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Outcomes Associated With Early Preventive Dental Care Among Medicaid-Enrolled Children in Alabama

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IMPORTANCE There is a recommendation for children to have a dental home by 6 months of age, but there is limited evidence supporting the effectiveness of early preventive dental care or whether primary care providers (PCPs) can deliver it.

OBJECTIVE To investigate the effectiveness of preventive dental care in reducing caries-related treatment visits among Medicaid enrollees.

DESIGN, SETTING, AND PARTICIPANTS High-dimensional propensity scores were used to address selection bias for a retrospective cohort study of children continuously enrolled in coverage from the Alabama Medicaid Agency from birth between 2008 and 2012, adjusting for demographics, access to care, and general health service use.

EXPOSURES Children receiving preventive dental care prior to age 2 years from PCPs or dentists vs no preventive dental care.

MAIN OUTCOME AND MEASURES Two-part models estimated caries-related treatment and expenditures.

RESULTS Among 19 658 eligible children, 25.8% (n = 3658) received early preventive dental care, of whom 44% were black, 37.6% were white, and 16.3% were Hispanic. Compared with matched children without early preventive dental care, children with dentist-delivered preventive dental care more frequently had a subsequent caries-related treatment (20.6% vs 11.3%, $P < .001$), higher rate of visits (0.29 vs 0.15 per child-year, $P < .001$), and greater dental expenditures ($168 vs $87 per year, $P < .001$). Dentist-delivered preventive dental care was associated with an increase in the expected number of caries-related treatment visits by 0.14 per child per year (95% CI, 0.11-0.16) and caries-related treatment expenditures by $40.77 per child per year (95% CI, $30.48-$51.07). Primary care provider–delivered preventive dental care did not significantly affect caries-related treatment use or expenditures.

CONCLUSIONS AND RELEVANCE Children with early preventive care visits from dentists were more likely to have subsequent dental care, including caries-related treatment, and greater expenditures than children without preventive dental care. There was no association with subsequent caries-related treatment and preventive dental care from PCPs. We observed no evidence of a benefit of early preventive dental care, regardless of the provider. Additional research beyond administrative data may be necessary to elucidate any benefits of early preventive dental care.

Editorial

Supplemental content

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Tooth decay, otherwise known as dental caries, is cited as the most common chronic disease among children.[1] It disproportionately affects minority and low-socioeconomic status children[2] and is associated with many poor outcomes including loss of teeth,[1] impaired growth,[3] decreased weight gain,[3] poor school performance,[4] and poor quality of life.[5] Contributing factors include lack of access to dental care,[2] low community water fluoride levels,[6] and a lack of parental knowledge about prevention.[7]

The landmark report[1] by the US Surgeon General in 2000 helped shape oral health policy in the subsequent 15 years.[8] In addition to emphasizing the importance of oral health on general health and well-being, the report called for improved oral health through prevention. A greater emphasis on early preventive dental care resulted, prompting recommendations that children have a dental home "within 6 months of the first tooth eruption and no later than 12 months of age."[9,10]

Pediatricians have been increasingly encouraged to provide oral care.[11] In addition to dental coverage under Early Periodic Screening, Diagnostic, and Treatment, many Medicaid agencies have initiatives for primary care providers (PCPs) to incorporate preventive dental care into well-child visits. For example, Alabama initiated the 1st Look program in January 2009, expanding coverage to allow PCPs reimbursement for an oral examination and 3 fluoride varnishes per year for children at high risk of caries.[12] Before 1st Look, preventive dental services were delivered by health care professionals other than dentists at Federally Qualified Health Centers in Alabama. 1st Look and similar programs in other states are designed to increase access, particularly in locations underserved by dentists.[13-15]

