

Oral Fluoride Supplementation: Improving Practitioner Compliance by Using a Protocol

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Despite its proven benefit, oral fluoride supplementation has received little attention in the family practice literature. This study describes how one academically affiliated family practice, staffed by physicians knowledgeable in fluoride supplementation, failed to prescribe fluoride appropriately until a specific protocol was developed. Initially a pilot study consisting of a chart review and a mail and telephone survey was performed. The results indicated a compliance problem involving the physicians as much as the patients. Next, a detailed protocol for improving fluoride supplementation was developed that delegated responsibilities not only to the physicians but also to the receptionists, the nurses, and a physician's assistant. The protocol was initiated in July 1982. From July to October 1982, 40 at-risk children visited the clinic for assorted health care needs. A follow-up chart audit on these children revealed that 23 (58 percent) were currently taking fluoride, and 27 families (79 percent) had had their wells checked for fluoride. This study demonstrates the advantage of using a protocol with a team approach for increasing compliance with respect to oral fluoride supplementation.

The importance of oral fluoride supplementation in children with nonfluoridated drinking water has been recognized for years. This issue was addressed in an audiotape produced by Wayne State University entitled "Dental Caries Prevention: The Physician's Responsibility."¹ Among other

things, the discussion pointed out five significant facts regarding dental health. In 1976 dental caries cost an estimated \$5 billion. Calcification begins in most teeth prior to the third year of life. Only 10 percent of children see a dentist before the age of five years. The use of oral fluoride supplements from birth can lower caries incidence in children by 50 to 60 percent. Finally, it is the physician's responsibility to identify and treat children whose drinking water does not contain fluoride. Logically this responsibility must fall on the family physician or pediatrician, because it is he or she, more than

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any other, who plays a pivotal role in maintaining children's health.

Despite these facts and the recent national emphasis on preventive medicine, oral fluoride supplementation has received surprisingly little attention in the family practice literature. In 1980 Eggertsen et al published an article in *The Journal of Family Practice*, "An Updated Protocol for Pediatric Health Screening."² The protocol was excellent but neglected to address the issue of pediatric dental health in general and oral fluoride supplementation in specific. This oversight is mirrored by practicing physicians' lack of knowledge about fluoride supplements. In 1982 Siegal and Gutgesell³ conducted a survey of the use of oral fluoride supplements among physicians in Harris County, Texas, where 95 percent of practices are located in fluoride-deficient areas. In that study, over 60 percent of respondents either overestimated or were unsure of the fluoride content of the area water supplies. Thirty-five percent of respondents prescribed fluoride and, of those who did, less than 50 percent knew the correct dosage. The authors' conclusion was that more physician education was necessary to ensure optimal oral fluoride supplementation among children at risk. However, as the following study will show, even physician education may not be enough.

Methods

The setting for these studies was the Bay de Noc Family Health Center (BDN-FHC) in Escanaba, Michigan, a rural teaching practice that is part of the Michigan State University College of Human Medicine. There are two family physicians, a physician's assistant, and medical students caring for patients at this office. The Family Health Center serves approximately 3,000 patients in the Delta County area.

A significant number of families who live in rural areas of Delta County rely on wells for their drinking water. Most of these wells lack optimal levels of fluoride. Since 1978 the Family Health Center had endeavored to identify families whose primary source of drinking water comes from wells, to have these wells tested for fluoride content, and to institute the use of supplemental fluoride in infants and children of these families whenever warranted. No defined system was es-

tablished, however, to help accomplish these objectives. Effectiveness depended totally on the physician's ability to remember to prescribe fluoride during routine office visits.

