

Dental study upsets the accepted wisdom

Ten years ago, the conventional wisdom was that children aged 12 to 18 developed two new cavities each year—largely from dental neglect. Moreover, it was assumed that dental caries, or cavities, could be all but eliminated in school-age children if they received combinations of treatments aimed at caries prevention—namely sealants and fluorides. But results of the largest controlled field test of preventive dental procedures ever in the United States suggest that the conventional wisdom was wrong on both counts.

The National Preventive Dentistry Demonstration Program was developed by the Chicago-based American Fund for Dental Health, a nonprofit group that raises funds for dental research, education and health-care delivery. Beginning in 1977, the program examined a total of almost 30,000 children aged 5 to 14, over a four-year period, in 10 communities. Half the communities had fluoridated water.

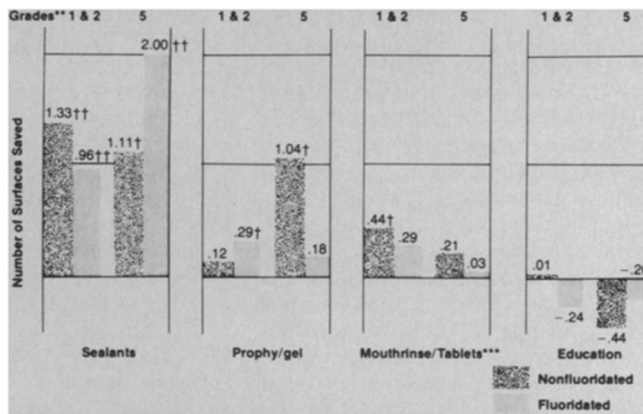
The program focused on four caries-prevention techniques: sealants (SN: 12/17/83, p. 389), a plastic-like coating applied to the chewing surfaces of back teeth and to pits or fissures on the sides of teeth (these surfaces are most prone to decay and ones which fluorides cannot protect adequately); professional teeth cleaning with a fluoride paste followed by fluoride gel treatment every six months; weekly rinses with a fluoride mouthwash—and if the community water supply was unfluoridated, a daily fluoride tablet; and classroom instruction on diet, on dental health, and on plaque control through brushing, flossing and use of fluoride toothpastes.

The program's goal was to determine which if any combination of these would eliminate childhood dental decay—and at what cost. Throughout the test, independent evaluation of program efficacy and costs associated with the dental procedures were conducted by the Rand Corp. of Santa Monica, Calif.

Examinations at the start of the study showed that levels of dental disease in the participants were similar to what had been found in other surveys. Follow-up exams, however, revealed a rate of cavity formation much lower than expected. "Even without any preventive services, only one group—fifth graders in nonfluoridated communities—would experience the 'two cavities a year' that conventional wisdom predicted," the study found. In the program's final year of data collection, 1981, the National Institute of Dental Research confirmed this observation with its own data indicating children 5 to 17 now experience one-third fewer cavities than previous national surveys had recorded.

A substantial percentage of the population got no cavities; rates ranged from 27.9 percent of fifth graders in nonfluoridated

Tooth Surfaces Saved With Each Procedure, Per Child



Bar chart records the average number of tooth surfaces saved over the four-year test, per child, for each procedure. Values were computed from decay rates measured in a control group—children in each community who received annual check-ups but no special caries-prevention treatment.

**Grades refer to grade-level at the beginning of the study (1977).

***Tablets were used in nonfluoridated communities only.

†Differs significantly from zero at .05 level. ††Differs significantly from zero at .001 level.

Bell, R. M., S. P. Klein, H. M. Bohannon et al. Treatment Effects in the National Preventive Dentistry Demonstration Program (Santa Monica, Calif.: The Rand Corp.), June 1983 (draft).

areas to 48.6 percent of first and second graders in fluoridated communities. Overall, 60 percent of the cavities occurred in 20 percent of the children; and the affected included those in the caries prevention program.

But what the study's authors termed one of the most surprising and potentially controversial findings was the poor performance of fluoride mouthrinses and tablets. Previous National Institute of Dental Research data suggested the mouthrinse/tablet regimen used in this study should have reduced decay from 20 to 50 percent. But in fact, the program only achieved 21.4 percent reductions—and even this rate occurred in only one group. That means that over the four-year test, the average number of tooth surfaces spared from decay amounted to less than one (the 28 permanent teeth contain 128 surfaces).

At \$12 per student per year, education was not only the least expensive of the four test treatments, but also uniformly nonproductive in altering decay rates. Water fluoridation, another low-cost caries preventative, represented the opposite extreme.

In each community, some of the study participants received annual dental checkups, but no other caries prevention. And among this group, the study found that those who came from communities with fluoridated water had a rate of new decay roughly one third less than similarly untreated counterparts from nonfluoridated areas.

Those receiving the full battery of anti-cavities techniques—sealants, topical application of fluoride paste and gel, mouthrinses (and tablets, in nonfluoridated communities), and education—saved approximately two tooth surfaces over the four-year test. Nationally, the achievement cost roughly \$55 per child per year (that's the average cost; in New York, for instance, the cost was \$105 per child per year). "By comparison," the study noted, "untreated younger children from fluoridated communities had one

fewer surface of decay over the four-year period than those in nonfluoridated communities. This savings—approximately half that offered by the most effective preventive program regimen—was achieved at a total cost of less than \$1 per child per year."

According to Harry Bohannon, who directed the study, "The most important finding is that it was not possible to completely eradicate decay in a school-based highly comprehensive preventive program." But even if it had been possible, he added, the cost would have been prohibitive. Furthermore, he said, "On the basis of our results, we can't make any strong argument that fluoride mouthrinse programs are effective enough to be recommended." In fluoridated communities, he said, "they are not merited at all."

The big value of the program, according to Stephen Klein, director of the Rand Corp. team that evaluated the study, is that it has highlighted which preventive-care techniques are either nonproductive or not cost effective. And considering how much is already spent on childhood dental health each year—an estimated \$4.5 billion—"that in itself represents a significant finding."

Alvin Morris, executive director of the Association for Academic Health Centers and chairman of the study's advisory committee, says that "providing routine standardized, individually applied preventive dentistry procedures to all children can no longer be justified." He said ways must be found to target measures on the high-risk populations—such as that 20 percent currently getting 60 percent of the cavities. And under a new research initiative, the American Fund for Dental Health has begun work on developing a model to do just that.

A report of the four-year study, "Preventing Tooth Decay," has just been published by the Robert Wood Johnson Foundation, a health-care philanthropy organization that contributed more than \$10 million to the project.

—J. Raloff