

The effectiveness and estimated costs of the Access to Baby and Child Dentistry program in Washington state

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Access to dental health care for low-income children is a well-documented problem in the United States.¹ Although the federal Medicaid program mandates that every state provide preventive dental services for all Medicaid-eligible children, few children receive preventive care by age 20 years.² For the most part, state legislatures have been unsuccessful in their efforts to increase access by expanding eligibility for Medicaid coverage.² In addition, a number of states have appropriated funds to boost reimbursement

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fees to dentists only to learn that these measures alone do not increase the number of dentists willing to treat eligible children.³

The Access to Baby and Child Dentistry (ABCD) program was launched in Spokane County, Wash., in 1995 in an effort to increase the number of Medicaid-eligible children younger than 6 years who saw a dentist. At the heart of this program is a community-based strategy, which involves a combination of outreach and linkage, education for parents and dental professionals and delivery of services.⁴⁻⁶ A recent study of the North Carolina Medicaid program concluded that "preschool-aged, Medicaid-enrolled children who had any early preventive dental visit were more

Objectives. The authors estimated the effectiveness of the Access to Baby and Child Dentistry (ABCD) program as a tool to improve the oral health of children, and they measured its costs. ABCD is an effort to increase the utilization of dental care by Medicaid-enrolled children younger than 6 years.

Methods. The authors compared the oral health of third-grade children in Spokane County Wash. (ABCD) with that of children in Pierce County (non-ABCD). They then compared the expenditures of ABCD with those associated with alternative dental care interventions.

Results. Children in Spokane County had better oral health than did the children in Pierce County. The authors also found that the ABCD program increased mean dental care costs by \$8.17 per user over costs in Pierce County, and the program cost a mean of \$5.33 per user in outreach and dentist and staff training costs.

Conclusions. This study found that ABCD improved the oral health of all third graders, including those not eligible or enrolled in the program. Increased expenditures were attributable mainly to outreach and training costs.

Clinical Implications. Programs such as ABCD, carried out collaboratively by component societies, health districts, dental schools and Medicaid, have the potential to increase access to care and improve health.

Key Words. Dental care for children; Medicaid; health services accessibility; program evaluation.

likely to use subsequent preventive services and experience lower dentally related costs."⁷

The origin of the ABCD program is instructive. Two of us (P.D., P.M.) sought out concerned Medicaid staff members who had previously collaborated with University of Washington School of Medicine, Seattle, professors in improving prenatal care. The Medicaid officials actively sought ways to adapt Medicaid guidelines and procedures to reduce the barriers to dentist

participation. The Spokane District Dental Society then became involved. Financial support from the Medicaid program itself and from the Washington Dental Service Foundation (the philanthropic arm of Washington Dental Service) allowed short-term training to be provided to members and staff of the dental society, as well as development of the outreach program.⁶

The Spokane Regional Health District and the Spokane District Dental Society had had a well-established working relationship. After being implemented successfully in Spokane County, the ABCD program has been implemented on a county-by-county basis as dental societies and health departments have found common ground. Studies have shown that the ABCD program has improved access for preschool-aged children enrolled in Medicaid.^{4,6}

The benefits of the ABCD program are as follows:

- routine dental services for children covered by Medicaid;
- up to three fluoride varnish treatments per year for children at high risk of developing caries;
- glass ionomer sealants and fillings;
- parental orientation focusing on the importance of preventive dental visits and on program expectations (for example, being on time for dental appointments and waiting room etiquette);
- short-term professional training provided by the University of Washington to dentists and staff members on pediatric dental techniques;
- community outreach and program marketing.

In addition, dentists who undergo the short-term training receive increased reimbursements from the Medicaid program for providing dental care.

For this report, we used a two-pronged approach to examine the ABCD program. Study 1 compares the oral health of third-grade children in an ABCD county (Spokane) with that of children in a similar county without the program (Pierce). We tested the hypothesis that all children in the study county—both those enrolled in ABCD and those not enrolled in ABCD—would be healthier than children in the comparison county. Thus, the study presumed that ABCD raised the standard of care in the overall community and that its impact was broader than that on ABCD enrollees alone.

We undertook study 2 to document program expenditures. The ability of the ABCD program to increase access to care, reduce fear of dental care

and improve parental satisfaction has been demonstrated.⁴ Expenditure data for dental care in the Medicaid program are available for both counties from the Medical Assistance Administration (MAA) of the Washington State Department of Social & Health Services. We studied children born in 1994 and 1995 because these children had the opportunity to enroll in ABCD when they were very young, and we now can observe the results of their participation. Documenting expenditures of the ABCD program vis-à-vis alternate health care interventions will help policy makers better understand the effectiveness of this program.

