

# Fluoride Prescribing Patterns Among Primary Care Physicians

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Fluoride supplement prescribing habits of US Air Force primary care physicians were studied. A questionnaire was sent to all active duty Air Force obstetricians, family physicians, and pediatricians assigned within the continental United States. Few obstetricians and family physicians in the Air Force currently prescribe prenatal fluoride supplements. The majority of respondents are skeptical of its efficacy or state that local water contains adequate amounts. Only 2.5 percent of all physicians question prenatal fluoride's safety. Fluoride supplements for breast-feeding infants are correctly prescribed by 80 percent of pediatricians and 54 percent of family physicians ( $P = .0002$ ). Pediatricians more often know the local concentration of fluoridated water and more readily prescribe fluoride for children of all ages. Primary care physicians, especially family physicians, are in an excellent position to practice caries prevention. The survey results indicate a need for more physician education on the current issues and proper use of fluoride supplements.

Dental caries is the most common chronic health problem of children. Ninety percent of American children experience dental caries by the age of 14 years.<sup>1</sup> The physical and psychologic impact of tooth decay and subsequent tooth loss can

be very significant. The direct economic burden is also substantial; in 1978 the American "dental bill" totaled \$10 billion with approximately 65 percent of the total spent for the treatment of caries and its sequelae.<sup>2</sup> Prevention of tooth decay should be a major concern of everyone involved in the health of children.

By the age of 5 years, only 10 percent of children have visited a dentist. However, the majority of American children have regular well-baby checkups, which puts the physician in an excellent position to practice caries prevention.<sup>2,3</sup> Recent studies indicate a salutary effect of prenatal<sup>4,5</sup> as well as postnatal fluoride supplements. The family physician may indeed be in the most favorable position to effect caries prevention.

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**Table 1. Recommended Fluoride Supplements\***

Age (years)	Concentration of Fluoride (ppm)		
	≤.3	0.3-0.7	≥0.7
0 to 2	0.25 mg/d	none	none
2 to 3	0.5 mg/d	0.25 mg/d	none
3 to 13	1.0 mg/d	0.5 mg/d	none

\*Current recommendations of the American Dental Association and the American Academy of Pediatrics

Fluoride is a naturally occurring element whose efficacy in preventing tooth decay was discovered in the late 1930s through numerous epidemiological studies culminating in the classic Dean study of 1946.<sup>6</sup> Children who grew up in areas with naturally fluoridated water were observed to have fewer cavities than children living in fluoride-free areas. Caries reduction correlated with increasing concentration of fluoride, but so did fluorosis, a cosmetic enamel defect that ranges in severity from minute white spotting to severe brown mottling.

An optimal level of 1.0 ppm of fluoride was arbitrarily selected as the public health recommendation for artificially fluoridating water because it provided a 50 to 60 percent reduction in caries while causing the least unacceptable fluorosis. It is, therefore, a somewhat subjective standard.

More than 100 million Americans have access to optimally fluoridated water and are thus afforded a 50 to 60 percent caries reduction. The other one half of the population receives little or no systemic fluoride unless it is prescribed by a physician or dentist.<sup>7</sup>

Experts agree that fluoride supplements are indicated when the water is suboptimally fluoridated. Table 1 depicts the current recommendations of the American Dental Association and the American Academy of Pediatrics.

These recommendations, as is the 1.0 ppm optimal standard, are based on attempts to produce the least fluorosis while still providing caries inhibition. Earlier regimens<sup>8</sup> with higher dosages produced an 80 percent caries reduction but the

reported 14 percent incidence of fluorosis was felt to be unacceptable.

More recently, some investigators recommended giving supplements to children without regard to whether the water is fluoridated.<sup>9</sup> This recommendation remains controversial. For children in whom dental problems may be of greater concern, such as hemophiliacs and the mentally retarded, supplementation should definitely be considered, as the risk of fluorosis is almost certainly justified.

Renewed interest in the use of prenatal fluoride supplements has been sparked by the work of Glenn and her associates<sup>4</sup> at the University of Miami School of Medicine. A 99 percent reduction in caries was described in those children whose mothers took supplemental fluoride during their pregnancy, with no fluorosis or medical or dental defects noted. The possibility of caries immunity seems at hand if Glenn's work is corroborated.

