The impact of dental benefits on the utilization of dental services by low-income children in western Pennsylvania

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Abstract

Purpose: This study examines the impact of dental coverage provided through a health insurance program for low-income children on the use of dental services in Western Pennsylvania.

Methods: A before-after design with a control group was used. Telephone interviews were conducted with the families of newly enrolled children at the time of enrollment, at 6 months and at 12 months after enrollment. Both structured and open-ended questions were asked about the use of health care services, unmet need/delayed care and causes and consequences of unmet need/delayed care. A second group of families were interviewed 12 months after the study group was initially interviewed to form a comparison sample. The study population consisted of 750 children who were continuously enrolled in the program for 12 months and 460 comparison children.

Results: After enrollment, the proportion of children with a regular source of dental care increased 42%, while the proportion of those who had a preventive dental visit increased 50%. The proportion of children reporting unmet need/delayed care for dental services fell from 43% to 10%. The program had a larger impact on the use of dental services than on the use of medical services.

Conclusions: The extension of dental benefits to SCHIP-eligible children in Western Pennsylvania had a positive impact on children by increasing their access to dental care and to preventive dental services.*(Pediatr Dent 24:234-240, 2002)*

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In May 2000, the United States Public Health Service issued *Oral Health in America, A Report of the Surgeon General,* the first such report ever issued.[1] The major message of this report is that "Oral health is essential to the general health and well-being of all Americans and can be achieved by all Americans." However, as the report notes, not all Americans have achieved good oral health. There are striking disparities in oral disease by income. In particular, poor children suffer twice as much dental caries as their more affluent peers and their disease is more likely to be untreated.

Furthermore, the report notes that dental insurance is a strong predictor of children's access to dental care. In particular, uninsured children have fewer dental visits and more unmet needs than insured children do. Specifically the report stated: "Uninsured children are 2.5 times less likely than insured children to receive dental care. Children from families without dental insurance are 3 times more likely to have dental needs than children with either public or private insurance."[1]

The problem of uninsured children has received much attention from researchers and policy makers,[2-6] although much more attention has been given to the problem of uninsurance in general rather than to dental coverage. In the early 1990s, the number of uninsured children was large and increasing. In response, the US Congress in 1997 implemented the State Children's Health Insurance Program (SCHIP), one of the most significant health reform initiatives for children since the enactment of the Medicaid program in 1965. The States were given considerable flexibility in their implementation of the program. Although the legislation did not mandate that dental benefits be provided, it did make funds available should the states decide to cover them.

While SCHIP has the potential for improving the oral health of young children,[7] improvements will depend not only on the type of dental benefits covered but also on the level of provider payments since dentist participation in dental benefit programs depends in part on reimbursement levels.[8,9]

This paper examines two health insurance programs developed for low-income children that were in effect in Western Pennsylvania: the Pennsylvania Children's Health Insurance Program and the Caring Program. (These health insurance programs were among the models for SCHIP.) An earlier paper presented the results of the evaluation of the overall impact of these programs.[10] This paper attempts to extend the findings of the earlier paper in the following way: described are the dental benefits provided under both programs; presented is data on the reasons parents gave as to why their children experienced unmet need and delayed dental care prior to enrollment in the programs and at 6 and at 12 months following enrolment and on the consequences of that unmet need and delayed care; also presented is basic data on the impact on use of services that were given in the earlier paper.

Methods

The health insurance programs

The Pennsylvania Children's Health Insurance Program and the Caring Programs provided health insurance coverage to uninsured children in Western Pennsylvania. The two programs, which were complementary, covered children up to the age of 19 in families with incomes below 235% of the Federal poverty level. (The eligibility criteria for the two programs differed with respect to family income and the age of the child.) The programs covered children who live in the 29 counties that make up Western Pennsylvania, an area that includes 4.1 million people. Both programs provided the same benefit package of inpatient, outpatient (including dental and vision services), and preventive health care services to children. With the exception of a small co-payment for prescription drugs, there was no cost sharing for any covered service. Hereafter, these programs are referred to as the Program.

Dental coverage under the Program included emergency, preventive and routine dental care; services such as orthodontics, crowns and implants were not covered. Dental services were managed differently than medical services. Although most children were enrolled in managed care plans in which they were asked to select a primary care physician, they were free to select a dentist from the Blue Cross/Blue Shield dentist network. Pre-authorization was required for simple extractions and space maintainers. The reimbursement levels under the Program were identical to those paid to providers under Highmark Blue Cross/Blue Shield's (the organization that managed the programs) commercial programs.

