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How a North Carolina program boosted preventive oral health services for low-income children

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Abstract

Dental caries, the most common chronic disease affecting young children, is exacerbated by limited access to preventive dental services for low-income children. To address this problem, North Carolina implemented a program to reimburse physicians for up to six preventive oral health visits for Medicaid-enrolled children younger than 36 months. Analysis of physician and dentist Medicaid claims from 2000 to 2006 shows the program substantially increased preventive oral health services. By 2006 approximately 30% of well-child visits for 6- to 36-month old children included these services. Additional strategies are needed to ensure preventive oral health care for more low-income children.

Dental caries is the most common chronic disease affecting children and can lead to serious complications and detrimental effects on children's lives.[1] One-third of children 2 to 5 years of age in the United States have experienced caries.[2] The proportion of poor children with severe caries in this age group is more than four-fold greater than for non-poor children.[3] Furthermore, the prevalence of dental caries in children younger than 6 years of age increased during the 1990s.[2]

A big challenge in addressing dental caries is the poor access that low-income children have to oral health services. Close to three-quarters of low-income children have public insurance coverage,[4] but this coverage fails to translate into adequate use of dental services.[5] Only 37% of children 2 to 18 years of age enrolled in Medicaid receive any dental care in a year, and an estimated 6.5 million Medicaid children have untreated tooth decay.[6] Access to care for preschool-aged children is even more restricted because of dentists' reluctance to see young children, parents' reluctance to take them to dentists, and confusion on the part of dentists and parents about the recommended age for the first dental visit.[7]

By the late 1990s, policymakers in North Carolina (NC) realized the enormous challenges in ensuring adequate oral health care for low-income children.[8] The rapidly growing population had far exceeded the capacity of the existing dental workforce to meet dental needs, compounding dentists' historically low participation in Medicaid. Furthermore, the Hispanic population, a group with elevated risk for dental disease, was growing rapidly. At the end of the 1990s, only 16% of NC dentists actively participated in Medicaid, and only 1

of every 10 Medicaid children under 6 years of age used any dental services.[8] Forty percent of children experienced dental caries by kindergarten, reaching as high as two-thirds of children in the state's more impoverished counties.[9]

In response, a program was initiated in NC in 2000 whereby physicians were encouraged to provide preventive oral health services for young children enrolled in Medicaid.[10] The program, called 'Into the Mouths of Babes', reimburses for up to six visits for preventive oral health services in primary care medical settings for children during their first 3 years of life. The services include assessments of dental caries and risk, topical application of fluoride to teeth, and parental counseling on the proper ways to take care of their children's oral health. For reimbursement, all three services must be delivered at a single visit by a provider who is trained in their use. Although providers are taught to recognize disease and to refer children with suspected disease to dentists, training during the study period did not address the referral process because of the shortage of dentists. Services can be provided at any medical visit, but ideally are delivered in conjunction with well-child visits at 6, 9, 12, 15, 18, 24 or 36 months of age. During the period of this study, guidelines required at least 90 days between visits, and medical oral health benefits ended on the child's third birthday.

An estimated 1,400 medical practices with a patient population of 240,000 Medicaid-eligible children aged 0 through 2 years of age were eligible at the start of the program. [11] Policymakers believed that medical providers would embrace this new program, thus increasing access to preventive oral health services through an established network of medical offices where virtually all young children receive well-child visits starting soon after birth. During the ensuing period covered by this study, about 3,000 providers in almost 600 practices were trained. Practice adoption rates were greater than 60%, with widespread geographic coverage of the state including every county.[11]

While use of the medical setting to deliver preventive oral health services to young children seems logical, evidence of the effects of such programs is scarce. With successful implementation, services provided in the medical setting would necessarily have to increase because they were not provided before. However, the possible extent of any increase in utilization is unknown.

