

【Original article】

Knowledge and practices of caries prevention among Taiwanese dentists attending a national conference

Running title: Dentists' caries knowledge and practices

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Abstract

Background/purpose: This study was carried out to evaluate Taiwanese dentists' knowledge and practice towards preventive dental care.

Materials and methods: A questionnaire survey was conducted at the nationwide annual dental congress in 2008 in Taipei, Taiwan. Dentists' knowledge about preventive dentistry was assessed based on their responses to 19 statements. Dentists' attitudes towards preventive dentistry were assessed based on responses to the effectiveness of 16 preventive procedures. The dentists were also asked about their experience with the use of sealants and fluoride.

Results: More than 80% could not distinguish between new and old theories of the mechanism of action of fluoride. The correct answer was "remineralization of incipient decay", not "incorporation of fluoride into developing teeth". Also 68% incorrectly answered that "lactobacilli play a more-significant role in the initiation of smooth surface carious lesions than do mutans streptococci", an older theory. Over 80% perceived the effectiveness of "pit and fissure sealants", "professional prophylaxis", and "flossing" for preventing caries in children, and the last 2 procedures for adults. "Community water fluoridation" and sealants were selected as the most effective procedures for caries prevention in children, and "professional prophylaxis" and "flossing" for adults. Although sealants were perceived as being effective, 44% of dentists reported that they only applied sealants to $\leq 10\%$ of their children patients. The reasons were that patients had difficulty understanding the value (67%) and were unwilling to pay (63%). Near 55% of dentists provided topical fluoride treatments to children more than 2 times per year. However, the frequency decreased to less than once per year for teenagers and adults. Most of the dentists finished a fluoride application in 1 min for in-office treatments.

Conclusions: A portion of Taiwanese dentists seemed to have limited up-to-date information about certain topics related to caries prevention. The frequency of treatments for caries prevention, such as topical fluoride and sealants, did not match the perceived effectiveness of these treatments by participants.

KEY WORDS: knowledge of dental caries prevention; Taiwanese dentists; sealant; fluoride

Introduction

Dental caries are a prevalent health problem and a leading cause of tooth loss among children in Taiwan, although the prevalence of dental caries has declined.¹ They represent a chronic, infectious, multifactorial disease that can occur throughout a person's lifetime. Recent reports stated that as high as 61% of 6-year-old children had experienced dental caries, and the DMFT (decayed, missing, and filled teeth) index was 2.58 for 12 year olds in 2006.¹ However, most of those could be prevented by the appropriate use of fluorides and pit and fissure sealants. In addition, a percentage of those were experiencing increased dental caries with age despite improvements in treatments for caries prevention in recent years.¹

To prevent caries, correct knowledge and positive attitudes about dental care are important, especially for dentists as leaders. However, few studies investigated dentists' or dental hygienists' knowledge, attitudes, and practices. In 1983, 1 study compared the knowledge, attitudes, and practices of pit and fissure sealants, fluorides, and fluoridation of 563 dental hygienists in 2 US states.² The dental hygienists involved were generally knowledgeable and had favorable attitudes about sealants, but sealants were only used in 54% of dental clinics in which respondents practiced. The most frequent reasons given for non-use of sealants were a lack of acceptance by the dentist-employer and that dental clinic policy did not permit their use.

That survey also examined the extent to which patient education was provided on fluoride-related topics.³ Although dental hygienists' knowledge about the benefits of fluoride and water fluoridation was relatively high, providing instructions to patients did not receive high priority. This finding was consistent with a 1995 study which reported that only 32% of respondents recalled that the benefits of fluoride being discussed.⁴

In regard to practices toward caries prevention, dentists and dental hygienists in the Houston, TX area were asked about patterns of fluoride use in a telephone survey,⁵ including types of fluoride, application techniques, application times, which patients received fluoride, and recommendations for home-use fluorides, which are used in some countries, such as Germany. All of them responded that they used topical fluoride products. Nearly 70% reported using a 1-min application time, although there are no clinical trials that demonstrate that this application time effectively reduces caries. On the other hand, there is clinical documentation about

caries inhibition when professionally applying stannous fluoride (SnF₂) and acidulated phosphate fluoride (APF) gels for 4 min semiannually, but not for only 1 min.^{6,7} Other findings revealed that reduced concentrations of fluorides, fluorides combined as a dual rinse, and fluoride tested as a daily or weekly use rinse were being applied inappropriately as in-office fluoride treatments.

