

Impact of Increasing Medicaid Dental Reimbursement and Implementing School Sealant Programs on Sealant Prevalence

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We examined the impact of two financing strategies—increasing Medicaid dental reimbursements and providing school sealant programs—on dental sealant prevalence (number of children with at least one sealant) among 7- to 9-year-olds in Alabama and Mississippi counties from 1999 to 2003. **Methods:** We used Medicaid claims data in a linear regression model. We regressed number of children sealed per county onto eligible children, median family income, dentist-to-population ratio, and indicator variables for reimbursement increase, presence of community health center (CHC) or school sealant program, and interaction between reimbursement increase and presence of school program or CHC. We also calculated the average incremental cost per sealant from increasing the Medicaid reimbursement rate and then disaggregated it into cost to provide additional sealants and cost to provide the same number of sealants under the higher rate. **Results:** Increasing the sealant reimbursement rate was associated with a 102 percent increase and a 39 percent increase in sealant prevalence in Mississippi and Alabama, respectively. Introducing school sealant programs more than doubled sealant prevalence in both states. In Mississippi, 85 percent of the average incremental cost from implementing the higher reimbursement rate was due to providing new sealants and 15 percent was due to paying a higher rate for sealants that likely would have been delivered at the old rate. **Conclusion:** Depending on supply and demand conditions in dental markets, both strategies can be effective in increasing sealant prevalence.

KEY WORDS: dental sealants, Medicaid, school health programs

Evidence strongly supports the effectiveness of dental sealants in reducing tooth decay when delivered in either a clinical or school setting. Systematic reviews of the evidence of effectiveness of sealants as a clinical procedure have been completed for the National Institutes of Health Consensus Development Conference on Diagnosis and Management of Dental Caries through Life.¹ The clinical effectiveness of sealants was found to be large in magnitude and consistent across included studies. In addition, the nonfederal, independent US Task Force on Community Preventive Services completed a systematic review of the evidence of effectiveness of sealants delivered in school-based programs.² Findings indicated that school sealant programs resulted in a median caries reduction of 60 percent in comparison to students who did not receive sealants and that school programs typically targeted lower income children with limited

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access to clinical dental care. This finding led to the Task Force's strong recommendation that these programs be included as part of a comprehensive population-based strategy to prevent or control dental caries in communities.

Despite the evidence for the effectiveness of dental sealants, only 29.4 percent of US children, aged 6–11 years, have at least one sealant; this is well below the Healthy People 2010 objective of 50 percent for 8-year-old children.³ Significant disparities in sealant prevalence by income status also exist although lower income children are both more likely to experience dental decay and less likely to have it treated.³

One explanation for disparities in sealant prevalence by income is the low rate of preventive dental service use by children enrolled in Medicaid/SCHIP. A 1996 report by the Health and Human Services Inspector General estimated that only 20 percent of Medicaid eligible children received preventive dental services annually.⁴ In Mississippi in FY 2000, a statewide basic screening survey showed that 17 percent of third-grade children (mean age of 8.6 years) had received at least one dental sealant on a permanent first tooth (unpublished data reported by Mosca). Two financing strategies commonly employed to reduce disparities by income are as follows: increasing access to clinical dental services among Medicaid eligible children by increasing reimbursement rates and delivering sealants directly to lower income children in school settings. Limited evidence supports both strategies for increasing sealant use and lowering disparities.^{5–7}

Recent events in Alabama and Mississippi provided a natural experiment to examine the impact of these two strategies on sealant prevalence among Medicaid eligible children. In both states, children aged 6–18 years were eligible for Medicaid dental coverage if they lived in families with incomes equal to or less than 100 percent of the Federal Poverty Line. Mississippi in June 1999 and Alabama in October 2000 increased their Medicaid reimbursement rates for sealants by 60 percent. Prior to 2000, Alabama alone sponsored school sealant programs in one county; by 2003, both states sponsored school sealant programs in selected counties.