The study sample

We received the names of 5,864 children as they were being enrolled into the Program between August and December 1995. Children were aggregated to the family level and randomly selected 887 families to be telephone interviewed by specially trained interviewers. The families were contacted within two weeks after being accepted into the Program but before receiving the insurance cards for their children. Of the 887 families, 783 (88%) agreed to participate and were interviewed, 44 (5%) refused, and 60 (7%) could not be contacted. The 783 families were contacted again at 6 months and later at 12 months: 659 (84%) families with 1,031 newly enrolled children answered all three surveys. The 750 children (498 families) who were continuously enrolled in the Program for the full year were selected as the study sample.

Variables measured

The interviewers used an almost identical survey instrument, which employed both fixed response format and open-ended questions, for all three interviews. The respondents, usually mothers (87%), were asked about each child in the family. In addition to standard demographic information, respondents were asked several questions about access to and use of health care services. (For all such questions, parents were asked to focus on the 6-month period prior to the interview). These questions included whether the child had a usual source of care for medical and dental care, the number of visits the child made to different types of health care providers, and whether the child experienced unmet or delayed care for different types of services. If the parent reported that the child had experienced unmet needs or delayed care, he or she was asked why the child had these experiences as well as the consequences.

The comparison families

A list of children who were enrolled in the Program between August and December 1996 was received. Three hundred and thirty randomly selected families were interviewed using the same survey instrument: 330 families (89%) who had 460 newly enrolled children agreed to participate. These 460 children served as a comparison group. Through the use of a comparison group, it was assessed whether changes observed in the study group were due to the insurance programs rather than to other underlying trends in the health care environment. This design, a variation of a recurrent institutional cycle design, rules out a major threat to the internal validity of simple before-after evaluations; namely, the effects of a secular trend.[11-13]

Analysis

We applied "within subject" tests to assess statistical significance of changes from enrollment to follow-up assessments for each of the measured variables. The McNemar test was used to assess within subject changes in dichotomous variables

Table 1. Enrollment Characteristics of Study and Comparison Group Families

Characteristics	Study children 498 families 750 children	Comparison group 330 families 460 children
Child characteristics		
Female	52%	46%
Mean age (SD)	9.7 years (4.7)	9.0 years (5.1)*
Uninsured>6 months	40%	60%**
Family characteristics		
White	95%	94%
Urban	74%	70%
Married	66%	68%
Mean # of children (SD)	2.1 (1.0)	2.1 (1.0)
Mean # of NEC (SD)†	1.5 (0.7)	1.4 (0.6)*
Mother works FT or PT	59%	64%
Father works FT or PT	67%	72%
Mother has health insurance	33%	35%
Father has health insurance	27%	31%

* Difference between comparison and continuously enrolled children is statistically significant at $P<.05$ by a 2-tailed test
** Difference between comparison and continuously enrolled children is statistically significant at $P<.005$
† NEC is newly enrolled children (some children may not have enrolled in the program since Medicaid or some other insurer covered them)

Table 2. Reported Unmet Need/Delayed Care for Types of Services in "Past 6 Months" at Different Time Periods

Type of Unmet/ Delayed Service	Study children n=750			Comparison children n=460
	Enrollment[1]	6 months[2] post enroll	12 months[3] post enroll	Enrollment
Dental care	43%*	15%*	10%*	38%
Physician care	25%*	3%	3%*	28%
Eye care	18%*	3%	3%*	16%
Emergency care	3%	1%	1%*	4%
Recommended care	5%*	2%	1%*	7%
Prescription drugs	11%*	1%	1%*	8%
Any care	57%	19%	16%	59%

[1]*Indicates statistical significance of difference between enrollment and 6-month follow-up ($P<.05$)
[2]*Indicates statistical significance of difference between 6-month and 12-month follow-up ($P<.05$)
[3]*Indicates statistical significance of difference between enrollment and 12-month follow-up ($P<.05$)
[4]There were no statistically significant differences between the comparison group and the continuously enrolled group

such as unmet/delayed medical need, and matched pair Wilcoxon Rank Sum tests (because of non-normal distributions) to assess within subject changes of continuous variables such as the number of visits. We also employed between subject tests (chi-square and t-tests) to compare the baseline findings for the study children with those of the comparison group of new enrollees. Bonferroni correction was used to adjust for multiple comparisons.[14] The Statistical Package for the Social Sciences (SPSS) Version 7.5 was used for all analyses.[15]

Results

Baseline characteristics and health insurance status at 12 months

Information on the study and comparison children is presented in Table 1. In the study families, 40% of the study children did not have health insurance for at least 6 months prior to enrollment into the Programs. (We did not ask explicitly about dental coverage and suspect that, prior to enrollment, dental coverage was lower than general coverage.) The vast majority of their families were white (95%) and/or lived in standard metropolitan areas (74%), which reflects the characteristics of the region in which they live. Both parents were typically involved in the labor force; however, less than one-third of the parents had health insurance coverage. In the comparison families, the children were slightly younger, the average number of newly enrolled children per family was smaller, and a larger proportion of the newly enrolled children were uninsured longer than 6 months, which may reflect the impact of enrollment limits that were in place in 1995.

