

Fluoride Supplement Prescribing and Dental Referral Patterns Among Academic Pediatricians

Michael W. Roberts, DDS, MScD*; Martha Ann Keels, DDS, PhD§; Michael C. Sharp, MD‡; and Jasper L. Lewis, Jr, DDS, MS||

ABSTRACT. *Objective.* To determine how well the current fluoride supplementation schedule was known by academic pediatricians and to examine the fluoride supplement prescribing and dental referral practices among primary care faculty pediatricians at four medical centers.

Setting. Four university medical centers in North Carolina.

Subjects. Primary care faculty pediatricians.

Method. A questionnaire pretested for clarity was distributed to all identified full-time primary care pediatric faculty (42 members).

Results. A total of 40 completed questionnaires were returned. Thirty-seven (93%) primary care faculty pediatricians reported that they routinely addressed the need for fluoride supplements for their patients, but only 28 (70%) determined the fluoride content of the drinking water before prescribing supplements. Thirty-five (87.5%) began supplements at the correct age, but fewer knew the correct doses for children of various ages. Only 23 (58%) referred their patients for oral examination and preventive care before the age of 36 months, contrary to American Academy of Pediatrics recommendations.

Conclusions. Pediatricians in an academic setting would be expected to be more knowledgeable of current recommendations than those in private practice. Failure to know and teach correct fluoride supplement recommendations and failure to recommend early professional dental involvement can result in less than optimum oral health. *Pediatrics* 1998;101(1). URL: <http://www.pediatrics.org/cgi/content/full/101/1/e6>; fluoride, pediatricians, dental.

ABBREVIATIONS. AAPD, American Academy of Pediatric Dentistry; AAP, American Academy of Pediatrics.

Pediatricians and family physicians have the opportunity to affect the oral health of children because of their early and frequent contact during well-child and chronic condition visits.^{1,2} Children <5 years of age see a physician more often than they do a dentist.³ Two effective ways of preventing

caries in children are ensuring that they receive the recommended amount of dietary fluoride and that they are under the care of a dentist.^{4,5}

Fluoride can increase the resistance to caries, but too much fluoride can result in dental fluorosis.^{6,7} The goal is to achieve a level of fluoride exposure that maximizes the benefits while minimizing the risk. Dietary fluoride supplementation is recommended for children living in areas with less than optimum fluoride in the drinking water supply.^{8,9}

The current dietary fluoride supplement schedule was adopted by the Council on Dental Therapeutics of the American Dental Association in April 1994¹⁰ and is presented in Table 1. Subsequently, this new guideline was accepted by the American Academy of Pediatric Dentistry (AAPD) the same year¹¹ and the American Academy of Pediatrics (AAP) in 1995.¹² The new supplement schedule represented a significant change from previous recommendations. The age of the child and the amount of fluoride recommended were adjusted to be more conservative. Shulman and coworkers¹³ have suggested that body weight rather than chronological age defines the average dose needed by growing children, but this means of determining the appropriate fluoride dose for an individual child has yet to be adopted.

The perception that many physicians continue to prescribe fluoride supplements inappropriately is a concern among many health care professionals.¹⁴ The present study was designed to determine 1) how well the current fluoride supplementation schedule has penetrated the academic pediatric community; 2) what the fluoride prescribing practices are among primary care pediatricians; and 3) what the dental referral practices are among primary care pediatricians at four university medical centers in North Carolina.

METHODS AND MATERIALS

Support for this study was obtained from the chairs/division chiefs of the Departments of Pediatrics at East Carolina University, Duke University, Bowman-Gray (Wake Forest), and the University of North Carolina. The names of the primary care faculty providers were obtained from the departments. Table 2 presents the questionnaire that was pretested for clarity and distributed to all full-time primary care pediatric faculty members identified at the four university medical centers between August 1996 and November 1996. A follow-up request was made to all pediatricians who did not respond to the initial mailing. Each survey participant was given a self-addressed envelope for return of the completed questionnaire.

From the Departments of *Pediatric Dentistry, School of Dentistry, and ‡Pediatrics, School of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; §Departments of Surgery and Pediatrics, Duke University Medical Center, Durham, North Carolina; and ||DDS, Private Practice.

Received for publication Mar 3, 1997; accepted Aug 11, 1997.

Reprint requests to (M.W.R.) Department of Pediatric Dentistry, School of Dentistry, CB# 7450, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-7450.

PEDIATRICS (ISSN 0031 4005). Copyright © 1998 by the American Academy of Pediatrics.

