the study.

The enrollment file was a listing of those persons living in North Carolina who had applied to the Department of Social Services, were determined to be eligible for benefits at any period of time during 1984–1992, and elected to enroll in the program. The variables used from the enrollment files included dates of enrollment, name, date of birth, sex, and county of residence.

Merging the Databases

Since the North Carolina Medicaid databases are not compiled at the person level or across time, it was first necessary to link claims and enrollment records by unique Medicaid identification numbers across study years. Linking the oral health survey to the Medicaid databases presented a problem because there was no unique identifier with which to merge the databases. A computer algorithm was devised to link the survey and Medicaid files based on 11 sociodemographic variables they had in common. Multiple computerized iterations progressively relaxed the matching criteria by one variable. Details of the linking process and its accuracy have been reported previously.[12] The Division of Medical Assistance, which administers the state Medicaid program, approved the procedure followed for maintaining confidentiality of records.

Results

Final Study Population

Sociodemographic information was collected for all 8026 children who were selected for the statewide school survey. Of that total, 6649 were clinically examined (response rate: 83%), and 1502 (19%) matched with the Medicaid database. Of these 1502 children, 775 used services and generated one or more claims, while 727 had a history of enrollment but no claims. The final study population comprised 570 children (of the 775 users) who had been clinically examined in the epidemiological survey and who had a record of a claim after the survey (which enabled a comparison of treatment needed and treatment received).

The final group of 570 children was regarded as a descriptively representative population but may not have truly been statistically representative of the larger universe of child Medicaid beneficiaries in 1984–1992. While the study group was derived from a statistical sample (the survey), a number of data manipulations on the survey, claims, and eligibility files were performed to define this group (e.g., linking, matching, and restrictions as to the timing of the dental visit). Thus, the analysis focused on descriptive statistics for the population of 570 children and did not make statistical inferences to a larger population.

Sociodemographic Characteristics of Users

Table 1 shows the sociodemographic characteristics of the 570 users and those of the larger epidemiological sample. Children in the Medicaid group tended to be young, female, non-White, residing in urban areas, and enrolled in the school lunch program and to have mothers with less than a high school education. Medicaid eligibility category was determined from claims data at the date of the first dental visit, although 19% of subjects changed categories at least once during the study period.

Use Patterns

Over the study span of 8 years, 46% of the 570 subjects used services for 1 year, 40% used services for 2 to 3 years, and 14% used services for 4 or more years. Twenty-five percent of the children who used services made only 1 visit. The study population made a mean number of 5.2 (SD = 5.2, range = 1–50) visits over the study's duration.

A total of 438 dentists were involved in the care of these children. Sixty-four percent of subjects saw only 1 dentist, 26% saw 2, and 10% saw 3 or more (range: 1 to 9 providers). General dentists treated 90% of subjects, pediatric dentists treated 6.7%, and oral surgeons and orthodontists treated 2.5% and 1.4%, respectively. Thirteen percent of children saw more than 1 type of dentist.

Enrollment Patterns

Medicaid eligibility is determined every 6 months; thus, the sample could fluctuate in terms of eligibility. Furthermore, not all children who are eligible for Medicaid enroll, and not all enrolled children use services. Medicaid beneficiaries may use services only during periods when they are eligible and enrolled.

While the study focused primarily on the 570 children who used dental services, the 727 enrolled nonusers are also included in this description of enrollment patterns. Overall, the number of enrollment periods ranged from 1 to 7, although the majority of both users and nonusers had 2 or fewer. Eleven percent of subjects were continuously enrolled. Among users and nonusers, respectively, 49% and 66% had a single period of enrollment, 31% and 23% had 2 periods, and 21% and 11% had 3 or more. For 1, 2, and 3 or more periods, respectively, users had mean enrollment intervals of 4.5 (SD = 2.9), 3.8 (SD = 2.3), and 4.1 (SD = 1.8) years, and nonusers had mean intervals of 1.4 (SD = 1.9), 2.2 (SD = 1.9), and 2.9 (SD = 1.8) years. Users tended to have a greater number of enrollment periods and more time enrolled when summed across multiple enrollment periods.

Treatment Provided

Diagnostic procedures were most common (40%), followed by equal rates of restorative and preventive care (both 24%). Extractions were uncommon (6%), and specialty procedures such as endodontics, periodontics, and orthodontics were also uncommon, at a combined rate of 6%. The 5 dental procedures performed with the greatest frequency were periodic oral examination, 1-surface amalgam restoration in a permanent tooth, fluoride treatment, initial oral examination, and application of dental sealants. Eleven percent of all examinations were coded as emergency procedures. Of the 570 children, 343 (60%) received 1818 restorations of some type, with a mean of 5.3 (SD = 4.8, range = 1–25).