The effect of program implementation on provision of services by dentists could vary. Dentists' visits could *increase* because of physicians' referral of children with risk factors or disease, or because of greater parental awareness of the importance of early dental care, a desirable outcome. Visits could show *no net change or decrease* because children have less disease as a result of exposure to preventive services in the medical office or from substitution of services away from dentists to medical offices. Substitution is an undesirable effect if it delays establishment of a usual source of dental care. But substitution could be a desirable result if dentist supply is limited and such substitution frees up dentists to provide services to children in greatest need.

Given these countervailing forces, the overall impact of the medical oral health program would depend on both the success of its implementation within medical offices and its effect on dentists' provision of preventive dental services. In this study, we examine: (1) the

delivery of preventive oral health services in NC medical offices, in total and in relation to dentist visits; (2) factors associated with use of medical oral health and dentist visits; and (3) the effect of the medical office-based program on use of dentist services for children up to 3 years of age during the first seven years of the program.

Methods

We conducted a descriptive analysis of oral health services in medical offices and dentist visits from 2000 through 2006. We also performed regression analyses of factors associated with the likelihood of a child having an oral health medical visit or dentist visit. The latter regression analysis provides an assessment of whether medical oral health visits substituted for dental visits. The analysis used NC Medicaid administrative files for children from 6 through 35 months of age enrolled in Medicaid anytime during January 2000 through December 2006. Children with treatment of cleft lip and/or palate or dental trauma were excluded. The study was approved by the University of North Carolina-Chapel Hill Institutional Review Board. A Technical Appendix provides a full description of the methods and results from the regression analyses.

Access to oral health services in medical offices is measured by the number of preventive visits: (1) among the entire population of Medicaid-enrolled children 6-35 months of age; and (2) during well-child visits. The first measure provides an absolute indication of use. The second measure was used because many children do not receive the full complement of well-child visits available under Medicaid and thus do not have optimal opportunities to receive preventive services.[12]

We assess two measures of dental care use: (1) dentist visits for any services; and (2) dentist visits with fluoride applications. Professional application of fluoride is unambiguously a preventive oral health service even when provided in conjunction with other dental services and is most directly comparable to the topical fluoride component of the medical oral health program.

The descriptive analyses present a comparison of the number of well-child visits and oral health visits in medical offices per 100 Medicaid-enrolled children 6 through 35 months of age by age group (6-11 months, 12-23 months, and 24-35 months) and calendar year. We further compare preventive dental visits in medical offices, dentist visits of any type, and dentist visits with fluoride, also per 100 Medicaid-enrolled children 6 through 35 months of age for each year.

The regression analyses determine: (1) child and county characteristics associated with use of oral health services in medical offices; and (2) whether implementation of the medical program was associated with a change in the likelihood of a dentist visit.

Results

The data set included over 11 million child-month records for 629,005 Medicaid-enrolled children 6 through 35 months of age from 2000 through 2006. Statistics in Exhibits 1 and 2 reflect the gradual implementation of the program over the seven year study period as more

physicians and staff received the required training. Exhibit 1 shows that both the number of well-child visits and oral health visits in medical offices per 100 Medicaid-enrolled children increased over time within age group. By 2006, the number of oral health medical visits per 100 Medicaid enrollees for each age group was 23.9 for 6-11 month olds, 66.2 for 12-23 month olds, and 31.7 for 24-35 month olds.

Two additional measures (not shown) reflect differences in diffusion of the program by age group. The estimated percent of children with at least one oral health medical visit in 2006 was 19.4% for 6-11 month olds, 38.8% for 12 to 23 month olds, and 17.8% for 24-35 month olds. The percentage of well-child visits that included oral health services in 2006 was 16.2% for 6-11 month olds, 35.8% for 12-23 month olds, and 43.0% for 24-35 month olds, suggesting a greater likelihood of oral health services for 2 year olds if they had a well-child visit.