Despite the emphasis on prevention, dental caries among children younger than 5 years has been increasing.[16] To our knowledge, evidence that early preventive dental care reduces caries is lacking, nor is there any convincing evidence supporting PCP oral health screenings, referrals to dentists, or fluoride services reducing caries. A recent review[17] concluded that the evidence for early preventive dental care recommendations reducing caries was "weak." A widely cited study recommended the benefits of early preventive dental care because children with a visit by 1 year of age were "more likely to have subsequent preventive visits but were not more likely to have a subsequent restorative or emergency visits."[18] This finding resulted from data on 23 Medicaid-enrolled children in North Carolina. Much of the existing literature comes from North Carolina's Medicaid program, with mixed results. Examples include reduced caries-related treatment only when children received multiple fluoride applications annually[19,20] or preventive and restorative care simultaneously.[21] Other evaluations observed no difference in subsequent restorative costs,[18,22] while some observed increased caries-related treatment for children with at least 1 preventive visit.[23] Multiple studies have observed that children with early preventive dental care had worse outcomes than children initiating later.[21,24,25] In Alabama, preventive dental care among Children's Health Insurance Program enrollees was associated with small reductions in subsequent restorative care.[26,27]

Our objective was to investigate the effectiveness of early preventive dental care in reducing early childhood caries among Medicaid enrollees. One limitation of previous studies is selection bias—namely that children receiving preventive dental care may differ on unmeasured characteristics from their counterparts, including preventive health behaviors or family histories of dental problems. We used an empirical strategy to minimize the effect of selection bias. Furthermore, we investigated how the effectiveness of early preventive dental care differed by provider type. Finally, we considered an analysis among children receiving early preventive dental care comparing whether the frequency of care was associated with subsequent caries-related treatment.

Key Points

Question Does early preventive dental care reduce caries-related treatment and does the provider matter?

Findings A retrospective cohort study of 19 658 children continuously enrolled in Medicaid from birth estimated the effect of early preventive dental care on caries-related visits and expenditures. Dentist-delivered care was associated with an increase of 0.14 caries-related visits per child-year and a $40.77 increase in expenditures per child-year compared with primary care providers, who had no statistically significant effect.

Meaning There was no evidence that early preventive dental care reduced caries-related visits regardless of provider; however, dentist-delivered care was associated with increased caries-related use and expenditures.

Methods

Sample and Design

This study was approved by Alabama Medicaid and the institutional review board at the University of Alabama at Birmingham, which waived informed consent because of the retrospective nature of the study. We conducted a retrospective cohort study using administrative data of children continuously enrolled in Medicaid from birth for 3 or more years beginning September 2007 through October 2012. We considered enrollment at birth if the child was enrolled by 180 days after birth. We used Medicaid enrollment data to construct annual observation files and medical claims data to identify preventive dental visits and expenditures within the first 2 years of life. We calculated annual caries-related visits and expenditures along with total dental expenditures for children in their third through sixth year of enrollment or when they were no longer enrolled in Medicaid. To ensure that children were actually using Medicaid, we restricted the analysis to enrollees with at least 1 paid claim. We also excluded children in the top 1% of total expenditures (more than $38 682, 203 participants) because they may have had profound health conditions contraindicating or restricting their access to dental care.

Treatment Variable

We identified preventive dental visits through oral examination claims containing any of the following Current Dental Terminology codes as specified by the Alabama Medicaid Agency provider

manual and consistent with prior studies: D0120, D0145, D0150, D1120, D1201, D1203, D1205, and D1208 (on a single date of service).[19,20,23] Given our focus on early care, we formed our treatment variable by assessing claims from birth through age 2 years and only included age-appropriate codes. We used provider specialty indicator codes to differentiate care delivered by oral health providers (ie dentists) vs all other providers (ie, PCPs). We identified fluoride varnish administrations by the following Current Dental Terminology codes: D1201, D1203, and D1208. We considered high-frequency preventive dental care to be 4 or more visits during the first 2 years of life, which is consistent with other studies reporting effects at this threshold.[19,20,23]

Outcome Measures

The main outcome measure was annual caries-related visits and expenditures beginning in the child's third year of life. Consistent with prior studies, we defined caries-related visits as containing at least 1 Current Dental Terminology code between D2000 and D9999 on a single date of service.[19,20,23] We considered caries-related expenditures as the amount paid by Medicaid for visits providing these procedures. We considered total expenditures as all paid expenditures to dental providers (including subsequent preventive visits after the first 2 years of life). All expenditures were adjusted for inflation to 2012 using the Consumer Price Index.