TABLE 1—Percentage Distribution of Sample of Medicaid Dental Users From Linked Medicaid Records and the Total Epidemiologic Sample, by Sociodemographic Characteristics: North Carolina, 1984–1992

Characteristic	Medicaid Sample (n = 570)	Epidemiological Sample[a] (n = 6649)
Age, y		
5–9	48	39
10–14	37	34
15–18	15	28
Non-White	67	33
Female	57	50
School lunch[b]		
Yes	76	31
No	19	65
Urban residence	58	52
Mother's education		
less than high school	41	21
Medicaid eligibility category		
Categorically needy[c]	77	. . .
Medically needy[d]	18	. . .
Other	5	. . .

[a]1986/87 epidemiological survey participants who received clinical exam.
[b]For 5% of Medicaid sample and 4% of epidemiological sample, participation in the school lunch program was unknown.
[c]Low-income families who receive Aid to Families with Dependent Children (AFDC) and who are automatically eligible for Medicaid.
[d]Families whose income is not low enough to qualify for AFDC but who have unusually large medical expenses.

Treatment Received in Relation to Treatment Need

Thirty-one percent of subjects visited a dentist within 1 year after the survey, while 46% made a visit within 2 years. Table 2 focuses on teeth that needed treatment at the time of the survey and received or did not receive care through the Medicaid program within 2 years after the survey. Limiting the tooth-level analysis to 2 years postsurvey minimized the change in treatment need that may occur over time with the exfoliation of primary teeth and the development of new disease. Follow-up of teeth over the entire course of the study (8 years) is discussed, but data are not shown in tables.

Forty-five percent (n = 129) of subjects 5 to 9 years of age needed treatment in a total of 324 primary teeth. Only 59 children (46%) in this group received treatment through the Medicaid program within 2 years of the survey; 58 of the 324 (18%) teeth that needed treatment received care, while 82% of teeth remained untreated. When the tooth-level analysis was carried out to the end of the study for each individual needing treatment, 238 (73%) teeth remained untreated.

Twenty-five percent (n = 134) of subjects 5 to 18 years of age needed treatment in a total of 269 permanent teeth. Within 2 years of the survey, 62 of these children (46%) received treatment, and 68 of the 269 (25%) teeth needing treatment received care; 75% of teeth remained untreated. Over the total course of the study, more permanent teeth were treated, yet 121 (45%) of the 269 teeth needing restorations or extractions remained untreated. Overall, at the child level, 43% of children who needed restorations or extractions in primary or permanent teeth had none of these teeth treated, 28% had needs partially met, and 29% had needs fully met.

Results from Table 2 regarding sealants also show marked undertreatment. Eight percent of subjects had sealants at the time of the survey. A total of 219 (38%) subjects were identified as needing an additional 615 sealants in permanent teeth. Within 2 years of the survey, only 12 of these teeth were sealed, 2 were extracted, and 75 received a more invasive amalgam restoration. Over the course of the study, of the 615 teeth that needed sealants 21 (3%) were sealed, 195 (32%) received amalgams, 23 (4%) were extracted, and 376 (61%) received no treatment.

Discussion

North Carolina Medicaid Dental Program

In comparison with other states, North Carolina has a generous set of dental benefits for children that follows federal guidelines. In North Carolina, during the period of the study, a child could receive emergency care and limited restorative care on a first visit, while the provider needed to obtain prior approval for any subsequent care, including sealants. In order to increase sealant use, North Carolina modified its Medicaid policy in 1992 by dropping the need for prior approval and increasing reimbursement for the procedure. Since Medicaid policies regarding service limitations, eligibility, and reimbursement vary from state to state, the results of this study cannot necessarily be generalized to other state programs.

Disparity Between Treatment Needed and Treatment Received

To our knowledge, this is the first study that links treatment need, enrollment, and treatment received in a state Medicaid dental program. The most significant finding was the high level of unmet treatment need in children using the program. Unmet dental treatment needs among North Carolina Medicaid enrollees were described in a previous report showing that the proportions of the decayed–missing–filled tooth surfaces score involving decayed surfaces were 33% in non-Medicaid children, 19% in a small group of Medicaid dental program users, 63% in a larger group of Medicaid dental users, and 62% in Medicaid enrolled children who had not used services. Dental caries prevalence did not vary substantially between non-Medicaid and Medicaid children.[12] The reasons why some Medicaid children are nonusers and why some users have high unmet treatment needs (e.g., as found in this study) are important areas for future research.

The disparity between treatment need and treatment received suggests that the program falls short of meeting federal guidelines for providing routine, preventively oriented, comprehensive dental care. Preventive care was not regular, and a large proportion of restorative dental needs were not met, despite a large number of restorations being placed. Providers used sealants infrequently and for a small number of children. Several factors may have contributed to the level of unmet treatment need found in this study, including low use by Medicaid enrollees, gaps in enrollment, lack of participation in the program by dentists, and methodological issues specific to the study design.