Several studies were conducted among Koreans regarding their oral health knowledge and attitudes. A questionnaire consisting of 36 items was used to interview 2000 Koreans aged 10~69 years in 1991.⁸ Nearly 70% had heard about fluoride. Nearly 60% reported that tooth-brushing was the best way to maintain good oral health. Dentists were also asked about their knowledge of and attitudes towards caries etiology and prevention.⁹ Results suggested that the majority of Korean dentists do not know current information concerning the etiology and prevention of dental caries, mechanisms of action of fluoride, or the effectiveness of preventive procedures for children and adults. A similar questionnaire was also used to survey Korean dental hygienists.¹⁰ Most dental hygienists did not have up-to-date information on the etiology and prevention of dental caries, the mechanism of action of fluoride, or the effectiveness of preventive procedures.

A similar questionnaire was also mailed to 960 US dentists in 1996.¹¹ The overall level of knowledge about caries etiology and preventive procedures was low. More than 40% of participants did not know that re-mineralization is the most important mechanism of action of fluoride. Another questionnaire survey was conducted in Iran in a recent report.¹² Those authors also concluded that preventive dentistry should be emphasized in dental education in order to update dentists' knowledge and attitudes regarding preventive dental care.

Dentists and dental hygienists play a significant role in providing preventive services, educating patients, and purchasing related products; it is important to understand what they know and believe about caries prevention and how they use caries preventive measures. However, there are no national data that document the knowledge, attitudes, and practices of Taiwanese dentists in terms of caries prevention. The aim of this study was to determine the knowledge, attitudes, and practices among dentists regarding dental caries etiology and prevention. This report focuses on knowledge and practices related to dental caries etiology, sealants, and fluoride.

Materials and Methods

This study involved gathering data on the knowledge, attitudes, and practices of dentists. A 20-question survey instrument consisting of 162 items was developed based on questions from a National Institute of Dental Research (NIDR) study of dental hygiene educators,¹³ and 2 published investigations of the knowledge, attitudes, and use of 2 major caries preventive measures by dentists, i.e., fluoride³ and sealants.¹⁴ Background information included the dentist's year of birth, gender, work-related factors, and interest in continuing education (CE). The questionnaire was an adaptation of those used in studies on US dental hygienists,¹¹ Korean dentists,⁹ and Korean dental hygienists.¹⁰

The questionnaire was comprehensively revised by 2 expert consultants according to the situation in Taiwan. The face validity of the instrument was enhanced by having it reviewed by 2 other experts. Minor revisions were made after a pretest with 10 dentists. The present data were gathered by distributing this self-administered questionnaire to 200 Taiwan dental practitioners who attended the annual conference of the Association for Dental Sciences of the Republic of China, a major nationwide dental congress in Taipei, Taiwan on December 28-30, 2008. The respondents filled out the questionnaire, which was introduced by trained students of the Department of Dental Hygiene, China Medical University, and returned it anonymously during the conference.

Data analysis

A database was designed using Microsoft Excel, and data were analyzed using SPSS Release 13.0 software (SPSS, Chicago, IL, USA). Descriptive data are reported as frequencies and percentages.

Nineteen knowledge items on a 5-point scale of “strongly agree, agree, disagree, strongly disagree, and do not know” were scored as correct or incorrect based on current scientific evidence and expert opinions.¹¹ Attitudes about the perceived effectiveness of various caries prevention procedures (16 items for children and 14 items for adults) were originally a 5-point scale as well, with responses “very effective, effective, somewhat effective, not effective, and do not know”.