Covariates

We used high-dimensional propensity score matching to account for biases related to differences between children receiving and not receiving early preventive dental care during their first 2 years of life.[28] This enabled us to derive up to 50 variables on health care use and comorbid conditions from claims data based on the association with the treatment and outcome.[29] Thus, the technique matches children on the predicted likelihood of receiving preventive dental care based on demographics, procedures, medications, and diagnoses to reduce bias introduced by parental preferences for health service use, including the use of preventive services and existing health conditions that influence receiving dental care.

The propensity score included all inpatient primary diagnosis codes, outpatient diagnosis and procedure codes, and pharmacy claims for children from birth through their second birthday. *International Classification of Diseases, Ninth Revision (ICD-9)* diagnosis codes were grouped using the Clinical Classification Software single-level definitions. Pharmacy use was grouped by American Hospital Formulary System therapeutic class. We excluded all dental-related diagnoses and procedures. Furthermore, because we included a specific variable for well-child visits, we excluded these claims as described later.

Previous studies indicate that socioeconomic status is associated with the low use of dental care and tooth decay.[2,7] Socioeconomic status within the Medicaid population is homogenous, but other potential confounders included in propensity scores were sex, race/ethnicity, and birth year. Race/ethnicity was classified as white, black, Hispanic, and all other races based on the available enrollment information. We used 4-level zip code approximation rural-urban commuting area codes as a marker of rural-urban status.

To indicate access to dentists, we estimated dentist supply using all Medicaid dental claims for children, regardless of age and eligibility in the current study, from 2007 through 2012. Using unique National Provider Identifier numbers from dental claims, we aggregated to the county level. Because of county variability, this measure was ranked and divided into octiles, the first having the fewest Medicaid-serving dentists and the eighth the greatest. Sensitivity analyses determined that different specifications of this variable did not change the final model estimation.

We considered the number of well-child visits as a measure of preventive-care seeking behavior. We used procedure and diagnostic codes consistent with the National Committee for Quality Assurance measure of well-child visits in the first 15 months of life.[30] This measure was ranked and divided into quartiles, the first quartile having the fewest and the fourth the greatest. Because of ties, quartiles were not evenly distributed. Sensitivity analyses determined different specifications did not change the final model estimation.

We could not obtain reliable information on water fluoridation for the entire study period. We included county fixed effects to control for variations in dental care-seeking behavior related to community water fluoridation or other unobserved heterogeneities.

We separately estimated propensity scores and matched children who received preventive care from dentists and PCPs. Children who received care from both types of providers within the first 2 years of life were few (n=362) and were excluded. In each analysis, propensity scores matched children who received preventive dental care with children who did not using the nearest neighbor technique with a caliper of 0.05 of the propensity score. Follow-up duration for a pair was determined by the longest common follow-up duration, dropping unmatched years. Among children who received preventive dental care, we estimated and matched unique propensity scores to compare children who received high frequency care (4 or more visits) vs 1 to 3 visits.