The purpose of this study was to determine whether Air Force physicians are currently prescribing fluoride supplements and to discover those areas where greater awareness might lead to improved patient care.

**Methods**

A one-page questionnaire and an addressed, stamped envelope were mailed to all active duty Air Force obstetricians, pediatricians, and family

physicians listed as board eligible or board certified. A total of 504 questionnaires were mailed.

Each physician noted his prescribing habits for fluoride for pregnant women, nursing infants, formula-fed infants, toddlers, and children. If fluoride was prescribed, the typical dosage was noted; if fluoride was not prescribed, the physician could write in the reason. The water fluoride concentrations in the community and at the military installation were requested.

Each physician was asked specialty affiliation, board status, year of graduation, and year of completion of residency. All questionnaires were scored by one investigator (J.R.). A scoring key used for correct dose of daily fluoride was 1.0 mg during pregnancy (as recommended by Glenn et al),<sup>4</sup> 0.25 mg for children aged under 2 years, 0.5 mg for children aged 2 to 3 years, and 1.0 mg for children aged 3 to 12 years.<sup>3</sup>

Local concentrations of fluoride were scored as adequate if the respondent indicated a concentration of 0.7 to 1.0 ppm or indicated the dental clinic or local authority certified the water as adequately fluoridated. All returned questionnaires were scored,\* and a chi-square 2 × 2 comparison test was used to analyze the results.

## Results

The overall response rate was 47 percent, ranging from 41 percent (family practice and obstetrics) to 56 percent (pediatrics).

There was no significant difference in the comparative frequency of "correct" prescribing of prenatal fluoride by family physicians and obstetricians (only about 10 percent in each group). Sixteen percent of family physicians assigned to a family practice residency program prescribe prenatal fluoride. Four percent of family physicians not practicing at a training site prescribe prenatal fluoride.

For all groups, pediatricians prescribed the appropriate fluoride dosage more frequently than

family physicians ( $P < .05$ ). Respondents were deleted from a second analysis if they indicated the local water had fluoride or if they did not provide care for children. Even with these exceptions a significant difference in prescribing patterns remained.

Some physicians indicated they prescribed supplements, but the amount prescribed was scored as inappropriate for the child's age. Misprescribing, as shown in Table 2, was increased among family physicians for all children.

Reasons for not prescribing fluoride supplements were also examined. Safety was rarely cited (six of 127) as a reason for not prescribing prenatal fluoride. Obstetricians most frequently stated they were unconvinced of the efficacy of prenatal fluoride, while among family physicians the most common reason was "the water already has fluoride." Similar reasons were given by pediatricians and family physicians for not prescribing fluoride supplements. Safety and availability of supplements were never cited. For nursing infants the most common reason for family physicians not prescribing was "water has fluoride." The most common reason among the ten nonprescribing pediatricians was "unconvinced of efficacy." For the other three categories of children, the most common reason for not prescribing was "water has fluoride."

Forty-two percent of family physicians either gave no response or stated "didn't know" when asked the concentration of fluoride in the local water supplies. In contrast, 26 percent of pediatricians "didn't know" or gave no response.

## Discussion

Few military physicians currently recommend fluoride supplements for their pregnant patients. The patterns of family physicians and obstetricians are similar in this regard. Safety does not seem to be an issue. Sodium fluoride tablets of 2.2 mg are available only by prescription, and although the Food and Drug Administration has not approved labeling for prenatal use, neither does the FDA consider such use "unsafe." Apparently

\*Copies of the questionnaire and scoring key are available upon request.