Exhibit 2 displays the number of medical visits with oral health services, any type of dentist visit, and dentist visits with fluoride per 100 Medicaid enrollees 6 through 35 months of age by year. The rate of dentist visits for any reason and with fluoride started at a very low level in 2000, but increased over time to 15.6 and 11.2 visits per 100 enrollees, respectively. By 2006, the rate of oral health visits in medical offices (40 per 100) substantially exceeded the rate of dentist visits (15 per 100) and was almost four times the rate of dentist visits with fluoride (11 per 100).

Exhibit 3 provides regression results for the analysis of the relationship between the child/county characteristics and the likelihood that a Medicaid-enrolled child had an oral health medical visit (Column 2) or any dentist visit (Column 3) in a month. Virtually all the estimated effects in Columns 2 and 3 are statistically significant at conventional levels, although many effects are small in magnitude (see Technical Appendix). The likelihood of having an oral health medical visit was greater for males, non-whites, and Hispanics than their comparison groups. The effect of age varied. The likelihood of having an oral health medical visit decreased with an increase in the number of dentists in the county but increased with increasing pediatrician and family physician supply. Compared to metropolitan counties, the likelihood of an oral health medical visit was substantially greater in non-metropolitan counties.

In addition to the control variables used in Column 2, the regression in Column 3 also included the county-level rate of medical oral health service implementation (measured by medical oral health visits as a percent of well-child visits) and this variable interacted with the metropolitan status indicator. These variables provide an estimate of the association between degree of county-level implementation of the medical oral health program and the monthly likelihood of a dentist visit according to three levels of urbanization. Exhibit 4 shows that the likelihood of a Medicaid-enrolled child having a dentist visit in a month ranged from 1.22% with no medical oral health program to 0.85% if 90% of well-child visits included oral health services in metropolitan counties. In non-metropolitan adjacent counties the likelihood ranged from 1.15% with no program to 0.42% with high program implementation. In non-metropolitan non-adjacent counties the likelihood was stable at about 0.8%.

Discussion

Implementation of a preventive oral health program in NC medical offices led to a net statewide increase in preventive oral health services for young Medicaid-enrolled children who historically have had very limited access to dentists. This change resulted from the substantial increase in services provided in medical offices and the small effect of the program on dentist visits. By the end of the study period, almost 30 percent of all well-child visits of the targeted age included preventive oral health services. Eighteen to 39% of children, depending on age, had one or more fluoride applications in 2006 as part of a medical visit, a rate much higher than in dental offices. Nationally, only 2.5% of children younger than 4 years of age with teeth had fluoride treatments from dentists in 2006.[13]

Participation by medical providers was greatest in rural areas of the state where shortages of dentists are most severe. We found that the number of visits in medical offices located in more sparsely populated, non-metropolitan counties was greater than in urban counties. The likelihood of having an oral health visit in a medical office was inversely related to the number of dentists per 10,000 population.

Although visits to dentists increased during the study period, the likelihood of a visit to the dentist decreased with higher levels of program implementation in metropolitan and adjacent counties. These reductions in visits to dentists were small (fewer than 1 out of 100 children), and visits remained the same in non-metropolitan, non-adjacent counties. This analysis could not determine the extent to which the small reductions in dentist visits associated with program implementation represented a reduction in dental caries and concomitant decrease in the need for restorative services (a desirable reduction) or delays in establishing a usual source of dentist care for the child (a non-desirable reduction).

The most recent NC Medicaid administrative reports show that the upward trend in oral health services provided in medical offices observed in this study continued through 2009. [14] Nevertheless, the number of children receiving oral health services in medical and dental offices in the state still falls short of professional recommendations to provide preventive oral health services to all children at high-risk for dental caries starting at one year of age.[15] A number of reasons for the shortfall in use of preventive oral health services should be considered when designing and implementing preventive oral health programs for medical settings.

Low-income families do not fully adhere to the well-child periodicity schedule, [16] and full implementation of a preventive program like the one examined in this study will depend in part on the success of broader efforts to increase adherence to the recommended well-child visit schedule. We found that physicians are more likely to provide oral health services during well-child visits for 2 year olds than for younger children, but 2 year olds are less likely to have well-child visits. Many children do not have their 36 month well-child visit until after their 3rd birthday, at which point oral health medical benefits were no longer available during the study period.