Statistical Analysis

Analyses were stratified by the type of provider: dentists or PCPs. We compared matched descriptive characteristics for children receiving preventive dental care compared with those who were not, using standardized differences more than 10 as a measure of imbalance. Dental care use and expenditures were compared using tests of proportions or *t* tests when appropriate. We estimated 2-part models to provide the combined effect of preventive dental care on any caries-related visits, the annual number of caries-related visits, and associated expenditures. We estimated the first part, any caries-related visit, using logit regression. The second part, the annual number of caries-related visits, was estimated by generalized linear models with a log-link negative binomial distribution because of the outcome's skewed nature. Expenditure outcomes were estimated by log-linked γ distribution. Both models included a robust variance estimator to account for longitudinal matched-child correlation. Our main effect measure was the combined marginal effects, which represented the absolute difference in caries-related visits or expenditures if an untreated child had received

Table 1. Comparison of Measurable Characteristics of the Propensity Score Matched Study Population for Children Receiving No Early Preventive Dental Care and Those Receiving Dentist-Delivered or Primary Care Provider–Delivered Early Preventive Dental Care

Characteristic	Dentist-Delivered Care, %			Primary Care Provider-Delivered Care, %		
	No Preventive Care (n=3658)	Received Preventive Care (n=3658)	Std Diff	No Preventive Care (n=846)	Received Preventive Care (n=846)	Std Diff
Male	50.7	50.9	0.5	50.5	51.1	1.2
Race/ethnicity						
Black	43.4	44.0	1.4	46.2	47.6	2.9
White	38.3	37.6	1.3	38.8	37.4	2.8
Hispanic	16.5	16.3	0.5	12.2	12.6	1.4
Other	1.8	2.0	1.4	2.8	2.4	3.0
Rural urban commuting area						
Urban	67.4	67.4	0.0	55.2	57.0	3.6
Large rural	15.3	15.1	0.5	21.0	20.7	0.9
Small rural	10.7	10.4	1.1	15.1	12.2	8.6
Isolated	6.6	7.1	2.1	8.6	10.2	5.3
Well-child visits[a]						
1st quartile (0-5)	20.7	17.9	7.2	13.6	12.5	3.2
2nd quartile (6-7)	37.2	37.6	0.7	41.6	41.3	0.7
3rd quartile (8-8)	23.9	25.2	3.0	23.3	25.9	6.0
4th quartile (9-16)	18.1	19.3	3.1	21.5	20.3	2.9
County total Medicaid-serving dentists[b]						
1st octile (0-2)	10.7	11.1	1.1	11.7	11.5	0.7
2nd octile (3-5)	11.0	10.6	1.4	28.7	28.7	0.0
3rd octile (6-8)	9.0	8.9	0.4	7.1	6.9	0.9
4th octile (9-11)	12.6	12.4	0.8	9.9	9.1	2.8
5th octile (12-13)	13.4	13.1	0.8	18.9	20.0	2.7
6th octile (14-18)	11.9	12.5	1.8	16.8	17.3	1.3
7th octile (19-27)	14.1	13.6	1.4	6.7	6.4	1.4
8th octile (64-74)	17.3	17.9	1.7	0.1	0.2	2.8
Birth year						
2007	19.0	19.1	0.1	17.7	16.4	3.5
2008	56.4	55.3	2.2	52.7	53.1	0.7
2009	24.6	25.6	2.4	29.6	30.5	2.1

Abbreviation: Std Diff, standardized difference.

[a] Binary indicator based on the ranked number of well-child visits from birth to date of second birthday; quartile range of well-child visits indicated in parentheses.

[b] Binary indicator based on the ranked number of dentists in the county treating Medicaid enrollees during the year of the child's second birthday; octile range of dentists per county indicated in parentheses.

early preventive dental care. Data were analyzed using SAS 9.4 (SAS Institute) and Stata version 13.1 (StataCorp).

Results

Among 19 658 eligible children, 5095 (25.9%) received preventive dental care before their second birthday, including 3878 from dentists and 1217 from PCPs. The final analysis considered 7316 matched children in the dental-delivered care analysis with an average follow-up of 3.6 years (median, 4 years, interquartile range, 3-4 years) and 1692 matched children in the PCP-delivered care analysis with an average follow-up of 3.5 years (median, 4 years, interquartile range, 3-4 years).

