

Fluoride Supplementation Adherence and Barriers in a Community Without Water Fluoridation



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ABSTRACT

BACKGROUND: To prevent early childhood caries, the American Dental Association recommends oral fluoride supplementation for children in communities lacking water fluoridation who are at high caries risk. However, patient adherence to oral fluoride supplementation has not been studied in this population. This study assessed adherence to oral fluoride and barriers to adherence in a community lacking water fluoridation.

METHODS: A self-administered survey was completed in a systematic sample of 209 parents of children aged 6 months to 4 years, during a primary care visit in an urban academic medical center. Participants reported frequency of administering oral fluoride to their children, as well as agreement or disagreement with proposed barriers to supplementation. Bivariate and multivariate analyses were used to assess adherence with oral supplementation and the association of barriers to supplementation and child receipt of fluoride on the day before.

RESULTS: More than half of parents either had not or did not know if their child had received fluoride on the day before. Approximately 1 in 4 of parents had given fluoride in 0 of the previous 7 days. Difficulty remembering to give fluoride and agreeing that the child does not need extra fluoride were associated with not receiving fluoride on the day before.

CONCLUSIONS: Adherence to oral fluoride supplementation in the primary care setting is low. Difficulty remembering to give fluoride daily is the greatest barrier to adherence. Further research on interventions to reduce common barriers is needed to increase fluoride administration and reduce early childhood caries in communities lacking water fluoridation.

KEYWORDS: adherence; community water fluoridation; early childhood caries; fluoride

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WHAT'S NEW

Adherence to oral fluoride supplementation is low. Difficulty remembering to give fluoride is the most common barrier. Oral supplementation may not be an adequate alternative to community water fluoridation.

EARLY CHILDHOOD CARIES (ECC) is defined by the American Academy of Pediatric Dentistry as evidence of current or previous tooth decay in a child 6 years of age or younger.^{1,2} ECC is a growing public health problem, particularly for populations of lower socioeconomic status. The impact of ECC on children and families is significant, including decreased quality of life due to pain, increased missed school days for children and missed work days for parents, avoidance of certain foods and beverages as a result of pain, and increased risk of weight loss.³ Pediatric clinics are often the first opportunity to intervene in children's oral health, and pediatricians generally appreciate their role in prevention ECC.⁴

Fluoride has been shown to prevent ECC through not only a microbial effect, affecting the carbohydrate metabolism of cariogenic bacteria such as *Streptococcus*

mutans, but also by a barrier effect, inhibiting demineralization and promoting remineralization of enamel.^{1,5–7} The American Academy of Pediatrics,⁸ the Centers for Disease Control and Prevention (CDC),⁹ and the US Preventive Services Task Force (USPSTF)¹⁰ recommend the use of fluoridated toothpaste for all children starting at tooth eruption regardless of caries risk. The CDC,⁹ American Academy of Pediatric Dentistry,¹ and the American Dental Association (ADA)¹¹ recommend fluoride varnish only for young children at high risk of caries, whereas the American Academy of Pediatrics (AAP)⁸ and USPSTF¹⁰ recommend application of fluoride varnish to all infants and young children in the primary care setting starting after tooth eruption.

In communities that lack adequate natural fluoride in the water, the ADA recommends community water fluoridation (CWF) as the most effective way of ensuring that all children get adequate fluoride exposure. Over 200 million people in the United States drink fluoridated water,¹² and there is robust evidence to suggest that CWF is effective and safe.^{13–16} However, in 2014, over 30% of the US population did not have access to fluoridated drinking water. Specifically, only 22.6% of the population in

Oregon was receiving fluoridated water in 2014.¹⁷ In communities without water fluoridation, the ADA, USPSTF, and AAP recommend oral fluoride supplementation in addition to topical fluoride varnish for children aged 6 months to 6 years for children who are at high caries risk.^{6,8}