The purpose of this research is to examine the effectiveness of these two financing strategies—increasing Medicaid reimbursements for sealants and implementing school sealant programs—on sealant prevalence among Medicaid eligible children. Findings of this study will give policy makers information to more efficiently allocate resources to increase sealant prevalence. We also estimate the average incremental cost of increasing the Medicaid reimbursement rate for sealants and disaggregate this value into the cost attributable to an increased number of sealants and that of increased reimbursements for the same num-

ber of sealants delivered under the old reimbursement rate.

● Methods

We used data provided by the Alabama and Mississippi Medicaid directors in a linear regression model to estimate the impact on sealant prevalence (number of children receiving at least one sealant) of increasing Medicaid reimbursement for sealants and of providing sealants in school settings. The study population consisted of Medicaid eligible children, aged 7–9 years, in Alabama in FY 2000 ($n = 52,070$) and FY 2003 ($n = 66,248$) and in Mississippi in FY 1999 ($n = 57,768$) and FY 2003 ($n = 79,688$). The unit of observation was the county. Alabama has 67 and Mississippi, 82 counties; the total number of observations was thus 298 counties (data for each county for 2 different years).

We hypothesized that sealant prevalence would be associated with Medicaid reimbursement levels, presence of a school sealant program, presence of a CHC that provided dental care, number of children eligible for Medicaid, dentist-to-population ratio, and median household income. These latter two variables control for forces in the market for dental services. Per capita income will affect demand for dental services among the non-Medicaid population, whereas dentist-to-population ratio reflects the supply of dental services.

Our full regression model was

$$\begin{aligned} \text{Sealed} = & B_0 + B_1 * \text{Reimb} + B_2 * \text{School} + B_3 * \text{CHC} \\ & + B_4 * \text{Income} + B_5 * \text{DP} + B_6 * \text{Eligibles} \\ & + B_7 * \text{State} + B_8 * \text{Reimb} * \text{School} \\ & + B_9 * \text{Reimb} * \text{CHC} \end{aligned}$$

where

Sealed equals the number of children in county receiving at least one sealant.

Reimb equals 0 if before Medicaid fee increase, equals 1 if after.

School equals 0 if no school sealant program present in county, equals 1 if present.

CHC equals 0 if no CHC that delivers dental services is present in county, equals 1 if CHC delivering dental services is present.

Income equals median family income in county.

DP equals the dentist-to-population ratio in county in 2003 in Alabama and 2000 for Mississippi.

Eligibles equals the number of children aged 7–9 years eligible for Medicaid.

State equals 0 if Mississippi, equals 1 if Alabama.

Reimb*School equals the interaction between fee

TABLE 1 ● Mean or proportion of selected characteristics per county (standard deviation)

	Alabama		Mississippi	
	2000 (n = 67)	2003 (n = 67)	1999 (n = 82)	2003 (n = 82)
CHC	19.4%(0.2%)	19.4%(0.2%)	18.3%(0.2%)	24.4%(0.2%)
School sealant program	1.5%(0.0%)	1.5%(0.0%)	0%	11.0%(0.1%)
Median family income	31,146.51 (6,450.52)	31,456.13 (6,839.95)	27,383.91 (5,330.59)	28,895.11 (6,059.14)
Number of eligible 7- to 9-year-olds	777.16 (1,063.91)	988.78 (1,371.29)	704.49 (760.37)	971.80 (1,050.27)
Dentist-to-population ratio	0.232 (0.115)	0.232 (0.115)	0.255 (0.157)	0.255 (0.157)
Number of children receiving at least one sealant	51.07 (71.65)*	95.84 (138.51)	21.17 (31.87)*	65.67 (85.13)
Number of sealants	Data not available	Data not available	79.67 (127.68)*	246.72 (331.41)
Medicaid sealant reimbursement rate	\$16.00	\$26.00	\$13.91	\$22.26

*Value differed significantly between years at $P \leq .05$.

increase and the presence of a school sealant program.

Reimb*CHC equals the interaction between fee increase and presence of CHC.