Characteristics of children receiving preventive care from dentists and PCPs are highlighted in **Table 1**. Matching reduced standardized differences between those receiving preventive care vs not below an absolute value of 10 for all covariates in both analyses (eFigures 1 and 2 in the Supplement).

In the dentist-delivered preventive care analysis, 2190 caries-related visits were observed among 2104 unique children in 9732 child-years of follow-up, a rate of 22.5 visits per 100 child-years. Children receiving preventive dental care from dentists were more likely to have had a caries-related visit (29.5%), more frequent visits (0.3 visits per child per year), and greater expenditures for caries-related visits ($91 per child per year) and overall dental care ($168 per child per year) than children without preventive dental care (**Table 2**). In the PCP-delivered preventive care analysis, 323 caries-related visits were observed among 321 unique children in 2174 child-years of follow-up, a rate of 14.9 visits per 100 child-years. Caries-related visits and expenditures were similar for those receiving preventive dental care from PCPs vs not. At least 1 fluoride varnish was applied on 3085 children (84.3%) with preventive dental care from dentists and 749 (88.5%) from PCPs.

Table 2. Comparison of Dental Health Services Utilization and Expenditures Among Children Not Receiving Early Preventive Dental Care and Those Receiving it, Stratified by Whether Delivered by Dentist or Primary Care Provider[a]

Outcome	Dentist-Delivered Care, Child-Years[b]			Primary Care Provider-Delivered Care, Child-Years[b]		
	No Preventive Care (n=4866)	Received Preventive Care (n=4866)	*P* Value	No Preventive Care (n=1087)	Received Preventive Care (n=1087)	*P* Value
Any caries-related treatment visit, %	11.3	20.6	<.001	10.1	10.7	.67
Mean caries-related visits per member per year (SD), $	0.15 (0.50)	0.29 (0.68)	<.001	0.14 (0.47)	0.16 (0.54)	.37
Mean annual caries-related expenditures (SD), $	50 (222)	91 (281)	<.001	37 (156)	49 (212)	.12
Any annual dental visit, %	42.8	80.1	<.001	39.0	43.6	.03
Mean annual dental expenditures (SD), $	87 (249)	168 (306)	<.001	71 (181)	88 (241)	.06
Received fluoride varnish during the first 2 years of life,[c] %	NA	84.3	NA	NA	88.5	NA
Mean No. of fluoride varnishes received[c] (SD)	NA	1.1 (0.7)	NA	NA	1.3 (0.9)	NA

Abbreviation: NA, not applicable.

[a] Expenditures adjusted to 2012 dollars.

[b] Sample size given as children-years of follow-up.

[c] Sample size for dentist-delivered varnishes was n = 3658 children (3085 received); sample size for primary care provider–delivered varnishes was n = 846 children (749 received).

Table 3. Results From 2-Part Models Estimating Health Service Utilization and Expenditures for Propensity-Score Matched Children Receiving Early Preventive Dental Care From Dentists and Primary Care Providers

Outcome	Expected Value of the Outcome	β (95% CI)		Effect of Early Preventive Dental Care	
		Logit[a]	GLM	Marginal Effect[b] (95% CI)	*P* Value
Preventive dental visits from dentists before age 2 y (n = 9732 child-years among 3658 matched child pairs)					
Annual caries-related visits	0.22	0.71 (0.60-0.83)	0.04 (−0.02 to 0.10)	0.14 (0.11-0.16)	<.001
Annual caries-related expenditures	70.50	0.72 (0.60-0.84)	−0.01 (−0.13 to 0.12)	40.77 (30.48-51.07)	<.001
Annual dental expenditures	127.43	1.68 (1.59-1.78)	0.03 (−0.06 to 0.13)	84.96 (72.76-97.17)	<.001
Preventive dental visits from dentists before age 2 y (n = 2174 child-years among 846 matched child pairs)					
Annual caries-related visits	0.15	0.06 (−0.24 to 0.36)	0.08 (−0.06 to 0.22)	0.02 (−0.03 to 0.06)	.40
Annual caries-related expenditures	42.98	0.06 (−0.23 to 0.37)	0.23 (−0.03 to 0.49)	12.36 (−3.86 to 28.58)	.14
Annual dental expenditures	79.58	0.19 (−0.01 to 0.38)	0.11 (−0.09 to 0.31)	17.41 (−1.22 to 36.05)	.07

Abbreviation: GLM, generalized linear model.