Preprotocol Study

In the fall of 1981 a pilot study was conducted to determine the effectiveness of fluoride supplementation in the practice. The Family Health Center obstetric log was reviewed from August 1978 to September 1981. Of 173 children born, 86 children from 77 families had rural addresses and were therefore candidates for oral fluoride supplements. It was assumed that compliance would be best among these recently delivered children because the frequency of their visits was greater than that of other children in the practice. These children were studied by means of a chart audit and a mail survey. The medical records of these 77 families were reviewed to determine the number of children prescribed fluoride by the practice. Also, a six-question survey was mailed to the 77 families. Forty-four responses were received by mail, and 22 additional responses were obtained in telephone follow-up. Eleven families could not be contacted, and 3 families used city water, leaving 63 families with 69 children in this first survey. All of the families obtained their drinking water from wells.

Preprotocol Results

In the mail survey 17 of these 69 children (25 percent) were actually taking fluoride prescribed by the Family Health Center. Only 38 percent of the families had had their wells checked for fluoride content. Six families stated their children were taking fluoride prescribed by the BDN-FHC, but they had never tested their water for fluoride content; therefore, these children were at risk of developing fluorosis.

The chart audit revealed that only 22 of 86 children had received prescriptions for fluoride during the three-year period of the study. It is interesting to note that the majority of children, 17 out of 22, or 77 percent, stayed on their fluoride once it had been prescribed. These results suggested a problem of provider compliance more than patient

Table 1. Fluoride Checklist		Yes	No
Should this child be taking fluoride?		—	—
Has he/she ever been given fluoride?		—	—
Is he/she currently on fluoride?		—	—
If yes, indicate dose below.			
2 wk	2 mo	4 mo	6 mo
12 mo	2 yr	3 yr	4 yr
5 yr	6 yr	7 yr	8 yr
Fluoride content of well (PPM)	_____		
Date water tested	_____		

compliance. As a result, a new protocol was developed, and was instituted in July 1982.

The Protocol

The protocol utilized the entire staff including the nurses and receptionists. Prior to the institution of the protocol, the physicians, the physician's assistant, and the medical students had responsibility for the program. Under the new plan the receptionists were told to place a small flow sheet on the chart of every child eight years of age or younger, regardless of the reason for the visit (Table 1). The responsibilities of the nurses were as follows: (1) to initiate the fluoride program in a pregnant woman's third trimester by providing the mother with patient education materials regarding fluoride and with a bottle to test her water, (2) to briefly check fluoride flow sheets of all at-risk children to ensure that their water had been tested and they were taking the appropriate dose of fluoride, and (3) to renew fluoride prescriptions when appropriate. Responsibilities of the physicians, physician's assistant, and medical students were (1) to ensure that all at-risk children were taking fluoride in appropriate doses, (2) to monitor fluoride status at all visits, and (3) to document on the medication list in the patient's chart the type and dosage of fluoride preparation prescribed. This system was redundant by design. Responsibilities overlapped to increase the likelihood that a child at risk would be identified and managed properly. In addition, in July 1982, a fluoride fact sheet was distributed by mail to families at risk.

Postprotocol Study

The protocol was initiated in July, and a follow-up chart audit was performed in October 1982. In early October a computer list of the 170 rural families, with 284 children, at the Family Health Center was reviewed. Forty children from 34 rural families had been seen in the clinic during the follow-up study period of July to October. Charts of these families were reviewed. The presence of a fluoride flow chart indicating the dosage of fluoride prescribed or indicating that the patient's well had been checked for fluoride was considered evidence that the protocol was working. Eighty-eight percent of the charts fulfilled at least one of these criteria. In this follow-up chart review, 23 children (58 percent) had been prescribed fluoride. In addition, 27 families (79 percent) had their wells tested for fluoride.