We included the State variable to control for their idiosyncracies. Because the number of school sealant programs and CHCs increased from baseline to 2003 in Mississippi, we also added interaction terms for Reimb with School and CHC. To obtain the final model, we used Kleinbaum’s backward hierarchical approach.⁸ Nonsignificant interaction terms ($p > .05$) were first dropped from the model and it was then rerun. Nonsignificant lower order terms were then dropped.

We also estimated the average incremental cost of increasing Medicaid reimbursement for sealants:

$$\frac{TR_1 - TR_0}{S_1 - S_0} = \frac{R_1 * S_1 - R_0 * S_0}{S_1 - S_0}$$

where

TR₀ = total reimbursement in 1999/2000.

TR₁ = total reimbursement in 2003.

R₀ = reimbursement rate in 1999/2000.

R₁ = reimbursement rate in 2003.

S₀ = number of sealants delivered in 1999/2000.

S₁ = number of sealants delivered in 2003.

By adding and subtracting $R_1 * S_0$ in the numerator and rearranging and factoring terms, (1) can be rewritten as

$$\frac{(R_1 - R_0) * S_0 + (S_1 - S_0) * R_1}{S_1 - S_0}$$

This shows that as a result of increased reimbursement rates, Medicaid pays more ($R_1 - R_0$) for the number of sealants delivered under the old reimbursement rate (S_0) and that Medicaid pays the new reimbursement rate (R_1) for the additional number of sealants delivered under the new reimbursement rate ($S_1 - S_0$).

● Results

In addition to increasing Medicaid fees during the study period, Mississippi also introduced school sealant programs in 11 percent ($n = 9$) of its counties (Table 1) and increased the percentage of counties with a CHC delivering dental services from 18.3 percent ($n = 15$) to 24.4 percent ($n = 20$), whereas the number of school sealant programs and CHCs did not change in Alabama. Both states experienced an increase in the number of children receiving at least one sealant. In Mississippi, the number of sealants delivered increased while Alabama did not report this value.

The reduced regression model (Table 2) indicated that the two policy variables (higher Medicaid reimbursement levels and more school sealant programs) increased sealant prevalence. Controlling for changes in number of eligible children, the regression model predicted that the increase in sealant reimbursement rates increased sealant prevalence on average per county by 102 percent in Mississippi and by 39 percent in Alabama. The model also predicted that at the old reimbursement rate, on average sealant prevalence in an Alabama county with a school sealant program would be 153 percent higher (103 vs 41 children) than that

TABLE 2 ● Reduced regression model

Variable	Estimate	SE	t _{calculated}	P value	AdjR ² = 0.74
Intercept	-23.62	5.08	-4.65	<.0001	
State	30.50	5.48	5.57	<.0001	
Eligibles	0.065	0.0029	22.83	<.0001	
Year	15.83	6.13	2.58	.0103	
CHC	-22.0063	9.90	-0.222	.027	
School	61.98	15.10	4.10	<.0001	
Yr_CHC	43.53	13.04	3.34	.0010	

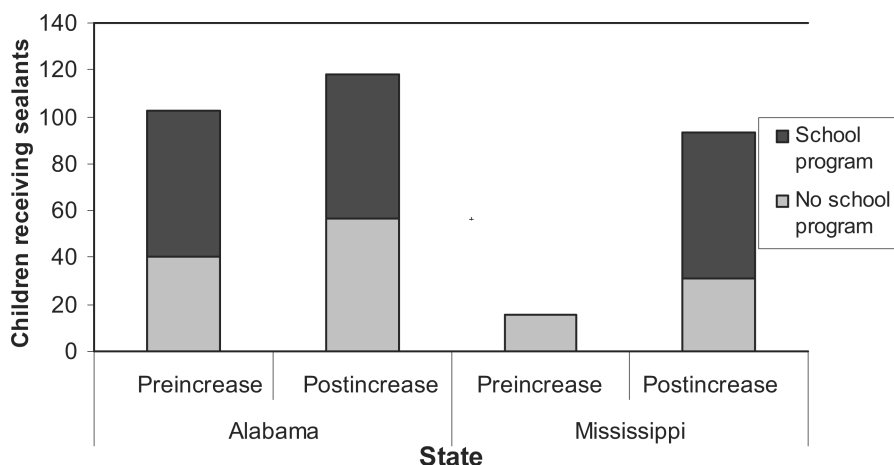


FIGURE 1. Regression prediction of number of Medicaid eligible children receiving at least one sealant for selected delivery strategies in counties without a CHC.