Results

Clinical practice characteristics

During the conference, 175 dentists effectively responded. Table 1 summarizes the dentists' background information and professional characteristics. Among the respondents, 130 (74.3%) were male and 45 (25.7%) are female. Among the 175 dentists, 42 (24.0%) said that they worked in a specialty, such as oral surgery (7, 4.0%). The most (41.1%) dentists were 24~30 years old, and had graduated between 2001 and 2010 (46.3%). More than 60% had worked for < 10 years, an additional 21.7% had worked for < 20 years, and 17.2% had worked for > 20 years.

Nearly 40% worked 31~40 h/week, 21.7% worked 41~50 h/week, and 17.1% 21~30 h/week. The other 3 working-hour groups, including < 10, 11~20, and > 50 h/week, together comprised 6.3%. More than 50% noted that they were interested in attending continuing education (CE) courses on dental caries prevention in the future, and as high as 17.7% were not. However, 31.4% were not sure or undecided.

Knowledge about caries etiology and prevention

Respondents were asked if they agreed or disagreed with 19 statements on caries etiology and preventive procedures (Table 2). Eighty-three percent correctly responded that the most important mechanism of action of fluoride is the remineralization of incipient decay, whereas 82% agreed/strongly agreed, albeit incorrectly, that the most important mechanism is the incorporation of fluoride into developing teeth, an older theory.¹¹ Sixty-eight percent agreed/strongly agreed, albeit incorrectly, with the statement, "lactobacilli play a more significant role in the initiation of smooth surface carious lesions than do mutans streptococci".

No more than 50% correctly disagreed/strongly disagreed that sealants are somewhat risky because decay may be sealed in the mouth. About 40% agreed/strongly agreed, albeit incorrectly, with the statement, "the quantity of sugar consumed is more important in causing caries than the frequency of sugar consumption", although as many as 17.7% strongly disagreed with this statement.

As many as 89% and 76% respectively answered correctly regarding remineralization of incipient caries and the benefits of fluoride for adults. Eighty-two percent of dentists recognized the effectiveness of dilute, frequently administered fluoride in caries prevention, although < 10% of dentists strongly agreed with the statement. Eighty percent correctly agreed or strongly agreed that fructose, glucose,

and sucrose are cariogenic; however, < 10 percent “strongly agreed” with the statement. Eighty percent of dentists correctly answered the item, “removal of plaque is more valuable for maintaining gingival health than for preventing caries”; however, only 15% of dentists strongly agreed with the item.

Perceived effectiveness of preventive procedures

Respondents were asked to rate the effectiveness of 16 and 14 procedures for caries prevention in children and adults, respectively (Table 3). In addition, respondents were asked to identify the 2 most effective procedures for caries prevention.

Of the 16 procedures rated for caries prevention in children, 89.1% reported that “pit and fissure sealants” were very effective/effective and 87.5% recognized the value of “professional prophylaxis”. “Flossing” was rated very effective/effective by almost 85% who undesirably rated it higher than any other fluoride mechanism. “Infrequent sugar consumption” (78.3%), “community water fluoridation” (76.6%), “topical fluorides applied by a professional” (76.6%), and “dietary fluoride drops/tablets” (74.8%) were also undesirably rated very effective/effective compared to other fluoride mechanisms, such as “fluoride dentifrices (only 63.5%).

In the questionnaire, 2 procedures were deleted about caries prevention in adults: “dietary fluoride drops/tablets” and “fluoride rinse administered at school”. The first procedure is usually applied to children, and the second is impossible for people who have already finished school. Similar to the results of the children sector, both “professional prophylaxis” and “flossing” were also rated very effective/effective by more than 85%. None of the other procedures was rated very effective/effective by more than 70% of respondents. For example, only 54.3% reported that “pit and fissure sealants” and 60.6% that “fluoride dentifrices” were very effective/effective.

