Sealant retention rates of dental hygienists and dental technicians using differing training protocols

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Introduction

Although there has been a dramatic increase in caries-free children in the United States, 84% of children experience caries in occlusal fissures by 18 years of age.[1] Dental personnel, other than dentists, must be trained to place sealants to provide this much needed service cost-effectively to the numbers of children who require it.

A program to train Air Force dental technicians (equivalent to dental assistants) to place sealants with assistance using the Vac-Ejector Moisture Control System (Whaledent International, New York, NY) for isolation was reported in a previous article.[2] Over a two-year period at the Benjamin Dunn Dental Clinic, Lackland Air Force Base, Texas, 20 dental technicians were trained to place sealants with supervision. Eight civilian dental hygienists hired by the Air Force also completed the first portion of this training program. The purpose of this study was to examine the sealant retention rates and compare them to the retention rates of the trained technicians.

Methods and Materials

Between November 13, 1985, and August 13, 1988, 20 dental technicians and eight dental hygienists were trained to place pit and fissure sealants as has been described previously.[2] All of the dental hygienists had received instructions in sealant placement during their hygiene training, but none had any experience with the Vac-Ejector Moisture Control System. They received the same manual, attended the same two-hour didactic training, and completed the same full day of training as the dental technicians. A gel etchant and Concise Light-Cured Sealant (3M Dental Products Division, St. Paul, MN) material were used. Technicians were required to recall their first 20 patients within a month to evaluate sealant retention; the hygienists were not, due to their prior training.

A log was maintained of long-term sealant retention from January 1, 1987, through January 1, 1989, as parents brought children in for regular annual examinations. Four dentists (including the senior author) examined all children at the Dunn Dental Clinic. Each dentist was instructed in the criteria to be used for sealant retention.[2]

Results

Over the two-year period, 48 patients of the hygienists had their sealant retention recorded in the log during their periodic examination. The mean time of examination after placement was 13.7 months. Two hundred and ninety-nine sealants were provided for these 48 patients with complete and partial retention rates of 81.3 and 93.3%, respectively. Two hundred and sixteen sealants were placed on molars; 77.2% of these were retained completely, 15.8% were retained partially, and 7.0% were lost completely. Eighty-three sealants were placed on premolars; 98% were retained completely, and 2% were lost completely.

The table (next page) compares the retention rates of the dental hygienists with those of the technicians, by time of examination after placement. The overall complete retention rate for the technicians was 91.0%, as compared with 81.3% for the hygienists. The complete retention rate of the technicians was compared to the complete retention rate of the hygienists using a single factor analysis of variance. There was a significant difference between the retention rates of the technicians and the hygienists [$F(1, 136) = 12.61$, $P < 0.002$].

To determine if this significant difference was due to individual differences or was a consistent pattern, retention rates of individual technicians and hygienists were examined. The complete retention rates of the individual technicians were compared with each other using a single factor analysis of variance. The complete retention rates of the hygienists were compared similarly. No significant difference was found between the individual technicians [$F(3, 86) = 1.2$, $P > 0.31$] or between the individual hygienists [$F(2, 45) = 0.6$, $P > 0.55$].

Table. Retention rates of sealants placed by dental technicians compared to dental hygienists

Range, Months	*Provider*	*Mean, Months*	*Total Placed*		*Completely Retained*		*Partially Lost*		*Completely Lost*	
			N	%	*N*	%	*N*	%	*N*	%
5 to 9	Technicians	8.1	113	18.9	104	92.0	7	6.2	2	1.8
Months	Hygienists	7.8	58	19.5	46	79.3	10	17.2	2	3.4
10 to 14	Technicians	11.6	271	45.2	252	93.0	15	5.5	4	1.6
Months	Hygienists	11.5	158	53.2	143	90.5	10	6.3	5	3.2
15 to 20	Technicians	17.4	123	20.5	112	91.1	8	6.5	3	2.4
Months	Hygienists	19.8	24	7.7	14	58.3	6	25.0	4	16.7
21 to 36	Technicians	23.5	92	15.4	77	83.7	12	13.0	3	3.3
Months	Hygienists	23.5	59	19.5	40	67.8	10	16.9	9	15.3
Total	Technicians	13.9	599	—	545	91.0*	42	7.0	12	2.0
	Hygienists	13.7	299	—	243	81.3*	36	12.0	20	6.7

*Significant, $P < .002$.

Discussion

The dental hygienists had more training in intraoral manipulation, including sealant application, and a greater educational background in basic and biological sciences. They also were more mature than the technicians, and more accustomed to being the sole provider of care to a dental patient. One would expect that a higher sealant retention rate would be observed for the dental hygienists as compared with the dental technicians, but this was not the case. The technicians had a significantly higher overall retention rate than the dental hygienists. Moreover, this difference cannot be attributed to the data from any single hygienist.

Although dental hygienists are more educated and trained than dental technicians in many procedures, this advantage did not seem to increase their aptitude in successfully placing pit and fissure sealants. In fact, in this study, the dental technicians had significantly greater success in sealant retention than hygienists using the same materials and trained in the same techniques. The difference may lie in the training approach, or simply in the inherent motivation and attention to detail by the two groups. Further evaluation is necessary to judge the benefits of one month recalls or some other form of initial sealant patient follow-up. Nevertheless, the results of this study indicate that the broadening of state practice acts to allow trained dental assistants, as well as dental hygienists, to place sealants, is justified fully.

At the time of this study, Lieutenant Colonel Foreman was the chief of the Pediatric Dentistry Section, Department of General Dentistry, Wilford Hall USAF Medical Center, Lackland Air Force Base, TX. Colonel Matis was special consultant in Preventive Dentistry and Infection Control to the Assistant Surgeon General for Dental Services, USAF School of Aerospace Medicine, Brooks Air Force Base, TX.

1. National Institutes of Health, U.S. Department of Health and Human Services: The prevalence of dental caries in United States children 1986–87. NIH Publ. No 89–2247 Washington DC 1989, pp 6–9.
2. Foreman FJ, Matis BA: Retention of sealants placed by dental technicians without assistance. Pediatr Dent 13:59–61, 1991.