METHODS: STUDY 1

We studied Spokane County because, in 1995, it became the first county in Washington state to implement the ABCD program.

Spokane County has a population of about 417,939. During the 1990s, the population grew about 16 percent. Per capita income was \$19,233 in 2000.⁸ About 37,104 children (30 percent) in Spokane County were eligible for Medicaid during the period from 1997 through 1999.^{8,9} Thirty-seven percent of children in the public schools receive free or reduced-fee lunches and are eligible for ABCD. About one-half of eligible children were enrolled in ABCD from 1997 through 1999.⁹ The county's population is 91.4 percent white, 2.8 percent Hispanic or Latino, 1.6 percent African-American, 1.9 percent Asian-American and 1.4 percent American Indian. Three hundred four licensed dentists practice in the county (Washington State Dental Quality Assurance Commission, unpublished table [Licensed Dentists by County], 2002), about one-half of whom received ABCD training.⁴ Fluoridated water is available for only 5 percent of the population.¹⁰

We selected Pierce County for comparison because it is demographically similar to Spokane County. In addition, it is located on the other side of the state and the chance of contamination (that is, a resident of Pierce County gaining access to the ABCD program in Spokane) was low. About 56,819 children (27 percent) were eligible for Medicaid during 1997 through 1999.^{8,9} Pierce County has a population of 700,820. The county's population grew about 20 percent during the 1990s. Per capita income was \$20,948 in 2000.⁸ About one-third of children (34 percent) in the county receive free or reduced-fee lunches and all of them are eligible for Medicaid.⁹ Pierce County's population is 78.4 percent white, 7.0 percent

African-American, 5.5 percent Hispanic or Latino, 5.1 percent Asian-American and 1.4 percent American Indian.⁸ Four hundred twenty-four dentists practice in the county (Washington State Dental Quality Assurance Commission, unpublished table [Licensed Dentists by County], 2002). About 4 percent of the population received fluoridated water at the time of the study¹¹ (see Table 1 for a comparison of the two counties in 2002).

This study, conducted in 2002, was composed of 453 third-grade children from three public elementary schools in Spokane County (Hamblen, Holmes and Roosevelt) and four public elementary schools in Pierce County (Boze, Gieger, Victor Falls and Custer). Six of the seven schools were examined in a 1994 study that found the counties comparable (Spokane County: mean dfs [decayed or filled primary tooth surfaces] plus DFS [decayed or filled permanent tooth surfaces] = 4.9 surfaces [27 percent of children needed treatment]; Pierce County: mean dfs plus DFS = 5.0 surfaces [23 percent of children needed treatment]).¹² The one substituted school is demographically similar to the school it replaced. The proportion of children examined in Spokane County who had been enrolled in ABCD could not be determined. The Institutional Review Board of the University of Washington approved the study, and we obtained the written consent of parents and the assent of their children.

Two dentists (M.K., P.D.) and one dental hygienist examined the children's teeth visually by using standardized National Institute of Dental and Craniofacial Research methods, and they recorded the status of each tooth surface.¹³ They also recorded the presence of sealants. They did not score missing primary teeth as decayed, although tooth loss at this age is most likely a result of advanced decay. Interrater reliability for the caries measures was good ($\kappa = 0.7$ to 1.0). In addition, the examiners assigned one of three treatment referral categories ("no obvious problems, continue with regular care"; "cavities noted,

needs a visit to the dentist within two months"; "should visit the dentist within one to two weeks").

RESULTS: STUDY 1

Consistent with our hypothesis, the mean (\pm standard deviation [SD]) ratio of dfs to all erupted surfaces was 0.1 ± 0.2 for children in Spokane County versus 0.2 ± 0.2 for children in Pierce County ($t = 2.3$, $P = .023$) (that is, about 10 percent of the erupted teeth in children in Spokane County were decayed or filled and twice that percentage were decayed or filled in children in Pierce County). The figure demonstrates the percentage of third-grade children in the two counties with varying proportions of decayed primary teeth. A smaller proportion of children in Spokane County had untreated dental decay compared with children in Pierce County (32 [18 percent] of 177 children versus 62 [22 percent] of 276 children, respectively), but the difference was not statistically significant ($\chi^2 = 1.3$, $P = .26$).

