Short Communication

Fluoride use by pediatric dentists in Houston

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The American Dental Association (ADA) and the Food and Drug Administration (FDA) have clinically evaluated and approved three fluoride compounds for professional topical application (application times, 4 min)[1]: 2% sodium fluoride (NaF), 8% stannous fluoride (SnF_2), and 1.23% acidulated phosphate fluoride (APF). No in-vivo studies that show caries reduction efficacy for reduced fluoride-concentration products or reduced application times for professional fluoride treatments currently exist.[2,3]

The Workshop on Changing Patterns of Fluoride Intake (WCPFI) held in 1991 at the University of North Carolina–Chapel Hill recommended that dental patients be evaluated for their risk of decay and that only children and adults with caries activity or with a moderate-to-high risk of developing caries routinely be given professionally applied fluoride treatments using "clinically proven products in the correct way".[2] The rationale for this recommendation is the declining caries rate and the high concentration of fluoride in these agents, which could result in fluorosis or toxicity, especially when young children are involved. Likewise, the American Academy of Pediatric Dentistry (AAPD), in its 1996 oral health policy on fluorides, recommended that professional fluoride treatments be "based on caries risk" and that topical fluoride-containing products be used appropriately.[4] The risk-versus-benefit of this treatment is an important consideration that poses an ethical conundrum for dental professionals: increased fluorosis in a low-caries population.

The WCPFI recommendations for in-office application of fluoride include the following precautions:

1. Use of an appropriate size tray, preferably foam-lined
2. Use of just enough fluoride (around one-third of tray capacity, less for small children) to cover the tooth surfaces
3. Use of a saliva ejector during treatment with the patient's head tilted forward
4. Use of custom trays for special-needs and cleft-palate patients
5. Use of special care for children younger than 6 (separate upper and lower applications)
6. Use of suctioning to remove all excess agent after the patient has expectorated for 30–60 s
7. Storage of fluoride products out of the reach of children, and
8. Supervision of the patient during administration.[2]

Studies reported by LeCompte[5] and LeCompte et al.[6] have shown that even with these precautions, a significant amount of fluoride (7.7 mg) remains in the mouth following a topical treatment. The resulting substantial elevations in plasma fluoride concentrations could result in dental fluorosis in children with developing dentition.[5,7]

The AAPD recommends that only children with active caries or at high risk for caries be prescribed home-use fluoride rinses or gels.[4] The WCPFI recommended that no daily-use, self-applied fluoride rinse or gel be prescribed for general use in children younger than age 6.[2] Clinical evidence is insufficient to support the use of 0.4% SnF_2 gels, and 0.2% SnF_2 weekly rinses. These should not be used in populations drinking fluoridated water.[1,2,4]

Children younger than age 6 need parental supervision when using a fluoridated dentifrice and home-use fluorides.[2,4] Studies by LeCompte[5,7] and LeCompte and Whitford[6] on the ingestion of dentifrices indicate that 3-year-old children swallow about 30–50% of the amount of dentifrice used. Skotowski[8] showed a direct correlation between the amount of toothpaste used by children up to age 8 and rates of dental fluorosis. Therefore, children should use only small dentifrice amounts (size of a pea) and should also rinse well after brushing to prevent swallowing residual fluoride.[2,4]

The purpose of this survey was to determine the current pattern of fluoride use by pediatric dentists in Houston. A report of a survey of general dentists in Houston reported that the majority were not adhering to AAPD and WCPFI recommendations.[10]

Methods

Surveys were mailed to the 55 licensed pediatric dentists in Houston. The open-ended and multiple-choice questions were developed from a previous telephone survey conducted with Houston general dentists.[10] The survey instrument was pretested by six dentists and two dental hygienists to assure face validity. Only minor wording changes were made. The questions were designed to assess the types of fluoride products and techniques being used as well as patient selection. Human

subjects approval was obtained.