CWF has received increased legislative attention in the past few years, with some cities failing to pass water fluoridation mandates and others removing fluoride from their water supply.^{18–21} Opponents of CWF cite a number of objections including health concerns that have been largely unsubstantiated,¹³ as well as philosophical objections about whether municipalities should use the water supply to promote public health goals.^{22,23} Opponents of CWF cite oral fluoride supplementation as a superior alternative to CWF because it allows for parental and family autonomy.²² However, oral fluoride supplementation is most effective if it is consistently given during tooth development, and limited data suggest that adherence to oral fluoride supplementation among young children is low.^{24–26}

There is reason to believe adherence to oral fluoride supplementation may be poor: adherence to other forms of caries prevention, such as tooth brushing, fluoride rinsing, and flossing is not high,²⁷ and adherence to other forms of dietary supplementation such as vitamin D is also poor.^{25,26,28} Understanding rates of adherence to oral fluoride supplementation could be helpful in determining whether recommending and prescribing fluoride supplements is an effective preventive strategy for ECC. In addition, understanding parents' barriers to adherence may help target interventions designed to maximize adherence.

The primary objectives of this study were thus to determine current adherence to oral fluoride supplementation recommendations and to determine barriers to adherence in a community lacking water fluoridation.

PATIENTS AND METHODS

SURVEY ADMINISTRATION

A sample of 209 parents or other primary caregivers (hereafter "parents") of children aged 6 months to 4 years were surveyed at an academic medical center–based primary care clinic in Portland, Oregon, a city lacking CWF. The clinic serves an urban underserved patient population, where approximately 70% of children are on Medicaid and a high proportion have special health care needs. As a result, most children are at high caries risk,²⁹ and oral fluoride supplementation is routinely prescribed. The age group was chosen such that children were old enough to meet recommendations for fluoride supplementation but too young to receive fluoride supplements at school, thus reflecting adherence at home. The sample size was chosen so that the primary outcome of interest (percentage of children who had received an oral fluoride supplement on the day before the survey) could be estimated with <10% uncertainty based on an a priori estimate that 70% of children would have the outcome and using 95% confidence intervals.

Parents whose children were attending a physician visit and who reported being prescribed fluoride by a physician in the past year were approached by a study research assistant and asked to complete a 5-minute self-administered survey. Parents completed the survey only once and reported data on only 1 child per family; if more than 1 child was eligible, caregivers were asked to complete the survey for the youngest eligible child. The survey was available in English and Spanish; bilingual oral administration was offered if necessary. The survey was systematically offered to all eligible clinic patients twice per week from March to October 2014. Caregivers who participated in the survey were offered a free toothbrush and tube of toothpaste as a thank-you gift for participating. The toothbrushes and paste were donated by the Oregon Health and Science University School of Dentistry. The Oregon Health and Science University institutional review board approved the study.

SURVEY CONTENT AND MEASURES

Survey domains included oral fluoride supplement administration practices, barriers to supplement administration, use of oral health services, and child and parent sociodemographics. To our knowledge, there are no validated scales or items assessing oral fluoride supplementation or barriers to oral fluoride use by parents to children; as a result, the study team constructed new items through an iterative process. We used an item from the 2011 National Survey of Children's Health to assess frequency of preventive dental care.³⁰ The survey comprised 20 questions including yes/no, multiple-choice, agreement/disagreement, and demographic questions.

SUPPLEMENT RECEIPT

To assess whether families had received oral fluoride supplements, parents were asked if their child had ever been prescribed fluoride by a primary care provider in the past 12 months, and if so, whether they were able to "get the fluoride supplement at the pharmacy." Only children whose parents reported receiving a prescription and filling it at a pharmacy were included in the main analytic sample, although some analyses considered all families who had received a prescription.

FREQUENCY OF ORAL FLUORIDE SUPPLEMENTATION

We used 2 measures of supplement adherence. The first measure assessed receipt of fluoride in the prior week by asking, "Over the past 7 days, how many days did your child receive fluoride?" Parents could mark any number of days between 0 and 7. The second measure assessed if the child had received fluoride the day before the survey by asking, "Did your child receive fluoride yesterday?" Parents could answer yes or no.

BARRIERS TO FLUORIDE SUPPLEMENTATION

Parents used a 4-point Likert scale to report their agreement or disagreement with statements about possible difficulties with fluoride supplementation

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