TABLE 1. Dietary Fluoride Supplementation Schedule (Revised 1994)

Age of Child	Fluoride in Home Water (Parts Per Million)		
	<0.3	0.3-0.6	>0.6
Birth to 6 months	0*	0	0
6 Months to 3 years	0.25	0	0
3-6 Years	0.5	0.25	0
6-16 Years	1.0	0.5	0

* Milligrams of fluoride per day.
Jointly endorsed by the American Academy of Pediatrics, the American Academy of Pediatric Dentistry, and the American Dental Association.

RESULTS

Completed questionnaires were received from 40 of the 42 primary care pediatricians identified, a response rate of 95%. Seven of the physicians reported that they saw patients <12 hours per week; eight reported 12 to 20 hours of clinical activity per week; 13 attended clinic 21 to 30 hours per week, eight reported 31 to 40 hours of patient contact/week, and 4 reported ≥41 hours per week.

Thirty-seven respondents (93%) stated that they addressed routinely the need for fluoride supplements for their patients. Only 28 physicians (70%) determined the fluoride content of their patients' drinking water before prescribing supplements. However, 6 of the 12 who prescribed supplements without knowledge of the fluoride content of the drinking water recommended that the fluoride content of the water supply be determined as soon as possible through various local and state public health agencies or by referring to information provided by a state agency.

The pediatricians were asked when dietary fluoride supplements should begin. Five (12.5%) stated incorrectly that fluoride supplements should begin at birth. The remaining 35 (87.5%) answered correctly that fluoride supplementation should begin at 6 months of age or on eruption of the first primary tooth. A summary of their responses is presented in Table 3.

The respondents were also asked to identify the correct dietary fluoride supplements to children who consumed nonfluoridated drinking water in their homes. Thirty-six participants (90%) responded correctly that 0.25 mg of fluoride per day is the recommended dosage for a child <3 years of age, 19 (48%) recognized that 0.5 mg of fluoride per day from 3 to 6 years of age was correct, and 22 (56%) correctly identified that 1.0 mg of fluoride per day was appropriate for children from 6 to 16 years of age. Eleven (28%) of the pediatricians identified higher levels of dietary fluoride supplements for a given age group than are recommended.

Table 4 summarizes the pediatricians' reported recommendations relative to their patients being seen first by a dentist for an oral examination. None recommended that a child be seen before their first birthday. Twenty-three (58%) referred their patients to a dentist between the ages of 13 and 35 months of age for their first oral examination, and 17 (43%)

TABLE 2. Survey Questionnaire

1. Which is your primary medical center affiliation?
 - ___ 11. Bowman Gray School of Medicine
 - ___ 12. Duke University Medical Center
 - ___ 13. East Carolina University Medical Center
 - ___ 14. University of North Carolina Hospitals
2. Circle your title:
 - ___ 21. Pediatrician ___ 22. Other
3. Are you a primary care provider in pediatrics?
 - ___ 31. Yes ___ 32. No*

* If your answer is "no" to question #3, stop here and return this survey in the enclosed self-addressed envelope.
4. How many clinical hours a week do you practice pediatrics?
 - ___ 41. 0-11 ___ 44. 31-40
 - ___ 42. 12-20 ___ 45. 41 or more
 - ___ 43. 21-30
5. Do you address routinely the need for fluoride supplements for your patients?
 - ___ 51. Yes ___ 52. No
6. Do you determine routinely the fluoride content of the patient's drinking water before prescribing fluoride supplements?
 - ___ 61. Yes ___ 62. No
7. If you answered "no" to question 6, do you routinely begin fluoride supplements and then recommend the drinking water be tested for fluoride content?
 - ___ 71. Yes ___ 72. No
8. What is the means by which you determine the fluoride content of your patient's drinking water? (Check all that apply)
 - ___ 81. Have it tested by state health department
 - ___ 82. Have it tested by county or city health department
 - ___ 83. Map/list of known fluoridated public water systems
 - ___ 84. Test water in my own office/clinic.
9. Please indicate what you believe to be correct regarding fluoride supplementation for children on drinking water/systems that contain no detectable level of fluoride (<0.10 parts per million F).
 - ___ 91. Fluoride supplements should begin at birth
 - ___ 92. 6 months of age or eruption of first primary tooth
 - ___ 93. 12 months of age
 - ___ 94. 24 months of age
10. Please indicate what you believe is the current total daily recommended level of fluoride ingestion for children? (Check all that you believe correct)
 - ___ 101. 0.25 mg fluoride until age 3 years
 - ___ 102. 0.50 mg fluoride until age 3 years
 - ___ 103. 0.50 mg fluoride from age 3 until age 6 years
 - ___ 104. 1.0 mg fluoride from age 4 until age 16 years
 - ___ 105. 1.0 mg fluoride from age 7 until age 16 years
11. At what age do you recommend that your patients have their first oral examination by a dentist?
 - ___ 111. Before their first birthday
 - ___ 112. 13-35 months of age
 - ___ 113. 36 months of age or older