Source of usual health care

The proportion of study children who had a regular source of dental care and of medical care increased significantly over the year ($P< 0.01$). At 12 months, 85% of the children had a regular dentist, up from 60% at enrollment, while 99% had a regular medical provider, up from 89% at enrollment. It is noteworthy that at enrollment a much lower proportion of children had a regular source of dental care than of medical care (60% vs 89%). At 12 months they were also less likely to have a regular source of dental care than of medical care, but the difference was not as large (85% vs 99%). The proportion of comparison children who had a regular dentist was similar to that of the study children at baseline (63% vs 60%); however they were more likely to have a regular medical provider (94% vs 89%).

Reported unmet need or delayed care

At each interview the following question was asked: "At any time over the last 6 months, did you think the (child's name) needed dental care but did not or could not get it?" If they answered no, they were asked, "Has there been any time in the last 6 months that you had to wait longer than you think that you should have?" As shown in Table 2, during the baseline interview, respondents reported that a large proportion of the children had experienced some unmet need and/

Table 3. Self-Reported Main Reasons for Unmet/Delayed Dental Care of All Continuously Enrolled Children

	At enrollment (baseline)		12 months after enrollment	
Reason for unmet/ delay dental care*	**n**	**% (95% CI)**	**n**	**% (95% CI)**
Not covered by insurance/Cost too much	298	40%(36.2,43.2)	48	6%(4.6,8.2)
Not covered by insurance	153	20%(17.5,23.3)	30	4%(2.6,5.4)
Cost too much	232	31%(27.6,34.2)	28	4%(2.4,5.1)
Barriers**	7	1%(0.2,1.6)	11	2%(0.6,2.4)
Other	40	5%(3.7,5.9)	17	2%(1.2,3.4)
No unmet need/ delay dental care	423	56%(52.9,59.9)	673	90%(87.6,91.8)

*Categories are not mutually exclusive; **Barriers include transportation problems, inconvenient hours and could not find a dentist; n=750

Table 4. Self-Reported Consequences of Unmet/Delayed Dental Care of All Continuously Enrolled Children

	At enrollment (baseline)		12 months after enrollment	
Consequence of unmet/delay dental care*	**n**	**% (95% CI)**	**n**	**% (95% CI)**
Preventive care delayed or not obtained	109	15%(12.0,17.0)	12	3%(1.9,4.3)
Cavities exacerbated/ decay	37	5%(3.4,6.4)	8	1%(0.4,1.8)
Needs braces or retainer	13	2%(0.8,2.6)	33	4%(2.9,5.9)
Other dental problems	41	6%(3.9,7.1)	12	2%(0.7,2.5)
No unmet/delay dental care	423	56%(52.9,59.9)	673	90%(87.6,91.8)

*Categories are not mutually exclusive; n=750

or delayed care in the prior 6 months. However, there were considerable differences in the amount of reported unmet need/delayed care by type of service. Dental care was the service with the most reported unmet need/delayed care. Respondents indicated that 43% of children had experienced some unmet need/delayed dental care, whereas 25% had such medical experiences and only 3% had such experiences for emergency care.

Once the children were enrolled in the Program, the amount of unmet need/delayed care decreased. At 12 months post enrollment, there was a significant decrease in reported unmet need/delayed care for each category of care ($P< 0.01$). Although the largest percentage decrease in unmet need/delayed care between enrollment and 12 months was reported for prescription drugs, the greatest percentage point decrease (33 points) was reported for dental care. Nevertheless, the respondents indicated that a significantly higher proportion of children still experienced more unmet need/ delayed dental care than they did for any other service. It will be noted that the proportion of comparison children who reported experiencing unmet need/delayed care for any type of service was comparable to that of the study children at baseline.

Causes and consequences of unmet need/delayed dental care

If the parents reported any unmet need/delayed care they were asked, "What was the main reason you didn't or couldn't get the help?" Although the respondents were asked to report the main reason, they often reported more than one. The reasons were grouped into cost-related issues, barrier problems (inconvenient dental hours, transportation problems, and knowledge of a good dentist) and other (a hodgepodge of reasons which defied classification as they ranged from fear of dentists to inability to take time away from job).