[a] Robust standard errors are used to account for matched pairs.

[b] Combined marginal effect, otherwise known as the absolute difference.

Table 3 lists the 2-part regression test results for caries-related outcomes among children receiving preventive dental care from dentists. The first column represents the unadjusted predicted value for each outcome, interpreted as the proportion of caries-related visits (or expenditures) per child per year. Columns 2 and 3 display coefficients from logit and generalized linear models, respectively. The predicted value of caries-related visits was 0.22 per child per year. Dentist-delivered preventive care increased the predicted number of caries-related visits by 0.14 per child per year (95% CI, 0.11-0.16). Likewise, predicted caries-related expenditures were $70.50 per child per year, with preventive dental care adding $40.77 per child per year (95% CI, $30.48-$51.07). Total dental expenditures increased by $84.96 per child per year (95% CI, $72.76-$97.17) for those with preventive dental care. None of the equivalent models for PCP-delivered preventive dental care shown in Table 3 yielded statistically significant effects at the conventional levels.

Among 3878 children with dentist-delivered preventive dental care, 1061 (27.4%) received 4 or more visits before their second birthday (ie, high frequency). Similarly, 180 of the 1217 children (14.8%) with PCP-delivered preventive dental care were considered high frequency. Suitable matches with 1 to 3 preventive visits were found for all but 10 children with dentist-delivered care (eTables 1 and 2 and eFigures 3 and 4 in the Supplement). Dentist-delivered high-frequency care increased the likelihood of caries-related visits by 0.07 per child per year (95% CI, 0.12-0.14), and increased caries-related expenditures by $17.57 (95% CI, $3.34-$38.47) (see **Table 4**). The effect of high-frequency PCP-delivered care was not statistically significant.

Discussion

Currently, the American Academy of Pediatrics, American Dental Association, and American Academy of Pediatric Dentistry

Table 4. Among Children With Early Preventive Dental Care, Comparison of Caries-Related Visits and Expenditures for Propensity Score Matched Children Receiving 4 or More Preventive Dental Visits Before Age 2 Years vs Children With Between 1 and 3 Visits

Outcome	Expected Value of the Outcome	β (95% CI)		Effect of High Frequency Preventive Dental Care	
		Logit[a]	GLM	Marginal Effect[b] (95% CI)	*P* Value
≥4 Preventive dental visits from dentists before age 2 y vs 1-3 visits (n=2848 child-years among 1051 matched child pairs)					
Annual caries-related visits	0.30	0.21 (0.02-0.40)	0.06 (−0.04 to 0.15)	0.07 (0.01-0.12)	.01
Annual caries-related expenditures	92.27	0.21 (0.02-0.40)	0.02 (−0.15 to 0.19)	17.57 (−3.34 to 38.47)	.10
≥4 Preventive dental visits from PCPs before age 2 y vs 1-3 visits (n=424 child-years among 180 matched child pairs)					
Annual caries-related visits	0.17	0.31 (−0.65 to 0.57)	−0.08 (−0.34 to 0.19)	−0.02 (−0.12 to 0.08)	.71
Annual caries-related expenditures	41.05	0.01 (−0.62 to 0.62)	−0.02 (−0.42 to 0.39)	−0.69 (−28.59 to 27.21)	.96

Abbreviations: GLM, generalized linear model; PCP, primary care provider.