When asked to identify which of the 16 procedures is the most effective in caries prevention in children (Table 4), 28.6% and 24.6% respectively identified “community water fluoridation” and “pit and fissure sealants”. In addition, 24.0% identified sealants as the second priority, which made sealants the highest percentage when the percentages of the first and second choices were added together. On the other hand, “professional prophylaxis” (28.0%) and “flossing” (20.6%) were the first and second choices for effectively preventing caries in adults. The third highest choice was “community water fluoridation” (12.6%). However, only 2.3% and 8.6%

of dentists respectively recognized “fluoride dentifrices” as the most important prevention measure for caries in children and adults.

Caries prevention practices

Dentists were asked about the percentage of their young patients who applied sealants (Table 5). As many as 44.0% of dentists said the percentage was < 10%. Another 21.7% fell into the 11%~25% category. Only 4 of 175 dentists (2.3%) mentioned that they applied sealants to more than 75% of their young patients. When asked to indicate all the reasons why their young patients did not receive sealants (Table 6), more than 60% of dentists indicated that “patients have difficulty understanding the value of sealants” and “patients are unwilling to pay for the procedure”. Thirty-six percent of dentists indicated that “parents are unfamiliar with the procedure”. All other reasons were indicated by < 20%, such as “sealants do not last very long” (16.0%) and “decay can develop under a sealant” (13.1%).

Dentists were also asked how frequently they provided topical fluoride treatments to patients in different age groups (Table 7). Nearly 55% reported providing more than 2 topical fluoride treatments per year to children under 13 years, and only 17.1% for adolescents 13~19 years old. Only 5.7% of dentists provided topical fluoride for children 1 time or less a year. The percentage of this frequency increased as the age of the patients increased. About 10% of dentists did not provide topical fluoride when the patients were older than 13 years.

When asked to indicate the application times of various types of fluoride used (Table 8), about 30% of the dentists provided a 1-min treatment for all types of fluoride, and also provided a 4-min treatment for APF or NaF gel. There were 17.7% and 34.9% of dentists who provided a NaF rinse in 30 s and 1 min, respectively. To apply fluoride varnish, 18.3% and 25.1% of dentists respectively used 30 s and 1 min. However, 23%~45% did not answer the questions because they did not provide the treatment.

Discussion

The knowledge of dentists was evaluated according to the correct answers of the 19 statements listed in Table 2. Some of the statements were incorrectly answered by most dentists. For example, only 21.8% correctly disagreed/strongly disagreed that “lactobacilli play a more significant role in the initiation of smooth surface carious lesions than do mutans streptococci”. Unfortunately, as few as 14% of US and 17.8% of Korean dental hygienists correctly answered this statement.^{10,11} The lowest percentage of a correct response for this statement was reported from the survey of Korean dentists (only 12.7%).⁹ These studies suggest that many dental healthcare personnel in the US, Korea, and Taiwan do not know that mutans streptococci play a more significant role in initiating smooth surface lesions, which is a currently accepted theory.

Similar results were obtained with the 2 statements about the mechanisms of action of fluoride. Only 5.3% of US dental hygienists correctly disagreed/strongly disagreed with the statement “the most important mechanism of action of fluoride is that it is incorporated into developing teeth to make them more resistant to acid demineralization”, which was also the one with the lowest correct answer rate (12.0%) among 19 statements by Taiwanese dentists. Even for the correct statement, “the most important mechanism of action of fluoride is the remineralization of incipient decay”, only 58% of US dental hygienists agreed/strongly agreed.¹¹ In our study, 70.3% agreed/strongly agreed with both statements. These 2 statements conflict with each other, and thus it might be difficult for some participants to correctly answer both statements.

Individuals who correctly strongly agreed or strongly disagreed might tend to be more knowledgeable than those who ticked agree or disagree. The latter group might just be basically hedging their bets or might not be sure of the answer. The clearest statement response should be “newly erupted molars are the most important candidates for sealants”, with which 28% of Taiwanese dentists strongly agreed. The statement with the worst response was “adults benefit from the use of fluorides”, with which only 5.2% strongly agreed. Actually, fluoride should benefit all people in preventing dental caries regardless of age. However, it is necessary to check or revise the contents of courses and information about caries etiology and prevention measures,

especially those statements with low percentages of correct responses in the current study, and in the US and Korean studies.⁹⁻¹¹

Major strides have been made in decreasing the decayed, missing, and filled teeth (DMFT) index of children 12 years old worldwide since the 1970s.¹⁵ However, dental caries remain a major health concern for many countries, including Taiwan. While many people in the world have received the benefits of effective caries prevention practices,¹⁶⁻¹⁸ none in Taiwan have access to fluoridated water or fluoridated salt.

