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Preventing Baby Bottle Tooth Decay: Eight-Year Results

SYNOPSIS

BABY BOTTLE TOOTH decay (BBTD) is a preventable dental disease that affects more than 50% of American Indian/Alaska Native (AI/AN) children. A community-oriented program to prevent BBTD was implemented in 12 AI/AN communities in 1986. In 1989, the overall prevalence of BBTD for the 12 sites combined decreased from 57% to 43%, which represented a 25% reduction ($P < .001$). Funding for the formal program was discontinued in 1990. In 1994, the Indian Health Service Dental Program and Head Start funded an assessment of the current prevalence of BBTD and the level of program implementation at the 12 original sites. This paper describes the findings. At the five sites where both one-to-one counseling and community-based educational activities had continued, BBTD prevalence was reduced by 38% ($P < .001$) over the eight-year period.

Baby bottle tooth decay (BBTD) is a preventable dental disease characterized by a unique pattern of dental decay that affects the upper primary incisors followed by the primary molars¹⁻⁸. BBTD causes pain and infection and may result in tooth extractions and costly dental treatment. BBTD is the result of either or both of the following practices: giving a child a bottle containing sweetened liquids at nap or bedtime and bottle-feeding past the age of 12 months. Sweetened liquids that can cause BBTD include formula, milk, and juice. Studies have shown that breastfed children who sleep with their mothers and nurse at will throughout the night also get BBTD^{3,9}. Surveys have documented that approximately 50% of American Indian/Alaska Native (AI/AN) children ages 3 to 5 years old suffer from BBTD^{10,11}. Head Start and Indian Health Service (IHS) cost estimates, based on children treated under contract by pediatric dentists, are \$1000 to \$2000 per child. If hospitalization is necessary, the cost may be doubled.

From 1986 to 1989, a BBTD prevention program was implemented in 12 AI/AN communities¹². This program was a cooperative effort among three Department of Health and Human Service agencies: the Administration for Children, Youth, and Families Head Start Bureau; the Indian Health Service (IHS) Dental Program; and the Centers for Disease Control and Prevention Division of Oral Health. The prevention program was multidisciplinary and multistrategic. The two major components were: (a) one-to-one counseling

with the caretakers of infants and (b) a community-wide intervention that included a media campaign, participation in health fairs, and computerized mailings to the caregivers of one-year-olds. For the 12 sites combined, the prevalence of BBTd decreased from 57% in 1986 to 43% in 1989, representing a 25% reduction ($P<.001$).

In 1990, funding for the BBTd prevention program ended. Centralized training and technical assistance were discontinued; however, individual sites were encouraged to continue their efforts. In 1994, the IHS Dental Program and Head Start funded an evaluation to assess the current prevalence of BBTd and the level of program implementation at the 12 original program sites. This paper describes the findings of the evaluation.

Methods

The 1994 sample included 1319 3- to 5-year-old AI/AN children from 12 Head Start centers in 10 different states. These children represent a new cohort of Head Start enrollees from the same Head Start centers involved in the original research in 1986 and 1989¹². Consistent with Head Start guidelines, the children are primarily from low-income families.

Data were gathered from Head Start dental examination forms for the 1993-1994 school year. BBTd was defined as decay of two primary maxillary anterior teeth, the same criterion used in 1986 and 1989. One of the authors reviewed

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the dental examination forms of the children in the sample. None of the children had "questionable caries" on the maxillary anterior teeth; BBTd appears in general to be an "all-or-nothing" dental disease. BBTd prevalence was determined for the total sample and by site. These data were analyzed using chi-square tests. A probability of $P<.05$ was considered significant for all tests performed.

The process evaluation consisted of telephone interviews with staff from the dental clinic and the Women, Infant, and Children (WIC) program at each site. One researcher conducted all of the interviews using a standard 15-question protocol. Respondents were asked why they thought the BBTd program did or did not work, why people in their community don't wean their children by one year of age, and if they were continuing to use any of the education materials developed for the original program. Staff were also asked to describe their collaborative efforts with other health programs to prevent BBTd. Finally, staff were asked what they thought might work to prevent BBTd in their community.