To address some of these barriers, the NC Medicaid program recently reduced the allowable interval between visits from 90 days to 60 days and increased the upper age limit to 3½

years of age. The NC Medicaid program also is considering increasing the number of allowable visits to eight. Most guidelines recommend at least three professional applications of topical fluoride per year at 3- to 4-month intervals for high-risk patients. [17, 18] These policy changes should provide opportunities to increase the percentage of children who have oral health visits according to the recommended schedule.

Other provider or practice-level barriers might be more difficult to address. Not all providers seeing young Medicaid children choose to undergo the required training in the provision of oral health services, and trained providers sometimes choose not to participate.[19] Practices with a low or modest volume of Medicaid patients have fewer financial incentives for adoption of oral health services than large volume practices. Well-child visits usually entail a number of tasks, and busy providers can omit preventive oral health services during a particular visit.

For practices that adopt the program, practice-level barriers can hinder full implementation. [16, 20] Two studies on implementation of oral health services in medical practices found that barriers include organizational and logistical difficulties in integrating oral health services into a busy practice, resistance among staff, opinions about whether physicians should provide dental services as part of medical visits, and difficulties in performing clinical procedures, such as applying fluoride varnish.[19, 21] Most barriers are similar to those that can lead to low rates of other services (e.g., developmental screenings, lead screenings or parental counseling) during well-child visits. Strategies exist to improve the quality of pediatric oral health services, and reliance on practice change strategies in the quality improvement literature can be applied to oral health services.[19]

Successful dental referrals by physicians depend on the supply of dentists who will accept these referrals. The number and distribution of dentists in NC continue to be a problem. Thirty percent of the state's counties had fewer than two dentists per 10,000 population in 2005, and 33 counties experienced a decline in dentist supply relative to population between 1996 and 2005.[22] This problem is likely to get worse with implementation of the Patient Protection and Affordable Care Act because of the large increase in the number of people who will be enrolled in insurance plans and its effect on demand for dental care.[23]

State Medicaid programs and professional guidelines view access to preventive oral health care as a critical goal in improving the oral health of low-income children. [18, 24] Given the continuing shortage of dentists in NC and long-term solutions required to address this problem, the provision of preventive oral health services in a young child's medical home represents an improvement in access to preventive oral health care, particularly for low-income children. Children who are at elevated risk or already have disease and need referral to a dentist can be identified during the medical visit. Those without disease can be cared for in the medical office and referred at an older age, therefore removing some of the demand on dentists who are in short supply in some communities.

Although this study demonstrates an increase in use of preventive oral health services, it does not assess the effectiveness of counseling or professional application of topical fluoride in preventing dental caries. Clinical trials show that the type of fluoride used in this study

(0.5% sodium fluoride varnish) is effective in reducing caries in young children.[25] Likewise, a recent study found that parental oral health counseling in an outpatient pediatric clinic significantly reduced the incidence of dental caries in young children.[26] Nevertheless, limited evidence is available for the effectiveness of these interventions in medical offices and studies are needed to determine the clinical, economic and psychosocial impacts of these services on children, their families and Medicaid programs.