As shown in Table 3, the parents indicated that at baseline close to 40% of children had experienced unmet need or delayed care because of cost (either the service was not covered or it cost too much). Less than 1% of the children experienced unmet need or delayed care because of barrier problems. At 12 months, the parents reported that less than 7% of children experienced unmet need and delayed dental care because of cost. The number of children with such experiences due to barrier problems remained very low.

Table 4 summarizes the parents' response to the question, "What happened as a result of not getting the dental care or any delay?" At enrollment, the most likely consequence was that preventive services were delayed or not obtained – about 15% of the children did not receive the preventive services that their parents believed they needed. The parents also reported that 5% of the children had suffered additional tooth decay or delay in getting cavities filled. At 12 months, the most commonly reported consequence of unmet or delayed dental care was not receiving needed braces or retainers. It is interesting to note that, although the children probably "needed" braces at enrollment, the parents mentioned it only infrequently. It can be speculated that one reason for the report of unmet orthodontic need after enrollment is that many parents may have learned of orthodontic treatment considerations upon first seeing the dentist. as much orthodontic care today involves "growth guidance" care that begins far earlier than many parents anticipate. In addition, it is likely that parents would tend to acute problems first.

Use of services

There was a significant increase in the proportion of study children who were reported having any dental visits, any

preventive dental visits and any physician visits "in the past 6 months" at both 6 months and 12 months after enrollment into the Program ($P<0.01$). For example, at enrollment 40% of the children indicated that they had a dental visit "in the past 6 months," while only 34% indicated that they had had a preventive dental visit. At 6 months these proportions increased to 60% and 56%, respectively; and at 12 months they increased again to 65% and 62%, respectively.

By comparison, 59% of children had had a medical visit "in the past 6 months" at enrollment and that increased to 69% at 6 months and then fell to 64% at 12 months. With respect to the comparison children, in the 6-month period prior to their enrolling in the Program, a smaller proportion of the comparison group children than of the continuously enrolled children had seen these different types of providers.

There was a significant increase in the number of dental visits per child ($P< 0.01$). For instance, at enrollment, the study children had an average of 0.7 dental visits "in the past 6 months"; at 6 months they had an average of 1.0 visits, and at 12 months they had an average of 1.03 visits. However, all of the increase in the average number of visits is accounted for by the increase in the number of children who saw a dentist rather than an increase in the number of visits by those children who had any visit. In fact, the average number of dental visits by children with any visit decreased from 1.7 visits in the 6 months prior to enrollment to 1.6 visits in the second 6 months of coverage. This is consistent with the significant increase in the proportion of children who had preventive dentist visits.

Discussion

The Institute of Medicine defines access as "the timely use of personal health services to achieve the best possible health outcomes"[16] The data in this paper indicate that providing health insurance coverage to children improved access to dental services in that, following enrollment in the Program, the children were more likely to have a regular source of dental care, they were more likely to have a preventive dental visit and they were less likely to experience unmet need and delayed care in receiving dental services. This is a remarkable achievement.

Since this is, in effect, a case study of a program that consisted of several components (a benefit package, a panel of participating dentists and a reimbursement structure), it is impossible to identify which component was primarily responsible for its success. Certainly, the benefits were very good in that the most common dental services were included and parents did not face any cost-sharing requirements for covered benefits. Furthermore, it is possible the reimbursement rates encouraged dentists to participate in the Program. The parents, as pointed out above, did not report that they faced problems accessing covered benefits. This outcome should be compared to that of some Medicaid programs where, although the dental benefits are quite good, it is difficult to find services since Medicaid fees are so low.[8,9,17]

It is also interesting to note that, in absolute terms, the effect of the Program was larger for dental services than it was for medical services. This, too, is consistent with what is known about patterns of care. For instance, in general surveys, children who are uninsured are more likely to report unmet need/delayed care for dental services than they are for medical services.[18-20] This is also consistent with the findings from the RAND health insurance experiment which found that cost-sharing had a larger impact on the use of dental services than medical services.[21,22]

The main effect of insurance coverage was to increase the proportion of children who used services, rather than to increase the intensity of use by those children who used services. This finding is also consistent with the findings of the RAND health insurance experiment.[22,23] Given the data on the lower use of services by the comparison children, the findings can be ascribed to the Program rather than to some change in the health care delivery system.