The British have the best condition with a value of the DMFT index of < 1 .¹⁶ They regard fluoridated toothpaste as the most important reason for brushing the teeth twice a day, which was recognized as being effective for children and adults by only 63.5% and 60.6% of Taiwanese dentists, respectively. In areas of the UK with high values of the DMFT index, several preventive procedures were implemented including water fluoridation, fluoride varnishes, and fluoridated milk. In our study, only 76.6% of dentists regarded professional topical fluoride as being effective for children, and 57% of dentists recognized it as being beneficial for adults. Among dentists who recognize the effectiveness of topical fluoride, the majority seldom apply it to patients in Taiwan. In addition, there is still no fluoridated milk in Taiwan.

Although the effectiveness of sealants for children was recognized by near 90% of participants (Table 3), parents in Taiwan have to pay for the procedure. This economic consideration was the second major reason (63.4%) that Taiwanese children did not receive sealants (Table 6). The most prevalent reason (66.9%), “patients have difficulty understanding their value”, indicates that more efforts need to be made to educate and communicate with governments, dentists, and parents. On the other hand, children in Taiwanese elementary schools could receive high-dose fluoride rinses once a week at school. However, no more than 60% of dentists perceived its effectiveness (Table 3).

Conclusions

A portion of Taiwanese dentists seemed to have limited up-to-date information about certain topics of caries prevention. The frequency of practices of caries prevention, such as topical fluoride and sealants did not match their effectiveness as perceived by participants. As oral health professionals, dentists and dental hygienists have a responsibility to use evidence-based knowledge to guide their practice. Findings from this Taiwanese study were consistent with previous Korean, Iranian, and US studies among dentists and dental hygienists. It would be better if additional efforts are made to provide more-effective preventive and educational practices to the public, and these practices should be consistent with the most recent scientific evidence.

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Table 1 Background information and professional characteristics of participating dentists.

Group	<i>n</i>	Percentage (%)
Gender		
Male	130	74.3
Female	45	25.7
Practice type		
General	133	76.0
Specialty	42	24.0
Age (yr)		
24-30	72	41.1
31-40	37	21.1
40-50	30	17.1
51-60	24	13.7
>60	12	6.9
Year graduated		
1951-1970	12	6.8
1971-1980	20	11.4
1981-1990	33	18.9
1991-2000	29	16.6
2001-2008	81	46.3
Years of practice		
1-10	107	61.1
11-20	38	21.7
21-30	22	12.6
31-40	8	4.6
Working hours per week		
<10	11	6.3
11-20	11	6.3
21-30	30	17.1
31-40	67	38.3
41-50	38	21.7
>50	11	6.3
N/A	7	4.0
Interested in continuous education on caries prevention		
Yes	89	50.9
No	31	17.7
Not sure/undecided	55	31.4

Table 2 Percentage distribution of dentists' responses to statement of knowledge of etiology and prevention of caries. The order of the statement is according to the percentage of correct responses. For each statement, * indicates the correct response.