The poor access to dental care experienced by children in the United States continues to undergo study in search of possible solutions.[27] Several organizations recommend that medical offices be used to deliver preventive oral health services as one approach to problems with access to dental care.[18, 28] More than one-half of state Medicaid programs have programs to reimburse physicians for prevention oral health services.[28] This population-level analysis provides useful information about the statewide impact of this previously untested model on access to preventive oral health services for young children. While this program was able to achieve access for only a portion of eligible children, similar programs likely will be a useful way to increase access to preventive oral health services for young low-income children, especially where dentist supply is limited.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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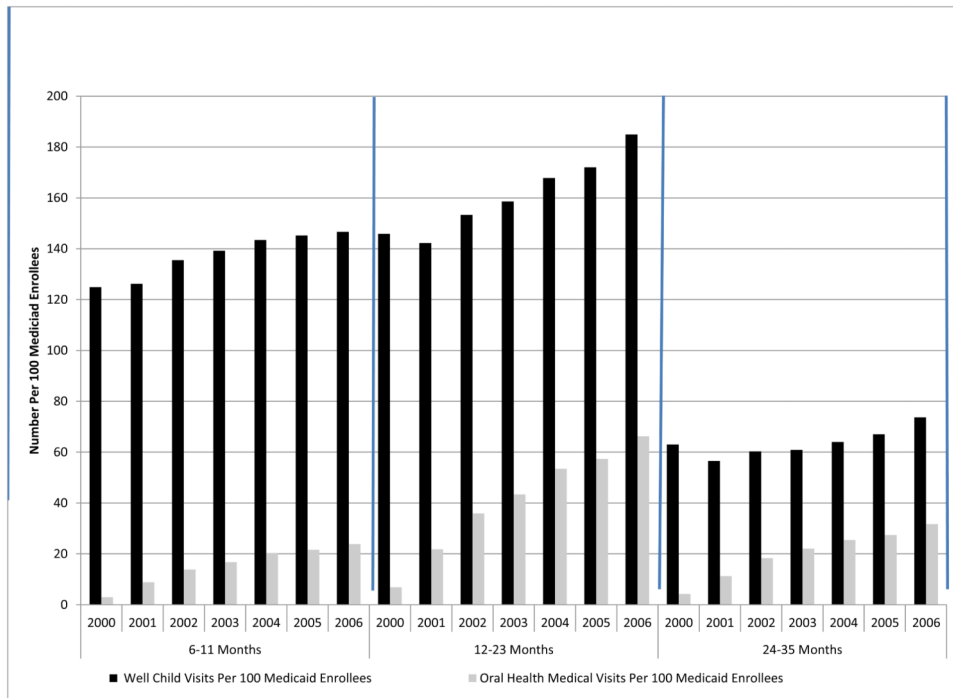


Exhibit 1.
Number of Well Child Visits and Oral Health Medical Visits per 100 Medicaid Enrolled Children, 2000-2006, by Age Group

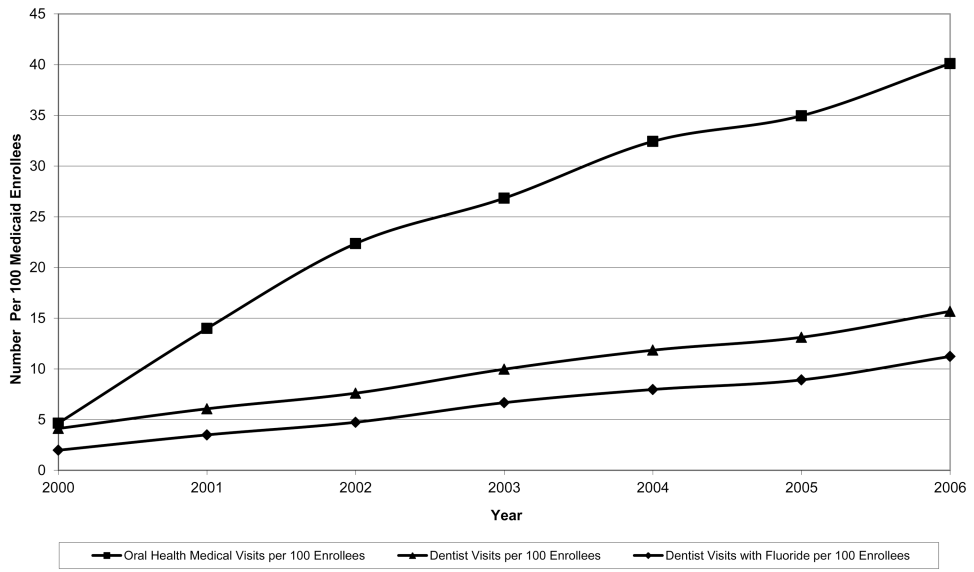


Exhibit 2.
Number of Oral Health Medical Visits and Dentist Visits Per 100 Medicaid Enrolled Children 6-35 Months of Age, 2000-2006