The questionnaires were mailed with a cover letter assuring anonymity and stating that only aggregate data would be used in reporting study results. A second survey was mailed to nonrespondents. Data were analyzed using descriptive statistics. Incomplete surveys were not counted. The questionnaire assessed the following information:

1. Brand of fluoride currently used to administer in-office fluoride treatments
2. Application technique used to administer the fluoride treatment
3. Length of application time used to administer the fluoride
4. Types of patients receiving fluoride treatments
5. Staff responsible for selection of fluorides and techniques used
6. Factors influencing the choice of fluoride products and techniques selected
7. Recommendations given for home-use fluorides
8. Techniques recommended for home-use fluorides
9. Patients advised to use home-use fluorides.

TABLE 1. SURVEY RESULTS OF A QUESTIONNAIRE MAILED TO HOUSTON PEDIATRIC DENTISTS ASSESSING THE IN-OFFICE USE OF FLUORIDES, APPLICATION TIMES, AND TECHNIQUES

Type of Fluoride	*Responses* N	%	*1-min Application (Technique)*	*2-min Application (Technique)*	*4-min Application (Technique)*	*Other Application (Technique)*
APF						
Gel* 1.23%	19	50%	15 (Brush-on)	2 (Tray)	1 (Tray)	1 Left on (Brush-on)
Foam* 1.23%	6	16%	4 (3 Brush-on 1 tray)	2 (Brush-on)	–	–
Rinse 0.05%	1	3%	1 (Rinse)	–	–	–
NaF						
Foam* 2.0%	1	3%	–	1 (Tray)	–	–
Gel* 2.0%	3	8%	–	3 (Brush-on)	–	–
Rinse 0.2%	2	5%	2 (Rinse)	–	–	–
SnF_2						
Gel 0.4%	1	3%	1 (Brush-on)	–	–	–
Dual Rinse						
APF .31% SnF_2 1.64%	5	13%	1 (Rinse)	4 (Rinse)	–	–
Total	38	100%	24	12	1	1

*ADA approved for professional use.

Results

Thirty-eight complete surveys were returned (Tables 1 and 2). Only one office used both an ADA-approved professional fluoride product and technique: 1.23% APF for 4 min. While 26 used 1.23% APF, they were administering the fluoride for 2 min or less. One office reported applying a coat of APF gel and leaving it on. Of the offices useing APF, 19 used APF gel and 6 used APF foam.

Of the respondents, another six reported the use of sodium fluoride. Four used 2% NaF gel or foam for 2 min. The other two respondents used 0.2% NaF rinse (which has been tested as a weekly use rinse) for 1 min.

The remaining six of the respondents reported the use of SnF_2, using a concentration of fluoride less than the ADA-approved 8.0%. Of these respondents, one was using 0.4% SnF_2 for 1 min, five were using a dual-rinse product containing 0.31% APF and 1.64% SnF_2 (one for 1 min, four for 2 min).

Fluoride gels and foams were primarily applied using the brush-on technique in 25 of the offices, trays were used in five of the offices, and the fluoride rinses were used in the remaining eight offices.

Fluoride applications were given to all patients in 35 responding offices and to children age 6 and older only in the other three. Two offices reported the application of fluoride to all orthodontic patients as well. Responses indicated that the decision as to which fluoride products and techniques were used was made by the dentist in 27, both the dentist and dental hygienist in four, the dental hygienist in three, and the assistant in two offices.

TABLE 2. FACTORS GIVEN FOR SELECTION OF FLUORIDE PRODUCTS AND TECHNIQUES

Factor	*% no. 1 Ranking*	*% no. 2 Ranking*
Patient preference and acceptibility	37% (14)	16% (6)
Clinical effectiveness	29% (11)	5% (2)
Convenience and efficiency	26% (10)	34% (13)
Product cost	8% (3)	5% (2)

Offices were asked to rank the reasons for choosing fluoride products (Table 2). The choices most often ranked number one are: patient preference and acceptability (14), clinical effectiveness (11), convenience and efficiency (10), and product cost (3). No offices chose brand names or sales representatives as their first reason for product selection. The factors most often ranked second were convenience and efficiency (13) and patient preference and acceptability (6).