Statement	SA/Agree (SD/ Disagree)	Strongly agree (SA)	Agree	Disagree	Strongly disagree (SD)	Don't know	No response
Newly erupted molars are the most important candidates for sealants.	91.4	28.0*	63.4	5.1	1.7	0.0	1.7
Decreased salivary flow increases the risk of developing caries.	90.3	25.7*	64.6	6.9	1.1	0.0	1.7
It is desirable to use professionally applied fluorides for all children in areas without fluoridated water.	89.2	14.3*	74.9	8.0	0.0	1.7	1.1
Incipient carious lesions (before cavitation) can be remineralized (healed).	89.1	9.7*	79.4	6.3	0.0	2.3	2.3
Levels of salivary microorganisms may indicate levels of caries risk or activity.	86.8	9.1*	77.7	10.3	0.0	0.6	2.3
Sealants are not needed if patients receive topical fluorides.	(85.2)	0.6	12.6	74.3	10.9*	0.6	1.1
The most important mechanism of action of fluoride is the remineralization of incipient decay.	82.9	10.3*	72.6	14.3	0.0	1.7	1.1
Root surface caries is an emerging problem.	82.8	9.7*	73.1	12.6	0.6	0.6	3.4
Dilute, frequently administered fluorides are more effective in caries prevention than more-concentrated, less-frequently administered fluorides.	82.8	9.7*	73.1	8.6	1.1	4.6	2.9
Removal of plaque is more valuable for maintaining gingival health than for preventing caries.	81.7	15.4*	66.3	14.9	2.3	0.6	0.6
Fructose, glucose, and sucrose are cariogenic.	80.0	9.1*	70.9	14.9	2.3	0.6	2.3
Adults benefit from the use of fluorides.	76.5	5.2*	71.3	20.1	0.0	1.7	1.7

Use of sealants is not substantiated by scientific research.	(76.5)	0.0	14.9	65.1	11.4*	5.1	3.4
Dental caries is a chronic, infectious disease process.	76.0	9.1*	66.9	20.6	0.6	1.1	1.7
Loss of sealants is generally attributed to inappropriate application techniques.	70.8	9.7*	61.1	25.7	1.1	1.1	1.1
The quantity of sugar consumed is more important in causing caries than the frequency of sugar consumption.	(57.7)	2.3	36.6	40.0	17.7*	1.7	1.7
Sealants are somewhat risky because decay may be sealed in the tooth.	(47.5)	2.9	45.1	40.6	6.9*	1.7	2.9
Lactobacilli play a more-significant role in initiating smooth surface carious lesions than do mutans streptococci.	(21.8)	7.4	60.6	18.9	2.9*	8.0	2.3
The most important mechanism of action of fluoride is that it is incorporated into developing teeth to make them more resistant to acid demineralization.	(12.0)	12.0	73.1	10.9	1.1*	1.1	1.7

Table 3 Percent (%) distribution of dentists' responses to statements on the perceived effectiveness of preventive procedures in children and adults.

Item	Very effective/Effective		Somewhat effective		Not effective		Don't know		No response	
	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult
Pit and fissure sealants	89.1	54.3	8.0	33.7	0.0	5.7	0.6	1.7	2.3	4.6
Professional prophylaxis	87.5	88.0	8.0	6.9	0.6	0.6	1.1	0.6	2.9	4.0
Flossing	84.6	85.7	10.3	8.0	1.1	2.3	1.7	0.6	2.3	3.4
Infrequent sugar consumption	78.3	68.0	14.9	22.3	2.3	4.0	1.7	0.6	2.9	5.1
Community water fluoridation	76.6	61.7	19.4	25.1	0.0	7.4	1.1	1.7	2.9	4.0
Topical fluorides professionally applied	76.6	57.1	19.4	33.1	0.0	5.1	0.6	0.0	3.4	4.6
Dietary fluoride drops/tablets	74.8	-	20.0	-	0.6	-	2.3	-	2.3	-
Fluoride dentifrices	63.5	60.6	30.9	30.3	2.3	4.6	0.0	1.1	3.4	3.4
Fluoride gel in a mouth guard	63.4	50.8	27.4	36.0	2.9	7.4	1.7	0.6	4.6	5.1
Nutritional counseling	59.4	53.1	30.3	34.9	3.4	5.1	1.7	2.3	5.1	4.6
Fluoride varnishes	58.8	51.4	22.9	32.0	1.7	5.1	11.4	6.9	5.1	4.6
Fluoride rinse given at school	57.7	-	36.6	-	2.9	-	0.0	-	2.9	-
Fluoride rinse used at home	57.7	53.8	33.7	35.4	2.9	5.1	0.6	0.6	5.1	5.1
Brush-on fluoride gels	57.7	46.2	34.3	40.6	1.7	6.9	2.3	1.1	4.0	5.1
Fluoridated salt	37.2	37.1	40.0	39.4	6.3	10.9	12.0	5.7	4.6	6.9
Tooth brushing without a fluoride dentifrice	29.2	34.3	33.7	37.7	25.7	18.3	5.7	4.6	5.7	5.1