TABLE 3. Reported Fluoride Supplementation

When Supplements Should Begin if Indicated	Positive Responses
At birth	5
6 Months of age/eruption of first tooth	35*
12 Months of age	0
24 Months of age	0
Dosage of Fluoride Supplementation (Indicate All Correct Answers)	Positive Responses
0.25 mg of fluoride until age 3 years	36*
0.5 mg of fluoride until age 3 years	4
0.5 mg of fluoride from age 3 to 6 years	28*
1.0 mg of fluoride from age 4 to 6 years	7
1.0 mg of fluoride from age 6 to 16 years	22*

* Correct response.

TABLE 4. First Oral Examination by a Dentist

Examination Recommended	Positive Responses
Before first birthday	0*
13–35 Months of age	23†
≥36 Months of age	13

* AAPD recommendation.

† AAP recommendation.

reported delaying referral to a dentist until their patients were ≥36 months of age.

DISCUSSION

The survey instrument used in the present study was completed at leisure by the respondents. A possibility exists that some participants sought out the correct answer to a question before completing the questionnaire. To the extent that this bias exists, the number of correct responses would be overstated. This would suggest that the data report a best-case scenario.

It was encouraging to discover that 93% of the responding primary care pediatricians reported addressing routinely the fluoride needs for their patients. However, it was disturbing to note that many reported prescribing fluoride supplements without first determining the level of fluoride content in the home drinking water and that 12.5% of the physicians believed that fluoride supplementation should begin at birth. This finding could exacerbate the increase in the prevalence of fluorosis reported recently.^{7,15–19}

The current recommendation that children <3 years of age receive 0.25 mg of fluoride per day was recognized by most respondents, but less than half identified correctly that the correct dose for children 3 to 6 years of age was 0.5 mg per day, and only slightly more than half acknowledged that the correct daily amount of fluoride for children 6 to 16 years of age was 1.0 mg of fluoride per day. These findings suggest that a number of pediatricians were still following pre-1994 guidelines. The most recent recommendations have not optimally penetrated the academic primary care pediatric community. This is consistent with similar studies before 1994.^{20,21} It would be expected that pediatricians in an academic

setting would be more up to date than those in private practice. So if, these knowledge gaps exist in academics, then the voids are likely to be larger among practitioners. There is a need for public health and dental authorities to increase the awareness of all primary care physicians concerning the correct supplement recommendations to optimize the benefits of fluoride to the growing child.^{22,23}

The AAP and AAPD differ in their recommendations about the age at which a typical child should have its first oral examination by a dentist.^{24,25} None of the respondents reported referring their patients to a dentist before the first birthday, as recommended by the AAPD. It is obvious that the primary care pediatricians participating in this survey do not embrace the AAPD's oral health policy on this issue. However, it is of greater concern that <60% of the pediatricians surveyed follow the AAP's recommendation regarding the referral of children by 3 years of age to a dentist for an oral examination. This failure negates the opportunity for dentists to initiate early preventive measures for the child and has often led to the misuse of the nursing bottle, resulting in bottle/nursing caries, and failure to initiate appropriate age-related oral hygiene practices.

CONCLUSION

The appropriate use of fluoride supplements is a public health issue. Professional organizations and state health agencies need to be aggressive in the dissemination of the appropriate water testing guidelines and dietary fluoride supplementation recommendations.

Primary care pediatricians on medical school faculties at university medical centers can have significant impact on medical students and pediatric residents. Failure to know and teach the correct fluoride supplement recommendations and failure to encourage early professional dental involvement can result in less than optimum oral health for the child patient. Physicians should be encouraged to refer their patients to a dentist at an early age for well-child and preventive care.

ACKNOWLEDGMENT

This study was supported in part by Project MCJ-379494 from the Maternal and Child Health Bureau, Health Resources and Services Administration, Department of Health and Human Services.