Discussion

In the preprotocol survey of 69 children, only 17 children (25 percent) were taking fluoride prescribed by the clinic. When these findings are compared with the postprotocol group, 23 children (58 percent) were taking fluoride prescribed by the Family Health Center (Table 2). An additional 12 children (30 percent) were managed appropriately (Table 2): 2 received fluoride from their dentist, 3 were found to have adequate fluoride in their wells, and 7 had sent in water samples to be tested and were awaiting results. The total number of children managed appropriately, therefore, was 35

Table 2. Comparison of Study Groups 1 and 2

Studies	Preprotocol 1981	Survey	Postprotocol 1982
Data collection method	Chart review	Survey	Chart review
Number of families	77	63	34
Number of children	86	69	40
Children taking fluoride prescribed by Bay de Noc Family Health Center	22 (26%)	17 (25%)	23 (58%)
Families with wells checked for fluoride	No data	24 (38%)	27 (79%)

(88 percent). Another significant finding was that in the initial survey, only 38 percent of the families had had their wells tested for fluoride compared with 79 percent of families in the postprotocol group, indicating a marked improvement in the effectiveness of the health care provider at identifying and treating children needing fluoride supplements.

It should be noted that the preprotocol and postprotocol groups were not identical and that the sampling method was different. Firm conclusions about increased compliance resulting from the protocol therefore cannot be made. Compliance among the physicians, the physician's assistant, and the students may have been better partly because of increased emphasis resulting from the study itself rather than the protocol. Nonetheless, a trend toward improvement is evident and may be due, in part, to the protocol. A subjective impression is that the presence of the fluoride flow sheet on the chart is an excellent device to jog the memory.

The concept that using a protocol will enhance the effectiveness of an oral fluoride supplementation program is supported by this study. Others in the literature have found office protocols important for routine preventive health measures.^{2,4,5} A recent family practice study indicates that immunization status may be improved significantly by the implementation of methods similar to those outlined in this paper. In a recent article, Hansen⁴ states that "the key elements for successful elimination of rubella risk in a family practice appear to be the utilization of an ongoing approach to all patients at risk, during any care for which they present, as a part of everyday practice. . . ."

Utilization of a protocol improved rubella immunity in Hansen's residency-based practice from 30.5 percent to 95.2 percent in 18 months. The Hansen article and the study presented here suggest three important aspects of preventive health care in the family physician's office. Routine preventive health measures in many family practices are not delivered so effectively as one might believe. The use of protocols can enhance the delivery of routine preventive health care measures. Finally, overlapping responsibilities among staff members seems to increase the likelihood of positive results.

Several unexpected problems emerged during this study. First, it rapidly became apparent that there are several groups in the community prescribing fluoride supplements. Aside from physicians, there are dentists, the public health departments, and two local parent-teacher organizations with fluoride programs. The indications for fluoride administration, dosage administered, and length of treatment espoused by these groups varies, as does the efficacy of the different preparations they use. There are no established lines of communication among these groups. It would be surprising if this problem were isolated to Escanaba alone. The Family Health Center staff is entering into a dialogue with other health care providers and agencies who provide fluoride to the community's children. It is hoped that a community-wide standardization of protocol regarding oral fluoride supplementation will be realized.

Second, among other groups who prescribe fluoride, there does not seem to be a consistent

emphasis on testing well water for fluoride content, which is alarming because wells tested by the local state health department laboratory have ranged from a low of 0.0 parts per million up to 1.1 parts per million. If oral supplements are given to children with fluoride in their drinking water, it may result in dental fluorosis when ingested chronically and, in rare cases, might cause toxicity.^{6,7}

Third, one of the major impediments to getting children started in the oral supplemental fluoride program is the necessity of having well water tested at the state laboratory, which can result in, at best, a delay of weeks in starting fluoride and, at worst, losing the child to further follow-up. Effectiveness might be improved by obtaining a fluoride electrode for the office so that water can be tested and fluoride can be prescribed at the same visit.

Finally, it was found that the successful implementation of an oral fluoride supplementation program is a complex task for practitioner and patient alike. In many respects the problems are similar to those encountered in maintaining an antihypertensive regimen in an otherwise healthy young person. Besides detecting those at risk,

screening tests must be completed and daily medication given to an asymptomatic person. Benefits are realized only in the future. The physician, the physician's office staff, and the child's parents must collaborate closely over several years if the program is to be effective.

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