Overall, children in Spokane County had more sound teeth than did children in Pierce County (mean \pm SD, 21 ± 3 sound teeth in Spokane County versus 20 ± 3 sound teeth in Pierce County [$t = 2.2$, $P = .028$]). In addition, the examiners found fewer crowned primary teeth in children in Spokane County than in children in Pierce County (mean \pm SD, 0.3 ± 1.0 crowned primary teeth in Spokane County versus 0.6 ± 1.6 crowned primary teeth in Pierce County

TABLE 1

COMPARISON OF SPOKANE (ABCD*) AND PIERCE (NON-ABCD) COUNTIES IN 2002.

VARIABLE	SPOKANE COUNTY	PIERCE COUNTY
Annual Per Capita Income (Dollars)	19,233	20,948
Percentage of Population Consuming Fluoridated Water	5	≈ 4
Percentage of Children 0-18 Years Old Receiving Medicaid	30	27
Percentage of Children Receiving Free or Reduced-Fee Lunches	37	34
Hispanic Population in County (Percentage)	2.8	5.5

* Access to Baby and Child Dentistry.

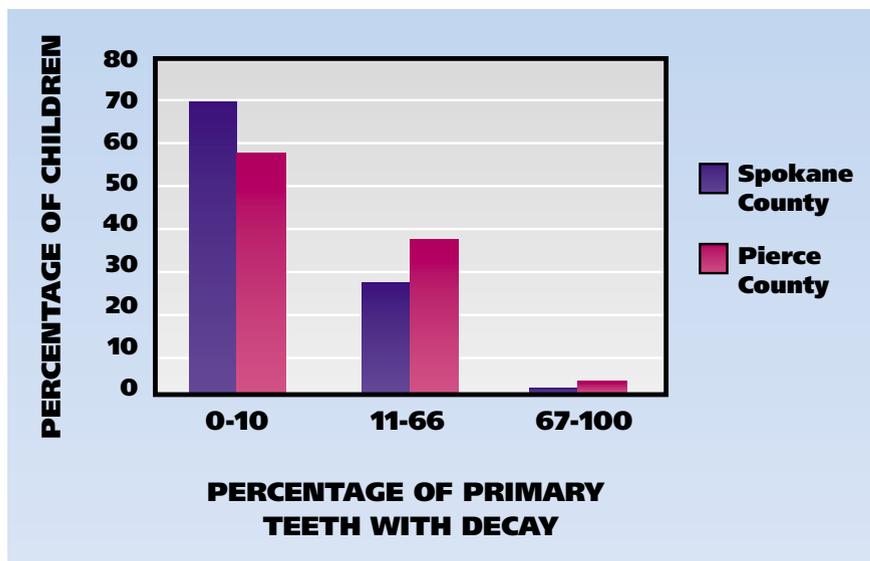


Figure. Percentage of third-grade children in Spokane and Pierce counties with decay in their primary teeth.

[$t = 2.8, P = .005$]). Children in Spokane County also had fewer missing primary teeth than did children in Pierce County (mean \pm SD, 0.6 ± 1.1 missing teeth in Spokane County versus 0.8 ± 1.3 missing teeth in Pierce County [$t = 2.1, P = .035$]), suggesting fewer decay-related extractions in the ABCD population.

We found no differences between the two counties with regard to the sex or mean age of the children. In both counties, 52 percent of the children received free or reduced-fee school lunches. However, the proportion of Hispanic children among those examined in Pierce County (13.3 percent) exceeded the proportion of Hispanic children examined in Spokane County (2.4 percent) ($\chi^2 = 21.93, P < .001$).

METHODS: STUDY 2

We designed this analysis to describe the expenditures for both dental care and dentist training and outreach in the ABCD program. The analysis also assesses the comparative impact of expenditures relative to different dental care treatments. In study 2, we analyzed cost data from both counties for 1995 through 2001 (Table 2).

Variable costs. The expenditure data consist of variable and fixed costs. We obtained variable cost data, which include dental care expenditures for both counties, from the MAA. These data include expenditures for children born in 1994 or 1995, because they would have had the opportunity to be enrolled in ABCD as preschoolers and were now in third grade (enabling us to assess the

impact of the program on first permanent molars). These data consist of two components for each county: the total dollars spent for each age cohort during each year, and the total number of children in each age cohort who had had at least one dental visit during the year.

