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Caregivers' understanding of fluoride varnish: implications for future clinical strategies and research on preventive care decision making

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Abstract

Objective.—To describe caregivers' understanding of fluoride varnish.

Methods.—We administered the Oral Health Literacy Inventory for Parents within a pediatric dental clinic (N=113). Caregivers were asked to read and define each item. Interviews were audio recorded, transcribed, and coded inductively. The main analyses focused on responses to “fluoride varnish” and were conducted at the response level.

Results.—Of the 140 responses, 22.1% of the responses indicated lack of knowledge, 23.6% that it was for teeth, 8.6% as something in toothpaste or water, and 45.7% as something that helps teeth. About 52.7% of responses indicated lack of knowledge, incomplete, or incorrect understanding. At the caregiver-level, 50.4% did not know what fluoride varnish was or provided an incomplete or incomplete response.

Conclusion.—Many caregivers have an incomplete or inaccurate understanding of fluoride varnish, which has implications for how healthcare providers communicate about preventive care and future research on caregiver decision making.

Introduction

Fluoride is a safe and effective caries prevention treatment [1]. However, one study indicates that 13% of caregivers have refused fluoride treatment [2]. Dentists report fluoride refusal rates are increasing [3]. The reasons why caregivers refuse fluoride have not been fully elucidated, although concerns about safety and necessity, social media, and information from the Internet may play a role. Another potential reason is incomplete understanding of fluoride and how various fluoride sources synergistically help to prevent tooth decay [4].

The goal of this study was to document caregivers' understanding of preventive dental care for children with an emphasis on fluoride varnish. The knowledge generated from this study is expected to help develop strategies healthcare providers can use to communicate more effectively with caregivers about preventive dental care, improve the process by which caregivers make preventive care decisions, and address fluoride refusal behaviors linked to oral health inequalities [5].

Method

Study population and data.

This investigation was part of an oral health literacy study of caregivers of preschool-aged children under age 6 years recruited from **two** private dental practices in Washington state. **Caregivers of children presenting for a preventive (recall) or treatment visit were approached and recruited from February to August 2012. Inclusion criteria included: ability to provide consent, ability to communicate in English, and having a child in the study age range.** We administered the Oral Health Literacy Inventory for Parents (OH-LIP), a 36-item word inventory that measures an individual's understanding of dental concepts [6]. **After obtaining written consent, a trained research assistant with a dental degree** administered the OH-LIP in English. Caregivers were asked to read and define each word aloud. Those unable to provide a definition were encouraged to guess by the interviewer. Caregivers completed a self-administered 16-item sociodemographic questionnaire. **A \$10 gift card was given to caregivers at the end of the study visit.** This study was approved by the University of Washington Institutional Review Board.

Data analysis.

Responses were audio recorded, professionally transcribed verbatim, and verified for accuracy. A multi-phased process based on content analytic methods was used to analyze caregivers' responses to the term "fluoride varnish". All responses were unitized by noun and verb phrases. Compound sentences were broken into component parts and coded separately. Each unit of analysis was coded. No units were discarded. Open coding was used to analyze, compare, and categorize each unit [7]. The units of analysis were organized according to the manifest meaning of the words [8]. The categories were labeled with emic words drawn from the participants' own words and corresponding definitions were developed and refined. For more complex categories, subcategories were identified. The categories were then organized into domains. All data were examined to assure no overlap between categories or between domains.

Results

Descriptive statistics.

There were 119 participating caregivers, six of whom did not provide a response to "fluoride varnish". Of the remaining 113 caregivers, most were female (84%), under age 36 years (82%), self-identified as Caucasian or White (76%), and non-Hispanic (88%) (Table 1). All participants had completed at least some high school and over half (61%) had completed at least some college. The majority spoke English at home (83%). Most (68%) had a household income under \$40,000 per year.

Qualitative responses.

One-hundred-forty responses were provided by 113 caregivers. Each response was classified into one of four domains (Table 2).

I don't know.—Thirty-one responses (22.1%) indicated the caregiver did not know what fluoride varnish was. Some stated they had never heard of fluoride varnish. Eight responses specifically indicated lack of familiarity with the word “varnish”.

Something put on teeth.—Thirty-three responses (23.6%) indicated fluoride varnish as something that is put on the teeth, a coating or covering for the tooth, or a rinse or a liquid for teeth. A few described it as something added to children's teeth and the need to wait before eating or drinking afterwards. Eight responses were incorrect or incomplete.