Use and Enrollment

Low and irregular use of the dental program by enrollees may have contributed to

TABLE 2—Number of Teeth Needing Treatment and Number Treated, by Treatment Type, Within 2 Years of the Survey

Type of Treatment	No. Needing Treatment	No. Treated			Treated, %
		Restoration	Extractions	Sealants	
Primary teeth					
Restorations[a]	281	41	12	0	19
Extractions[a]	43	0	5	0	12
Total[a]	324	41	17	0	18
Permanent teeth					
Restorations[b]	263	52	14	0	25
Extractions[b]	6	0	2	0	33
Total[b]	269	52	16	0	25
Sealants[c]	615	75	2	12	14

[a]n = 129 children.
[b]n = 134 children.
[c]n = 219 children.

unmet treatment needs. Data from this study show a use rate of 22%, similar to that reported for adults and children combined (23%) in North Carolina state Medicaid documents.[13] Use rates in this Medicaid population were lower than those of the overall school-aged child population in the United States. In the 1989 National Health Interview Survey, 69% of US children 5 to 17 years of age had made a visit to the dentist in the 12 months preceding the interview.[14] Although the focus in the Medicaid dental program has been on improving access to care in the dental office setting, an additional strategy could be to reach children in other settings. Studies are required to more fully understand the low level of use in this population.

Length of enrollment appeared to be linked with use of dental services, as shown by the comparison in enrollment time between users and nonusers. Among users of dental services, gaps in continuity of enrollment may be one factor that contributed to low use and, therefore, to unmet treatment needs. Previous research has shown that Medicaid serves 2 different populations: a minority of recipients who are persistently poor and a majority who experience short-term spells of poverty.[15] Further research is required on the relationships between enrollment, oral health status, and type of dental services received among short-term and long-term enrollees in a Medicaid population.

Dentist and Patient Participation

Previous reports have found that low-income children's access to dental care is limited. For example, Medicaid reimbursement levels to providers are low, resulting in low provider participation and reduced accessibility for patients.[16] Even though the number of dentists who signed up as Medicaid providers in North Carolina grew from 1977 to 2381 during the time of this study, the number billing for 1 or more services remained stable at around 1500, resulting in a declining proportion of enrolled dentists providing services.[17] Procedures for obtaining Medicaid eligibility are often difficult, and efforts to inform parents about available dental services are inadequate.[18]

Methodological Issues

Various methodological problems in the study could explain some of the disparity between treatment needed and treatment received. The internal and external validity of the Dental Restorative Treatment Need Index and the sealant need index have not been established, although the former has been used in 2 prior national surveys.[19] Previous studies have shown that dental epidemiological surveys cannot accurately predict treatment subsequently received, primarily as a result of differences in dentists' clinical decision making.[20–24] In this study, the focus was on teeth needing treatment, and explanations must be sought for the large number of teeth identified as carious on the survey that received no subsequent treatment. Possible reasons for this phenomenon include the following: (1) the epidemiological assessment was in error, (2) the clinician failed to detect the lesion, (3) the clinician decided not to treat the lesion, (4) treatment recommendations were not accepted by the patient, (5) the patient used care irregularly, and (6) the patient was unable to find a willing provider.[25] The greater unmet treatment need found in primary teeth than in permanent teeth could, in part, be due to exfoliation of teeth before a dental visit was made. The magnitude of the number of untreated teeth in the study argues that factors other than differences in dentists' decision making were responsible for much of the unmet treatment need. Sporadic use and discontinuous enrollment may have played an important role.

An accurate determination of unmet treatment needs may have been affected by other methodological issues. The exclusion of non–Medicaid financed care in this study may have resulted in an overestimate of unmet treatment need. The extent to which the study population sought dental care outside of the Medicaid system is not known but is assumed to be relatively small. Finally, this study underestimated overall dental treatment need by excluding other needs, such as periodontal and orthodontic, and focusing only on restorative need.

Policy Implications

The current goal of providing routine, preventively oriented, comprehensive dental care is attainable only in a minority of long-term enrollees who use services with some regularity. The North Carolina program should be designed to better serve the more typical population of short-term Medicaid enrollees who use services sporadically. This strategy is also important because many of these children leave the Medicaid program to return to a situation of poor health care coverage or none at all.[18] Once a child appears for the first dental visit, Medicaid administrative procedures, such as prior approval, should be streamlined to ensure that all needed care can be completed within a short period of time. Timely provision of sealants to prevent a subsequent need for restorations is a priority in this population. □

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