Results

The overall prevalence of BBTd for the 12 sites combined was 43% (see Table 1). For the five sites that continued both one-to-one counseling and community prevention activities over the eight-year period from 1986 to 1994, the prevalence of BBTd was decreased by 38% ($P<.001$). For the seven sites that discontinued community-based prevention activities, the decrease from 1986 to 1989 was statistically significant ($P<.001$); however, the increase from 1989 to 1994 was *not* statistically significant.

The primary reason given for discontinuation of the community-based prevention activities was staff turnover. The one-to-one intervention continued to some degree at all 12 sites. WIC staff at all 12 sites reported that they offered BBTd counseling at the intervals recommended by national WIC guidelines. This included advising parents to use a tippee cup for juice at six months of age and to wean

Table 1. Reduction in prevalence of BBTd among Head Start children at 12 Indian Health Service sites, 1986-1994.

	Number screened	BBTD		Percent reduction	p value
		Number	Percent		
BBTD prevention program ongoing 1986-1994: 5 sites					
1986.....	595	363	61		
1989.....	549	296	54		
1994.....	509	193	38	38	<.001
BBTD prevention program stopped in 1989: 7 sites					
1986.....	809	437	54		
1989.....	985	364	37		
1994.....	810	381	47	13	ns
TOTAL ALL SITES					
1986.....	1404	801	57		
1994.....	1319	567	43	25	<.001

children from the bottle at 12 months. At those sites where BBTD prevalence continued to decrease after program funding was discontinued, the dental staff also worked closely with the medical staff to encourage routine BBTD counseling during well-baby clinic visits.

At the successful sites, staff reported involvement in a wide variety of community-based education activities, including computerized mailings to caretakers of infants, smile contests, health fair booths, TV and radio public service announcements, posters, newspaper articles, and parenting workshops.

Discussion

The success of the BBTD prevention program was demonstrated by the three-year and eight-year evaluations. At each site that discontinued the program, BBTD prevalence increased.

While attempts were made to institutionalize the BBTD program, these efforts did not provide for training of new staff. Most of the site coordinators were dentists who have since transferred to other IHS sites. At one of the successful sites, a dental assistant was the key to the continuation of the program. Dental assistants may be better choices to serve as BBTD site coordinators in the IHS environment because they are usually community members and they often work in the same clinic for their entire career. One dental assistant coordinator reported, "I like seeing the difference. It's really fun. I talk to people [about BBTD] at the supermarket and everywhere else in the community."

The extent to which an innovative program fits into an organization's mission and core operations is critical in determining the extent to which it becomes institutionalized¹³. The WIC Program has effectively institutionalized BBTD counseling into its core operations through the use of performance standards that require BBTD prevention messages at key intervals. Community-wide activities were less likely to be institutionalized because the dental staff did not view them as routine duties. Because the funding no longer existed for training and technical assistance, these activities were lost with staff turnover. A dental assistant reported, "Things changed five years ago when we got a new dentist. BBTD activity stopped. The dentist was only into dental treatment." This theme was common at the sites that had high staff turnover. A dentist from a successful site put it succinctly: "It works, but it takes a long-term commitment to the community."

A common concern among the dentists at the successful sites was how to reach more families. They felt that their strategies were reaching the majority of families but that there was a segment of young children whose parents were difficult to reach. The dentists stated that those children still getting BBTD are the "poorest of the poor." These inaccessible children come from troubled families who move frequently, change caretakers often, and tend not to access well-child care. Future strategies should address these issues and offer creative ways to reach more families.

Some young children develop dental decay unrelated to bottle feeding or breast feeding. Dental decay in infants and young children is the result of a specific bacterium, *Streptococci mutans*, which is transmitted from mothers to their infants¹⁴⁻¹⁶. These bacteria are "fueled" by frequent intake of sucrose and other refined carbohydrates. Dental decay affecting the primary molar teeth without decay in the maxillary incisors is probably caused by frequent snacking.

In 1995, funding was secured to continue and expand the BBTD effort. The BBTD program is being expanded to include messages that address frequent snacking, the use of fluorides, and early identification of dental decay. Further research is needed to test the effectiveness of these educational messages. Another approach to the prevention and management of dental decay in infants and young children is the application of fluoride varnishes or other pharmacological agents. Clinical interventions are being field-tested in selected IHS communities. If successful, these clinical interventions will add to the arsenal in the battle against BBTD and other early childhood dental decay.

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