Results include estimates from care delivered by dentists and primary care providers.

[a] Robust standard errors are used to account for matched pairs.

[b] Combined marginal effect, otherwise known as the absolute difference.

recommend having established a dental home for children by age 6 months, but this lacks conclusive evidence of improved outcomes. We evaluated the effectiveness of early preventive dental care in preventing caries-related visits among Medicaid-enrolled children, using high-dimensional-propensity scores to reduce selection bias. We have 3 principal findings. First, children who received early preventive dental care from dentists were more likely to have caries-related visits and greater caries-related expenditures than children without preventive dental care. Second, children receiving preventive dental care from PCPs had similar caries-related visits and expenditures compared with children without preventive dental care. Finally, the frequency of preventive dental care did not modify this effect.

Our observations are consistent with previous findings demonstrating an association between early preventive dental care and increased caries-related treatments.[21,23-25] One explanation is that parents and guardians may recognize signs of tooth decay and are more likely to use dental services. At the population level, this would result in a greater use of preventive dental care by children with existing problems, and would increase subsequent caries-related visits and expenditures compared with untreated counterparts. Under this scenario, our analysis could demonstrate a spurious association. Our empirical strategy attempted to minimize this by accounting for health service use, health status, and access to dentists. Much of the restorative dental paradigm is early detection and treatment to prevent worse future outcomes.[1] This too could explain subsequent increases in caries-related visits and expenditures following preventive dental care. An alternative explanation is that dentists have an incentive to perform restorative procedures, a phenomenon of supplier-induced demand previously observed when the supply of dentists exceeds demand.[31]

Declining numbers of dentists accepting Medicaid or other barriers to dental care have increased the involvement of PCPs in oral health.[1,13] Incorporating preventive dental care into well-child visits and allowing additional reimbursement for these services has been proposed as an efficient way to increase the provision of this care.[13-15] Primary care provider–delivered preventive dental care has been associated with fewer caries-related visits and decayed, missing, and filled teeth.[15,23] We did not observe any association between caries-related visits or expenditures from PCP-delivered preventive dental care. However, caries may be underdiagnosed among this group. For example, Kranz et al[32] observed that PCP-delivered preventive dental care appeared to result in fewer decayed, missing, and filled teeth, but those children were later observed to have more untreated decayed teeth compared with those treated by dentists.[32]

Previous studies have observed the benefits of preventive dental care only when children receive 4 or more visits,[19,20] suggesting that consistency is key. However, randomized clinical trials have observed caries-related reductions from any fluoride application, suggesting that a single application is beneficial.[33] Most of our study population received fluoride applications; therefore. we tested whether high-frequency preventive dental care had an additive effect. Our findings were not sensitive to this threshold and were consistent with the main analysis for both provider types.

Limitations

Our findings must be interpreted with some limitations. First, claims data cannot capture any indirect benefits of preventive dental care, such as reductions in missed school days or an improved quality of life. Nor is it possible to evaluate the clinical need for caries-related visits, the presence of caries and tooth decay, or variations in the quality of care provided. Likewise, we do not have information regarding behaviors related to oral health, such as teeth brushing. Despite our efforts to minimize selection bias through restrictions and the use of high-dimensional propensity scores, residual unmeasured parental or child characteristics may predispose some children to use preventive dental care. We controlled for county effects, but water supplies in Alabama do not conform to county boundaries and there is a noticeable variation over time in Alabama's water fluoridation. This lack of precise data on water fluoridation may result in confounding. Finally, our study population of continuously-enrolled Medicaid enrollees from birth in a single state may not generalize to other populations.

Conclusions

Adding to a limited body of literature on early preventive dental care, we observed little evidence of the benefits of this care, regardless of the provider. In fact, preventive dental care from dentists appears to increase caries-related treatment, which is surprising. Additional research among other populations and beyond administrative data may be necessary to elucidate the true effects of early preventive dental care.

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