Fixed costs. We obtained fixed cost data for 1995 and 1996 for Spokane, which included expenditures associated with dentist training, program administration and miscellaneous expenses, from a previous study.¹² These data include actual expenditures from the first two years of administering the ABCD program. Because actual expenditures for 1997 through 2001 were not available, we extrapolated

these data by assuming that program expenses remained at 1996 levels and adjusted for the proportion of children from this group who were part of ABCD during each year.

In both 1995 and 2001, one-sixth of the total program expenditures were spent on the study sample, because the program covered six years of life and only a single birth cohort (those born in 1994 and 1995) was in the study. In each of the middle years (1996 through 2000), one-third of the total program expenditures were spent on the study sample. We converted all expenditures to 1995 dollars using changes in average price data for the Seattle-Tacoma-Bremerton area (All Items category) obtained from the U.S. Department of Labor's, Bureau of Labor Statistics Web site.¹⁴

We compared mean expenditures for the ABCD program with the costs associated with single-surface resin-based composite restorations. We obtained statewide reimbursement rates from a November 2002 fee-for-service dental fees schedule, and we converted these amounts to 1995 dollars using changes in average price data.¹⁴

RESULTS: STUDY 2

Table 2 presents the total Medicaid expenditures for Pierce and Spokane counties. After adjusting for inflation and converting all amounts to 1995 dollars, we found that the mean annual expenditure per child visiting a dentist in Pierce County was \$198.92, compared with a mean annual expenditure of \$212.42 for children visiting a dentist in Spokane County. This means that the

TABLE 2

ANNUAL MEDICAID DENTAL AND ABCD* PROGRAM EXPENDITURES FOR SPOKANE (ABCD) AND PIERCE (NON-ABCD) COUNTIES, 1995-2001, FOR CHILDREN BORN IN 1994 AND 1995.

YEAR	VARIABLE COSTS (DOLLARS)	FIXED COSTS† (DOLLARS)	TOTAL ADJUSTED EXPENDITURES (DOLLARS)	NUMBER OF CHILDREN WITH ONE OR MORE DENTAL VISITS	MEAN EXPENDITURE PER CHILD (DOLLARS)
Spokane County					
1995	71,911.00	27,747.67	99,658.67	654	152.38
1996	214,201.81	29,972.73	244,174.54	1,282	190.46
1997	354,423.00	29,686.84‡	384,109.84	1,778	216.03
1998	590,712.22	29,569.61‡	620,281.83	2,514	246.73
1999	622,562.99	29,504.29‡	652,067.28	2,745	237.55
2000	313,595.92	29,082.08‡	342,678.00	1,573	217.85
2001	50,346.60	14,060.83‡	64,407.43	285	225.99
Mean expenditure (1995-2001)	—§	—	—	—	212.42
Estimated annual utilization (percentage)¶	—	—	—	—	47.2
Pierce County					
1995	24,951.00	0.00	24,951.00	130	191.93
1996	126,935.30	0.00	126,935.30	570	222.69
1997	312,253.08	0.00	312,253.08	1,512	206.52
1998	520,884.20	0.00	520,884.20	2,562	203.31
1999	621,892.62	0.00	621,892.62	3,069	202.64
2000	337,507.36	0.00	337,507.36	1,788	188.76
2001	33,087.07	0.00	33,087.07	310	106.73
Mean expenditure (1995-2001)	—§	—	—	—	198.92
Estimated annual utilization (percentage)¶	—	—	—	—	26.5
<p>* ABCD: Access to Baby and Child Dentistry. † ABCD program covers children aged 0 to 6 years; because this study covers only children born in 1994 and 1995, the fixed costs have been adjusted downward. ‡ Estimated costs. § Not applicable. ¶ Based on an estimated mean number of 3,053 Medicaid enrollees in Spokane County and 4,798 Medicaid enrollees in Pierce County.</p>					

Medicaid Program spent \$13.50 more per child in Spokane County than it did in Pierce County. When fixed outreach costs are excluded, the mean expenditure per child visiting a dentist in

Spokane County was \$207.09, or \$8.17 more than that for a child in Pierce County.