in an Alabama county without a school sealant program. After increasing Medicaid reimbursement rates, Mississippi also implemented school sealant programs in 9 counties. The model predicted that in these counties sealant prevalence on average would be 300 percent of the value in the absence of a school program (93 vs 31 children).

We also found that prior to the fee increase the presence of a CHC had a negative impact on sealant prevalence. In both states, CHCs are reimbursed with a fixed amount per encounter and sealants delivered in this setting are frequently not included in Medicaid data. Among our study population, CHCs and private dentists who accept Medicaid patients may be viewed as substitute providers. Our finding that prior to the increase, CHCs had a negative impact on sealant prevalence, thus, may be due to the fact that in these counties, Medicaid patients were substituting CHCs for private dental offices. Our finding that the reimbursement increase had a higher effect in counties with a CHC has two possible explanations. First, in counties with a CHC, the increase in the sealant reimbursement rate increased not only private dentists' supply of dental sealants but also Medicaid patients' demand for dental sealants provided in private dental offices due to the decreased costs of substituting private dental offices for CHCs (ie, shorter wait and travel times). Second, it may have been an artifact of the data. The increase in mean number of children eligible for Medicaid over the study period was higher in counties with a CHC (344 in Mississippi and 494 in Alabama) than in counties without a CHC (195 in Mississippi and 145 in Alabama).

The average incremental cost (per sealant) equaled \$26.24 in Mississippi; there were not sufficient data to estimate this value in Alabama because the state did not provide the total number of sealants delivered. In Mississippi, providing new sealants accounted for 85

percent of the incremental cost whereas paying a higher reimbursement rate for sealants that would likely have been delivered at the old rate accounted for 15 percent of the cost.

● Discussion

Increasing sealant prevalence among children at high risk for dental decay is an important public health issue because retained sealants are 100 percent effective.⁹ Many Medicaid eligible children do not receive restorative care.³ Decay left untreated can advance and result in pain and suffering, which in turn can lead to problems in eating, speaking, and learning.¹⁰ In the absence of treatment, prevention becomes even more important. In addition, delivering sealants to children at high risk for dental decay has been shown to be cost saving in both clinical and school settings.^{11,12} In Alabama and Mississippi, both increasing Medicaid reimbursements for sealants and providing sealants in a school setting were effective in increasing sealant prevalence.

The impact of each strategy will depend on whether sufficient demand for sealants exists and whether additional capacity (supply of dental services) is made available. Multiple factors influence demand for, and supply of, dental sealants. These factors will affect the generalizability of the findings reported here to other states. Delivering sealants in school settings, which does not require a parent to take their child to the dentist, may increase demand for sealants among Medicaid parents and ultimately sealant prevalence.⁷ Increasing sealant reimbursement rates may make suppliers of dental services more willing to see Medicaid patients, thus increasing the supply of sealants. Substitutability of dental service suppliers (ie, provision of sealants by a wide range of dental professionals) is more restrictive in Alabama and Mississippi than in most other states,

suggesting that this supply effect is likely to be at least as great in other states.

This research did not compare the per additional sealant cost of implementing school sealant programs to the cost per additional sealant resulting from increasing reimbursement rates, an important factor in allocating resources among these possible financing strategies. The reported cost per child of providing sealants (including start-up costs) in a school setting tends to be lower than in a clinical setting, not accounting for parental time and travel costs.² The less restrictive the constraints on supply/provision of sealants and the more amenable Medicaid regulations are to allowing reimbursement for sealants delivered in a school setting, the lower the barriers to school sealant program formation.

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