	(1) Mean or Percent	(2) Effect on Likelihood of Oral Health Medical Visit*	(3) Effect on Likelihood of Dentist Visit*
Child Characteristics			
Male	51.0%	+	+
Age Groups			
6 to 12 months	26.7%	+	+
>12 to 18 months	19.3%	-	+
>18 to 24 months	18.8%	+	+
>24-30 months	17.8%	-	+
>30 to 36 months	17.4%	-	+
Race			
White	40.0%		
Black	36.5%	+	-
Other Race	23.5%	+	-
Hispanic	13.4%	+	+
County-Level Measures			
Dentists per 10,000 Population	3.95 (1.84)	-	+
Pediatricians & Family Physicians per 10,000 Population	4.45 (1.92)	+	-
Number of Medicaid Enrollees <3 years	643.90 (852.5)	-	-
Medicaid Eligibles 18 and Younger per 10,000 Population	733.03 (209.50)	-	-
Water Fluoridation Status			
74%-100% fluoridated	85.0%		
51 to 74% fluoridated	8.5%	-	-
25 to 50% fluoridated	2.2%	+	-
0 to 24% fluoridated	4.3%	-	-
Metropolitan Status			
Metropolitan	65.3%		
Non-Metro, Adjacent to Metro	30.1%	+	See notes.
Non-Metro, Non-Adjacent to Metro	4.6%	+	See notes.

Exhibit 3.
Descriptive Statistics and Models of the Likelihood of Oral Health Visits and Dentist Visits

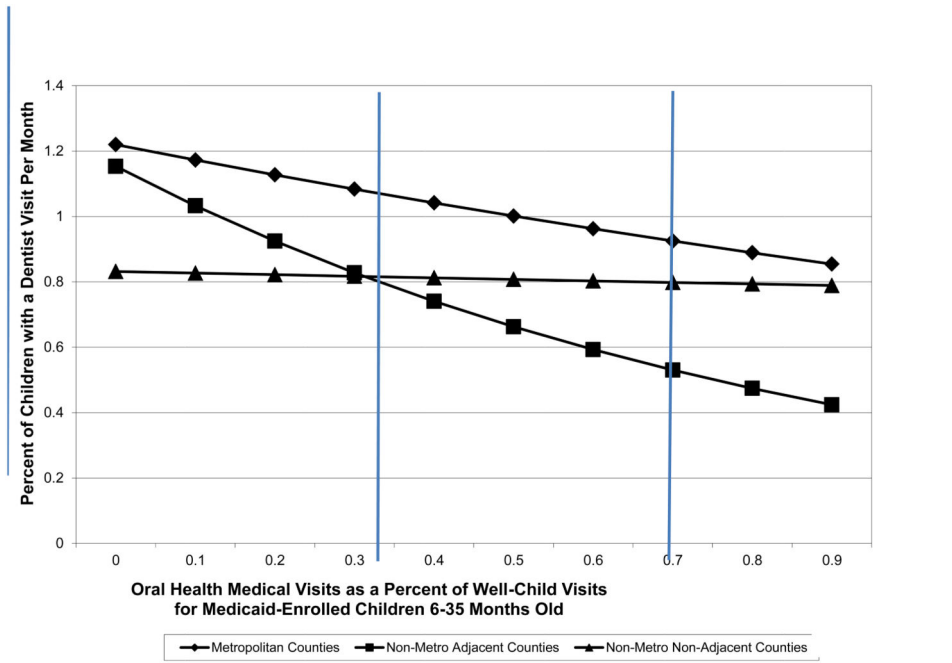


Exhibit 4.
Effects of County-Level Oral Health Medical Visits on Dentist Visits per Month