Table 2. Accuracy of Fluoride Dosage by Family Physicians and Pediatricians			
	Correct Dose Prescribed	Incorrect Dose Prescribed or Unspecified	Statistical Significance
	No. (%)	No. (%)	
Nursing infants			
Family practice	50 (71)	20 (29)	$\chi^2 = 9.28$ P = .002
Pediatrics	70 (91)	7 (9)	
Formula-fed infants			
Family practice	28 (70)	12 (30)	$\chi^2 = 5.70$ P = .017
Pediatrics	39 (91)	4 (9)	
Toddlers			
Family practice	19 (61)	12 (39)	$\chi^2 = 4.99$ P = .025
Pediatrics	37 (84)	7 (16)	
Children			
Family practice	14 (54)	12 (46)	$\chi^2 = 5.14$ P = .023
Pediatrics	35 (80)	9 (20)	

either military physicians are unaware of the Glenn study, which revealed impressive benefits, or they remain unconvinced.

While policy setters in the American Dental Association and the National Institutes of Health are skeptical of the efficacy of prenatal fluoride,<sup>10-13</sup> some clinicians believe it should be considered. Gift et al<sup>14</sup> surveyed 2,000 civilian physicians; of 933 respondents, 23 percent stated fluoride supplements should begin during pregnancy.

There is no question that further prospective studies on the use of prenatal fluoride are needed. Should these studies corroborate the work of Glenn et al, the FDA might be inclined to include prenatal use of fluoride as a labeled indication, which might be expected to increase prescribing. In the meantime, however, given that fluoride is unquestionably safe and low in cost (\$.60/month\*) and the potential benefits are so great, it seems reasonable to offer fluoride supplementation in pregnancy. Glenn et al recommend one tablet per

day with water (if given with other substances, chelation may occur) in the second and third trimesters even if the local water is optimally fluoridated.

Both the American Academy of Pediatrics and the American Dental Association recommend fluoride supplements for all breast-feeding infants. The amount of fluoride present in breast milk is negligible, not only in areas of optimally fluoridated water but in areas with excessive fluoride as well. Exactly when supplementation should begin remains controversial (eg, immediately vs 2 months of age), but experts agree that fluoride should be prescribed in a dosage of .25 mg/d for nursing infants. This survey shows that only 54 percent of family physicians are correctly prescribing fluoride supplements for nursing infants. In contrast, 80 percent of pediatricians correctly prescribe for this group. Residency education may be a significant factor in explaining why pediatricians are doing a better job. Who, then, is responsible for family practice resident education in this area—the family practice faculty or the pediatric faculty? Again, a joint effort is needed to

\*Based on military depot cost of \$22/1,000 tablets.

ensure proper instruction of residents in this most important aspect of well-baby care. Perhaps using fluoride supplementation as a quality assurance issue would further reinforce prescribing behaviors. Involving pharmacists in such a quality assurance program would provide another level of feedback to the prescriber.

Another misconception this survey uncovered is the belief by some physicians that commercially prepared infant formulas contain fluoride. It must be emphasized that these products contain no fluoride. Infants who receive ready-to-feed formulas should also be given 0.25 mg fluoride per day as should infants fed powdered and concentrated formulas prepared with suboptimally fluoridated water containing inadequate amounts.

Pediatricians more often indicated that they prescribe supplements for toddlers and children. Family physicians were more likely to state an incorrect dose or fail to state any dose at all. This suggests once again that greater educational efforts are needed.

All respondents were asked to write the local fluoride concentration both on base and in the local community. As was expected, obstetricians rarely knew, for the prescribing of prenatal fluoride is really not dependent on local concentrations (although fluoride is probably best not prescribed in areas of very high concentration). Family physicians and pediatricians have an equal obligation to be aware of the local fluoride concentration. Pediatricians, however, were much more likely to know the concentration or at least to indicate that they had checked to see that it was adequate.

Pediatricians and family physicians were compared in terms of board certification status and year of graduation from medical school and from residency training to determine whether these factors could account for the observed differences in prescribing patterns. The only statistical difference was that family physicians were more likely to be board certified.

Fluoride supplementation is an important preventive health measure with which all physicians should be familiar. In an area of consensus, such as fluoride supplements for nursing infants, all physicians are expected to know the issues and practice appropriately. Greater emphasis in the

training years that reinforces caries prevention is a task for all educators. Creative ways to reinforce physician behaviors, such as the protocol described by Messimer and Hickner,<sup>15</sup> can be effective in delivering fluoride supplements to children.

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