We cannot ascertain the effect of the Program on children's oral health because one would not expect to observe major changes over the course of a single year. However, as noted, the parents reported that their children had experienced a significant amount of unmet need and delayed care in the 6 months prior to enrollment in the programs, and several parents indicated that this led to bad outcomes. For instance, parents reported leaving cavities unfilled and extracting teeth themselves. Furthermore, during the baseline interview, 23 respondents (5%) spontaneously told the interviewers that they felt guilty because they did not have health insurance for their children. It is likely they underreported some negative outcomes at baseline.

Therefore, it seems reasonable to believe that the increased care associated with enrollment in the programs would lead to improved oral health. The RAND health insurance experiment found that reduced cost sharing led to increased use of dental services and to improvements in oral health.[24]

This study has some limitations. One limitation is that it focuses on children who voluntarily enrolled in a health insurance program in a relatively small section of the country. However, the study children and their families are similar to those of uninsured children and families elsewhere with respect to family size, family structure and working status of the parents.[25] They also come from families with incomes below 235% of the poverty line (with the majority being 185% below), thus they are similar to the types of children who are eligible for care under SCHIP. It is worth noting that enrollment into SCHIP programs is also voluntary. A second limitation is that the data are based on self-reported information.

However, the respondents were asked to provide information on access and use of services "in the prior 6 months" during each interview, and it is unlikely that there would be any differences in recall bias at each interview. Finally, this study was not designed to focus on specific dental

concerns. For instance, it is possible that parents would have reported more dental problems if they had been asked specifically about whether the children had dental pain, dental caries, etc.

The data here are consistent with the Surgeon General's Report.[1] Low-income children without dental coverage experience large access problems to the dental system. Extending dental coverage to low-income children through insurance programs that successfully engage dental providers will improve utilization of care. It is likely that coverage will improve oral health.

The results of this study reveal a persistent underutilization of dental health preventive and curative services by uninsured children. These findings are consistent with other studies that have documented a similar pattern. Providing dental health insurance coverage can improve access to and utilization of dental services. However, coverage is not a simple construct because dental coverage includes a set of covered services, specific cost-sharing requirements, the dental network, the payment structure and so forth. Dental practice and the types of services received by low-income children will depend on the design of the overall dental insurance program. The Surgeon General has highlighted the oral health problems faced by low-income children. The Surgeon General has also argued that "oral health is essential to the general health and well-being of all Americans and can be achieved by all Americans." However, improvements in the provision and utilization of oral health services by children require more than just dental insurance.[26] Nevertheless, the financing made available through the State Children's Health Insurance Program could be used to provide a base upon which to build a comprehensive approach that can lead to the reduction of childhood dental disease. This base, however, must be well designed.

Conclusions

The extension of dental benefits to SCHIP eligible children in Western Pennsylvania had a positive impact on children by increasing their access to dental care and preventive dental services.

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Abstract of the Scientific Literature

Remineralization of Enamel Subsurface Lesions by Sugar-Free Chewing Gum Containing Casein Phosphopeptide-Amorphous Calcium Phosphate

Casein phosphopeptide-amorphous calcium phosphate nanocomplexes (CPP-ACP) has been shown to exhibit anticariogenic potential in laboratory, animal and human in situ experiments. The aim of this study was to determine the ability of CPP-ACP in sugar-free chewing gum to remineralize enamel subsurface lesions in an in-situ model. Thirty subjects in crossover, double-blind studies were randomly selected to wear removable palatal appliances with six human-enamel half-slabs inset containing subsurface demineralized lesions. The appliances were inserted immediately before gum-chewing for 20 minutes and then retained for another 20 minutes. This was performed 4 times per day for 14 days. At the completion of each treatment, the experimental half-slabs were compared with their respective control half-slabs and subjected to microradiography and densitometric image analysis in the quantification of remineralization. The addition of CPP-ACP to either sorbitol- or xylitol-based gum resulted in a dose-related increase in enamel remineralization. The 0.19, 10.0, 18.8, and 56.4 mg of CPP-ACP have caused an increase in enamel remineralization of 9, 63, 102 and 152%, respectively, relative to the control gum, independent of gum weight or type.

Comments: Casein phosphopeptide-amorphous calcium phosphate nanocomplexes (CPP-ACP) may have promising clinical effects on remineralization of white spot lesions in enamel, although other clinical trials and the cost/benefit analysis are needed to identify the optimal does of CPP-ACP and the types of chewing gums. **SH**

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Shen P, Cai F, Nowicki A, Vincent J, Reynolds EC. Remineralization of enamel subsurface lesions by sugar-free chewing gum containing casein phosphopeptide-amorphous calcium phosphate. *J Dent Res.* 2001;Dec;80(12):2066-2070.

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