Something in toothpaste or water.—Twelve responses (8.6%) identified fluoride varnish as something in toothpaste or water. These responses correctly describe fluoride, but not fluoride varnish.

Something that helps your teeth.—Sixty-four responses (45.7%) responses described fluoride varnish as something that provided a positive benefit for teeth. This included protecting the teeth, keeping teeth healthy, and preventing cavities. Most responses correctly identified fluoride varnish as a substance that protects the teeth and keeps them healthy. One response indicated that fluoride varnish helped with sensitivity. Twelve responses indicated that fluoride varnish was a substance used to clean teeth, clean out germs, or treat gingivitis. Two responses indicated fluoride varnish as a tooth whitener. Three responses indicated fluoride varnish as a tooth sealant material. Twenty-two responses were incorrect.

Accuracy of knowledge.

At the response level, 52.7% of responses indicated lack of knowledge, incomplete, or incorrect understanding of fluoride varnish. At the caregiver level, 57 caregivers (50.4%) did not know what fluoride varnish was or provided a response that was incomplete or incorrect.

Discussion

One-in-two caregivers in our study were unable to explain what fluoride varnish was or provided an incomplete or incorrect explanation, which is a concern given the extent to which fluoride varnish treatments have diffused into clinical practice. Incomplete or incorrect responses were one of three types: 1) modality (varnish versus liquid or rinse); 2) how it prevents dental disease; and 3) fluoride varnish received as part of professional dental visits versus fluoride found in toothpaste and water.

Our findings suggest the need to improve the way how providers communicate with caregivers about fluoride varnish. This could occur in three ways. The first is to introduce caregivers to fluoride varnish using a tell-show-do approach. This is an opportunity to explain how varnish is different from older modalities of professional fluoride (e.g., gels, foams) and how varnish improves topical therapeutic benefit. Some caregivers may not understand words like varnish. Showing fluoride varnish to caregivers prior to application and using alternative terms like vitamins may help introduce the concept of fluoride varnish to unfamiliar caregivers. Second, there is a need to explain to caregivers how fluoride varnish helps prevent tooth decay, which can be facilitated with pictures or video materials. Third, clinicians should differentiate the roles of various fluoride modalities (e.g.,

professionally applied fluoride varnish, toothpaste, fluoridated water) and how each modality has a caries prevention role in high-risk children. An important message is the unique but synergistic role of professionally applied fluoride varnish and fluoride found in toothpaste and water [5]. These explanations could help to proactively alleviate caregiver concern about why fluoride varnish is indicated for a child who is already exposed to other fluoride sources. Simple health communication strategies that account for health literacy could improve caregivers' understanding of fluoride varnish [9].

One assumption is that improved knowledge and literacy about fluoride varnish lead caregivers to make optimal decisions about preventive care for their children [10]. However, the growing number of caregivers who refuse or are hesitant about fluoride varnish underscores the importance of additional strategies that go beyond improving knowledge [3]. There is a need for brief tools that providers can use to screen caregivers for fluoride hesitancy, which are currently unavailable. Other instruments are needed to identify the behavioral and social factors beyond knowledge gaps that explain why caregivers are hesitant. These factors include concerns about necessity and safety, misperceptions about risk, and misinformation circulated online and through social media. Information about why caregivers are reluctant about fluoride could help providers implement tailored strategies to address fluoride refusal behaviors.

This is one of the first known qualitative studies to examine caregivers' understanding of fluoride varnish. However, there were **four** main limitations. **First, the study was conducted in a single private dental practice, which limits external generalizability.** Our data indicate there was socioeconomic variation within the practice, especially in terms of income and caregiver education. Future studies should be conducted in multiple settings, especially community health centers, to help broaden the racial, ethnic, and economic background of participants.

Second, the OH-LIP is not a comprehensive oral health literacy assessment tool. Additional tools are needed to assess caregivers' understanding of dental concepts and therapies like fluoride varnish.

Third, we encouraged caregivers who did not know what fluoride varnish was to guess, thereby potentially leading to an artificially inflated number of incorrect or incomplete responses. However, the response- and caregiver-level analyses indicated that the proportion of incorrect or incomplete responses were similar.

Fourth, we did not collect data on whether caregivers in the study had refused fluoride varnish nor do we know the prevalence of fluoride hesitancy within this study population. Future research should continue to elucidate the extent to which caregivers who accept fluoride are hesitant, which represents an important subgroup of caregivers who may be susceptible to the factors that drive fluoride refusal.