Table 4 Percentages of preventive procedures considered by Taiwanese dentists as the most effective in preventing caries in children and adults.

Priority	Children				Adults			
	1st	2nd	Total	Order	1st	2nd	Total	Order
Community water fluoridation	28.6	9.1	37.7	2	12.6	8.6	21.2	-
Pit and fissure sealants	24.6	24.0	48.6	1	7.4	5.1	12.5	-
Professional prophylaxis	14.3	9.7	24.0	-	28.0	20.6	48.6	2
Infrequent sugar consumption	8.0	8.0	16.0	-	6.3	10.3	16.6	-
Flossing	4.6	11.4	16.0	-	20.6	31.4	52.0	1
Dietary fluoride drops/tablets	5.1	8.0	13.1	-	-	-	-	-
Topical fluorides professionally applied	3.4	8.6	12.0	-	2.9	4.6	7.5	-
Fluoride dentifrices	2.3	5.7	8.0	-	8.6	7.4	16.0	-

Table 5 Distribution of the percentages of children patients to whom sealants were applied by each dentist.

Percentage of patients applying sealants	<i>n</i>	%
none	9	5.1
≤10%	77	44.0
11%~25%	38	21.7
26%~50%	28	16.0
51%~75%	12	6.9
>75%	4	2.3
N/A	7	4.0
Total	175	100

Table 6 Percentage of reasons that child patients did not receive sealants as indicated by the dentists.

Reason	Percent (%)
Patients have difficulty understanding their value.	66.9
Patients are unwilling to pay for the procedure.	63.4
Parents are unfamiliar with the procedure.	36.0
Sealants do not last very long.	16.0
Decay can develop under a sealant.	13.1
Equipment and materials are too expensive.	10.9
Office policy does not support the use of sealants.	6.3
They are too time consuming to apply.	5.1
The technique is too difficult.	5.1
Use of sealants are unsubstantiated by research	4.6
It is possible to seal in decay.	3.4
It is more economical to place amalgam fillings as needed.	2.9

Table 7 Frequency of topical fluoride treatments provided to patients in each age group (percentage distribution).

Age group (year)	Once a year	2 per year	More than 2 per year	Only if they have caries	Do not provide	N/A
1 Children (<13)	5.7	21.7	54.9	10.9	2.3	4.6
2 Teenagers (13-19)	37.7	27.4	17.1	2.3	10.3	5.1
3 Adults (20-64)	56.6	14.9	5.7	3.4	12.6	6.9
4 Elderly (≥65)	61.1	10.9	6.9	3.4	10.9	6.9

Table 8 Application time of each type of fluoride for in-office treatments (percentage distribution).

	Type of fluoride	Application time				N/A	total
		30 s	1 min	2 min	4 min		
1	APF gel	8.0	31.4	5.7	31.4	23.5	100
		10.5	41.0	7.5	41.0		100
2	APF foam	12.0	24.0	12.0	10.3	41.7	100
		20.6	41.2	20.6	17.1		100
3	NaF gel	6.9	25.7	5.1	28.0	34.3	100
		10.5	39.1	7.8	42.6		100
4	NaF rinse	17.7	34.9	6.3	4.0	37.1	100
		28.1	55.5	10.0	6.4		100
5	SnF ₂	10.3	31.4	7.4	6.3	44.6	100
		18.6	56.7	13.4	11.4		100
6	Fluoride varnish	18.3	25.1	6.3	9.7	40.6	100
		30.8	42.3	10.6	16.3		100

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