To estimate the relative cost of the ABCD program, we compared the \$13.50 difference with the

cost of a one-surface restoration. According to the MAA Dental Program Billing Instructions, allowed charges in 1995 dollars were \$42.78 for a single-surface anterior composite restoration and \$50.83 for a single-surface composite restoration in a posterior tooth.¹⁵

DISCUSSION

The goal of the ABCD program is to ensure that Medicaid-eligible children are given an equal opportunity to achieve good oral health. The program has met this goal by increasing access to dental services for underserved children. On the basis of simple comparisons, the ABCD program, which emphasizes prevention and early intervention, appears to be relatively inexpensive. This is especially true relative to the more expensive and invasive treatments (such as pulpal treatments and stainless steel crowns) that are the inevitable result of inadequate dental care or no dental care.

This argument is bolstered by a recent evaluation of the North Carolina Medicaid dental program,⁷ which found that the costs of dental treatments subsequent to the first dental treatment were related to the patient's age at his or her first visit. Children who saw a dentist for preventive visits by age 1 year were more likely to "use subsequent preventive visits and experience lower dentally-related costs"⁷ than were children who received their first visit at ages 2 to 5 years.

The results of our study indicate that children in Spokane County have better dental health than do children in Pierce County, and they have benefited from the ABCD program. If children in both counties were examined periodically until they reached age 21 years (the age at which Medicaid benefits cease), it is likely that children in Spokane County would enjoy even better oral health than the results of this study indicate. This prediction is likely because children in Spokane County are exposed to fluoride treatments at an earlier age, parents are provided with family oral health education and are more involved in the process of maintaining their children's oral health, and dentists have the opportunity to learn and practice at a higher standard of care. Thus, we would expect the effects to be cumulative during the course of a patient's life.

Given the chronic nature of dental disease, we expect the gap between Spokane and Pierce counties to widen.

Of the non-ABCD counties, we chose Pierce County for comparison purposes because it is the most demographically similar to Spokane County, and it is sufficiently distant geographically to avoid the likelihood of children in Pierce County's having been treated by dentists in Spokane County. As in any such study, unaccounted-for differences between the counties could have affected the results of this study. Immigration by Hispanic families whose children can have more dental disease may have affected these findings.¹²

Similarly, the results might be different for counties in which a greater proportion of children drink fluoridated water.

Nevertheless, ABCD is based on the premise that children from low-income families will benefit if they gain access to dentists, as children from better-off families have benefited. Thus, the well-documented increases in access to care from ABCD alone support the conclusions drawn in this report.

Although the ABCD program seems expensive initially when compared with no dental care at all, our comparison with alternative treatments demonstrates that it is indeed a good investment. Our comparison may have underestimated the savings from early prevention, because dental care utilization was lower in Pierce County and in other non-ABCD counties.

In addition, it is probable that we overestimated the total expenditures. First, the expenditure data for 1995 and 2001 are not accurate estimations of what would be spent in a typical program year, because relatively fewer children in the age cohort we studied were served, while fixed program costs were high. A second source of overestimation is the assumption that fixed costs from 1997 through 2001 would remain at the same level as those during the second year of the program (1996). If we assume that fixed costs peaked at the onset of the program, decreased over time (for example, as outreach personnel became more efficient at their jobs) and eventually leveled off, then we overstated these fixed cost estimations. Of course, such a program needs to strive to control these fixed costs while

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maximizing outreach efforts.

The health outcomes and relatively modest costs of the ABCD program are of particular importance to policy makers. Although our data do not allow us to replicate the findings from the North Carolina study,⁷ that study along with our study suggest that savings will accrue over time. Currently, there are 13 ABCD counties in Washington state and the program continues to grow. Pierce County is in discussions about implementing a program.

The ABCD program also has qualitative benefits. The program emphasizes preventive care and a conservative approach to treatment, while dental procedures in non-ABCD counties, such as Pierce County, have been oriented toward invasive procedures. Restoratively oriented care often fails because of recurrent infection.¹⁶ Also, because ABCD children in the ABCD program are more likely to have a positive first experience with a dentist, these children are less likely to exhibit dental fear during future visits.¹⁷ Children who receive preventively oriented dental services also are less likely to be absent from school as a result of hospitalization and dental pain.¹ Finally, parental education could have a positive effect on an ABCD program enrollee's siblings or other family members, thereby distributing benefits of the program to nonparticipants.

CONCLUSION

We conducted these two studies to evaluate the health outcomes and describe the costs of the ABCD program in Spokane County, Wash. The results indicate that the program is an effective and relatively inexpensive way of improving the oral health status of children enrolled in Medicaid. ■

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The Web site for the ABCD programs in Washington state is "www.abcd-dental.org".

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