In conclusion, we examined caregivers' understanding of fluoride varnish. **We found that one-in-two caregivers have an incomplete or inaccurate understanding of fluoride varnish, which leaves open the possibility of inadequate knowledge and low oral health literacy as potential determinants of fluoride refusal behaviors.** The goal of this work is

to inform future strategies to improve health communication and literacy-based approaches to help caregivers make optimal preventive care decisions for their children and prevent inappropriate fluoride refusal behaviors. There is a need to further improve our understanding of how caregivers perceive and understand fluoride varnish. Future researchers could use this information to develop: 1) screening tools to identify caregivers likely to refuse topical fluoride; 2) diagnostic instruments to clarify why caregivers refuse including but not limited to knowledge gaps. These efforts are expected to help guide efforts to meaningfully prevent dental disease in high-risk children and address oral health disparities that disproportionately affect vulnerable populations.

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Table 1

Sociodemographic characteristics of participating caregivers of children under age 6 years in a private pediatric dentistry clinic in Washington (N=113 caregivers)

Characteristic	Categories	N (%)
Caregiver sex	Female	96 (84)
	Male	14 (12)
Caregiver age (years)	18–25	32 (28)
	26–35	61 (54)
	36–45	17 (15)
	46–55	3 (3)
Caregiver race	Caucasian or White	79 (76)
	African-American, African, or Black	5 (5)
	American Indian or Alaskan Native	1 (1)
	Native Hawaiian or Pacific Islander	7 (5)
	Asian or Asian American	8 (7)
	Other	4 (4)
Caregiver ethnicity	Hispanic or Latino	13 (12)
	Not Hispanic or Latino	99 (88)
Caregiver education	Some high school	13 (12)
	High school diploma or GED	31 (27)
	Some college	36 (32)
	College degree	33 (29)
Language spoken at home	English	97 (83)
	Other	20 (17)
Annual household income	<\$10,000	19 (17)
	\$10,000-\$39,000	57 (51)
	\$40,000-\$69,999	24 (21)
	\$70,000-\$99,999	11 (10)
	\$100,000 or above	1 (1)

Table 2

Summary of caregivers' qualitative responses to the term "fluoride varnish" when administered the Oral Health Literacy Inventory for Parents (N=140 responses)

Domain	Category	Subcategory	Sample quote
I don't know	I don't know what that means (n=31)	Generally don't know (n=23)	I don't know that. I don't know what that means. I don't know what fluoride means.
		Don't know what varnish is (n=8)	-
Something put on teeth	Something they put on teeth (n=33)	Generally put on teeth (n=11)	I think they put it on your teeth when they clean them.
		Rinse or liquid (n=8)	It would be like a rinse.
		Paint, coating, covering (n=14)	With kids, they paint it on.
Something in toothpaste or water (n=12)	Something in toothpaste (n=7)		Fluoride, I think, is something inside the toothpaste.
	Something in water (n=5)		I know fluoride is in the water.
Something that helps your teeth (n=64)	Protects the teeth (n=25)	General protectant (n=16)	I guess it's something for your teeth, to protect it.
		Protectant rinse or added to body, paste (n=3)	They rinse their mouth with it. It protects them. Something that you add into your body to help protect your teeth. It's a paste that goes over the teeth to protect the teeth from gingivitis.
		Protective coating (n=6)	Protective coating for the teeth.
	Keeps your teeth healthy (n=10)	Generally keep teeth healthy (n=7)	Stuff to keep your teeth healthy.
		Variations on keeping teeth healthy (n=3)	Something you brush on your teeth to, I don't know, help make them healthy. So I'm going to guess something to help your teeth for the sensitivity. I know fluoride is that stuff they use to kind of keep the vitamins on your teeth.
	Helps prevent cavities (n=9)		I guess it's a fluoride treatment or it's a treatment that they put on your teeth that helps for cavities.
	What they use to clean your teeth (n=16)	General cleaning (n=10)	Something you put on your teeth to clean it.
		Clean germs or dirt (n=1)	Something that can clean out germs.
		Clean gingivitis (n=2)	It's a product used t...clean gingivitis.
		Whitening substance (n=3)	It's like stuff that they put on your mouth to make your teeth white.
	Seals the tooth (n=4)		That's a type of sealant to me, because they put fluoride on your teeth to seal them.