Every office reported recommending prescription home-use fluorides for their patients. The brush-on technique (1–2 min) was overwhelmingly the most popular with 31 responses. The remaining seven recommended a 1–2-min rinse. These home-use fluorides were prescribed only for high caries-risk patients in 22 of the offices, for everyone in 11, for patients 6 and older in two, and for orthodontic patients in three.

Discussion

The importance of fluoride to pediatric dentists is evident in the fact that 100% of the offices used both in-office and self-applied fluorides. An ADA-approved fluoride product was used for in-office treatments by 29 of the pediatric offices, in contrast to only half the general dentists in Houston.[10] However, as with the general dentists, pediatric dentists were using 1–2-min application times. The difficulty in treating younger patients may account for this reduction in application time, as well as for the use of brush-on technique (66%).

Both the pediatric and general dentists report efficacy, patient acceptability, and efficiency and as the main criteria for product selection. Product selection and application times seemed to be based on manufacturer's claims instead of AAPD, ADA, or WCPFI recommendations. Unfortunately, these claims are not backed with clinical evidence of caries reduction. It is important to note that other types of fluoride, such as varnishes, have clinical data to substantiate their effectiveness, though without ADA or FDA approval to date.

Only six pediatric dentists reported the use of low-fluoride concentration products for in-office use compared with almost half of the general dentists.[10] These NaF and SnF_2 rinses and gels were designed and tested for daily or weekly home-use and have the same fluoride concentration as toothpastes (1000 ppm). There is no evidence of efficacy in caries-reduction when used as a semiannual professional topical treatment.[1-3, 11]

The practice of these pediatric offices applying fluoride (for 1–2 min) and recommending home-use fluorides to all patients is not in compliance with the AAPD guidelines or the WCPFI recommendations: use of approved professional fluorides and techniques for patients with a high risk of caries age 6 and older only. The reason for this noncompliance may be due to a lack of knowledge of these recent recommendations, or perhaps, that eliminating a routine fluoride treatment could result in a significant income reduction.

The limitations of this study are those inherent in any survey. Sixty percent of Houston pediatric dentists responded to this survey. The strength of the response suggests that the results of the survey might be generalized to Houston pediatric dentists. Further study regarding the efficacy of alternate topical fluoride products and procedures is warranted.

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References

1. National Fluoride Task Force: A guide to the use of fluorides for the prevention of dental caries. J Am Dent Assoc 113:503–563, 1986.
2. Changing patterns of fluoride intake. Workshop. Chapel Hill, April 23–25, 1991. J Dent Res 71:1214–27, 1992.
3. Mellburg JR: Evaluation of topical fluoride preparations. J Dent Res 69:771–79, 1990.
4. American Academy of Pediatric Dentistry: Fluoride. Pediatr Dent 17:24–25, 1995.
5. LeCompte EJ: Clinical application of topical fluoride products—risks, benefits, and recommendations. J Dent Res 66:1066–71, 1987.
6. LeCompte EJ, Whitford GM: Pharmacokinetics of fluoride from APF gel and fluoride tablets in children. J Dent Res 61:469–472, 1982.
7. LeCompte EJ, Doyle TE: Oral fluoride retention following various topical application techniques in children. J Dent Res 61:1397–1400, 1982.
8. Skotowski MC, Hunt RJ, Levy SM: Risk factors for dental fluorosis in pediatric dental patients. J Public Health Dent 55:154–59, 1995.
9. Warren DP, Henson HA, Chan JT: A survey of in-office use of fluorides in the Houston area. J Dent Hyg 70:166–71, 1996.
10. Pendrys DG, Stamm JW: Relationship of total fluoride intake to beneficial effects and enamel fluorosis. J Dent Res 69:529–38, 1990.