REFERENCES

1. Lokshin MF. Preventive oral health care: a review for family physicians. *Am Fam Physician.* 1994;50:1677–1684
2. Clark MM, Album MM, Lloyd RW. Preventive dentistry and the family physician. *Am Fam Physician.* 1996;53:619–626
3. Office of the Inspector General. *Children's Dental Services Under Medicaid. Access and Utilization.* Washington DC: US Department of Health and Human Services publication OEI-09-93-00240; 1996
4. US Preventive Services Task Force. *Guide to Clinical Preventive Services: An Assessment of the Effectiveness of 169 Interventions.* Baltimore, MD: Williams and Wilkins; 1989
5. Subcommittee on Fluoride of the Committee to Coordinate Environmental Health and Related Programs. *Review of Fluoride—Benefits and Risks.* Washington, DC: US Department of Health and Human Services; 1991
6. US Public Health Service. Report on fluoride benefits and risks. *MMWR.* 1991;40:1–8

7. Lalumandier JA, Rozier RG. The prevalence and risk factors of fluorosis among patients in a pediatric dental practice. *Pediatr Dentistry*. 1995;17:19–26
8. Levy SM. Expansion of the proper use of systemic fluoride supplements. *J Am Dent Assoc*. 1986;112:30–34
9. US Department of Health and Human Services, Public Health Service. *Fluoridation Census 1985*, Atlanta, GA: Centers for Disease Control; 1985
10. Council on Scientific Affairs, American Dental Association. Association report on dietary fluoride supplements. *J Am Dent Assoc*. 1995;126(suppl):1S–10S
11. American Academy of Pediatric Dentistry, Dental Caries Committee. Protocol for fluoride therapy. *Pediatr Dentistry*. 1994;16:27. Special issue
12. American Academy of Pediatrics, Committee on Nutrition. Fluoride supplementation for children: interim policy recommendations. *Pediatrics*. 1995;95:777
13. Shulman JD, Lalumandier JA, Grabenstein JD. The average daily dose of fluoride: a model based on fluid consumption. *Pediatr Dentistry*. 1995;17:13–19
14. Newbrun E. Current regulations and recommendations concerning water fluoridation, fluoride supplements, and topical fluoride agents. *J Dent Res*. 1992;71:1255–1265
15. Levy SM, Bawden JW, Bowden BS, Rozier RG. Fluoride analyses of patient water supplies requested by North Carolina health professionals. *Am J Public Health*. 1984;74:1412–1413
16. Pendrys DG, Stamm JW. Relationship of total fluoride intake to beneficial effects and dental fluorosis. *J Dent Res*. 1990;69:529–538
17. Clark DC. Trends in prevalence of dental fluorosis in North America. *Community Dent Oral Epidemiol*. 1994;22:148–152
18. Pendrys DG, Katz RV, Morse DE. Risk factors for enamel fluorosis in a nonfluoridated population. *Am J Epidemiol*. 1996;143:808–815
19. Pendrys DG. Risk of fluorosis in a fluoridated population. *J Am Dent Assoc*. 1995;126:1617–1623
20. Dillenbergs JS, Levy SM, Schroeder DC, Gerston EN, Andersen CJC. Arizona providers' use and knowledge of fluoride supplements. *Clin Prev Dent*. 1991;14:15–26
21. Rigilano JC, Friedler EM, Ehemann LJ. Fluoride prescribing patterns among primary care physicians. *J Fam Pract*. 1985;21:381–385
22. Levy SM, Rozier RG, Bowden JW. Use of systemic fluoride supplements by North Carolina dentists. *J Am Dent Assoc*. 1987;114:347–350
23. Levy SM, Muchow G. Provider compliance with recommended dietary fluoride supplement protocol. *Am J Public Health*. 1992;82:281–283
24. American Academy of Pediatric Dentistry, Oral health policies. Infant oral health care. *Pediatr Dent*. 1996;18:25
25. American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine. Recommendations for preventive pediatric health care. 1995;96:373–374

Fluoride Supplement Prescribing and Dental Referral Patterns Among Academic Pediatricians

Michael W. Roberts, Martha Ann Keels, Michael C. Sharp and Jasper L. Lewis Jr
Pediatrics 1998;101:e6
DOI: 10.1542/peds.101.1.e6

Updated Information & Services

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/101/1/e6>

References

This article cites 18 articles, 4 of which you can access for free at:
<http://pediatrics.aappublications.org/content/101/1/e6#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Dentistry/Oral Health
http://www.aappublications.org/cgi/collection/dentistry:oral_health_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®



PEDIATRICS[®]

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Fluoride Supplement Prescribing and Dental Referral Patterns Among Academic Pediatricians

Michael W. Roberts, Martha Ann Keels, Michael C. Sharp and Jasper L. Lewis Jr

Pediatrics 1998;101:e6

DOI: 10.1542/peds.101.1.e6

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/101/1/e6>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 345 Park Avenue, Itasca, Illinois, 60143. Copyright © 1998 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN[®]

