Challenges of and Strategies for Changing Prescribing Practices of Health Care Providers

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Abstract

Problems related to inappropriate prescribing practices of physicians in general are well recognized. Dietary fluoride supplements have been implicated as one of the contributing factors in an increase in dental fluorosis. Inappropriate prescribing practices of providers have been cited as a major factor in this implication. Numerous studies of physicians and dentists have documented a lack of knowledge and inappropriate prescribing practices regarding fluoride supplements. The purpose of this paper is to identify barriers to changing fluoride-prescribing practices of health care providers and to suggest strategies for implementing change. To increase optimal and appropriate use of fluoride supplements, educational interventions are necessary for all user groups—detail men and women, physicians, dentists, pharmacists, nurse practitioners, dental hygienists, and the public. In addition, environmental supports for the educational activities in the form of policy, regulation, standards of care, and guidelines are recommended for consideration. [J Public Health Dent 1999;59(4):275-81].

Key Words: dietary fluoride supplements, providers, changing prescribing practices, educational interventions, policy, guidelines, and regulations.

The use of prescription drugs in the United States is widespread and growing. According to the Prescription Trends Survey, more than 1.8 billion prescriptions were dispensed through retail pharmacies in 1992 (1). When properly prescribed and used, prescription items generally are assumed to be safe and nontoxic. Adverse side effects or drug interactions can occur, however, with inappropriate prescriptions and/or inappropriate use by patients. Effective use of prescription drugs largely depends upon: (1) appropriate prescribing practices by physicians, dentists, and other health professionals allowed to prescribe based on individual state practice acts; (2) appropriate dispensing by pharmacists; and (3) compliance with the regimen by patients or their caretakers in the case of young children or incapacitated individuals.

Improving the precision of prescribing drugs is an objective whose importance has increased with the proliferation of new medications and with recognition of the increased need to contain the overall costs of health care. Changing practitioners' behavior to follow currently recommended practices has long been a concern of the medical and dental professions (2-4). In the case of fluoride supplements, an added and compelling need is to ensure appropriate prescribing practices because the prevalence of dental fluorosis has increased over time and the use of supplements has been identified as a contributing risk factor (5-9).

As difficult as it may be to agree on a dosage schedule for dietary fluoride supplements for use in the United States, this task is relatively simple compared with its implementation and use on a routine basis. Except for purposes of establishing responsibility and liability, it is immaterial what a given dosage schedule is UNLESS the schedule is known and adhered to by all user groups. The real task before us, then, is to ensure that health care providers know the dietary fluoride dosage schedule and use it appropriately. In this paper I review the challenges that we will face in changing prescribing patterns of health care professionals, their prescribing practices and knowledge of dietary fluoride supplements, and strategies available to foster optimal use of dietary fluoride supplements.

Challenges to Change

Challenges to implementing a dosage schedule in the United States are multiple and complex. Change does not occur easily. Current fluoride prescribing practices may be based on several dosage schedules that have been advocated in the United States over the past 15 to 20 years (10). Both the American Dental Association and the American Academy of Pediatrics revised their respective dosage schedules in the late 1970s. Further, Trask published a dosage schedule for use in California in 1978 (11). And, more recently, the University of North Carolina and the state health department have advocated a reduced dosage schedule (12). Some practitioners have stopped prescribing fluoride altogether because of the concern about fluorosis, and there are those who never started.

Other challenges may include the misconception that dental caries is no longer a problem, so why bother to prescribe fluoride? This factor combined with what is referred to as the RIOT Syndrome—meaning, "Remember It's Only Teeth"—and the complexity of the schedule may be more than what those prescribing are willing to deal with. A further deterrent to appropriate prescription writing may be the need for a water analysis when the concentration of fluoride in the drinking water is not known. This factor may be especially problematic if there is a perceived lack of access to laboratories for water analysis at a reasonable cost.

Another factor that may be associ-

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ated with poor fluoride-prescribing practices is the lack of immediate feedback when incorrect prescriptions are dispensed. The time lag between the time the prescription is issued and when fluorosis is diagnosed in permanent teeth may inadvertently foster indifference on the part of those providing prescriptions. A similar challenge occurred with the inappropriate use of broad-spectrum antibiotics in children through the age of 8 years and trying to get physicians to change their prescribing practices (13,14).

Providers Prescribing Practices and Knowledge of Dietary Fluoride Supplements

Several studies have been published regarding the fluoride-prescribing practices of physicians or dentists (Table 1). The results of these studies are instructive in addressing challenges to changing prescribing practices. An early national survey of physicians—family practitioners and pediatricians—was conducted in 1978–79 to determine physicians' knowledge of and prescribing practices regarding dietary fluoride supplements (15). Two especially relevant findings should be noted. First, 11 percent of the pediatricians and 22 percent of the family practitioners reported that they did not prescribe fluoride supplements. Second, 46 percent who practiced in large fluoridated communities and 71 percent of the physicians in smaller fluoridated communities prescribed fluoride supplements (15).

A study conducted in 1979 in Harris County, Texas, among family practitioners and pediatricians found that 95 percent of the respondents practiced in communities whose water was fluoride deficient—yet over one-third indicated that the concentration of fluoride in the water was adequate and 25 percent were not sure. Approximately one-third of the physicians prescribed fluorides; of these, only 45 percent knew the correct dosage schedule (16).

Two national studies conducted by the American Dental Association (ADA) for the National Institute of Dental Research (NIDR) in 1982 surveyed dentists and physicians regarding caries-preventive procedures that included the prescription of dietary fluoride supplements (17,18). Seventy-nine percent of the physicians and 60 percent of the dentists reported prescribing dietary fluoride supplements for some of their patients. More pediatricians prescribed than did family practitioners. Physicians were far more likely to consider fluoride supplements as very effective than were dentists (37% vs 14%). More than 90 percent of both groups indicated that the amount of fluoridated water consumed was considered when prescribing systemic fluorides. Few physicians or dentists reported continuing fluoride supplement prescriptions through the teen years as recommended. Physicians were more knowledgeable than dentists regarding the age at which fluoride supplements should be started. Both types of health care providers underrated fluoride use in caries prevention compared with brushing and flossing.

A 1985 study conducted in Ohio among family physicians and pediatricians found that nearly 77 percent reportedly prescribed fluoride supplements for at least some of their patients (19). Pediatricians were more likely to prescribe fluoride supplements than were family physicians, and younger physicians were more likely to prescribe than were older practitioners. Nearly half of each specialty group indicated that they either did not routinely use information regarding fluoride content of the child's drinking water prior to prescribing fluoride supplements or, if they did, they relied upon the parents for the information. Only a small percentage of each group obtained water samples for fluoride analysis prior to prescribing fluoride supplementation when the fluoride content was unknown. Only 31 percent of the family physicians and 36 percent of the pediatricians continued prescribing fluoride supplements until at least age 10 years (19).

Jones and Berg (20) conducted a study among pediatric dentists and pediatricians in Houston, TX, in 1989 (20). Overall, 96 percent of the respondents reported prescribing fluoride supplements. Of these, 51 percent of the pediatricians and 61 percent of the pediatric dentists considered the fluoride content of the child's drinking water to be an important factor when prescribing fluoride supplements. Sixty-one percent of the dentists and 49 percent of the physicians used water fluoride analysis to determine a child's need for fluoride supplements.

Another study on providers' use and knowledge of fluoride supplements was conducted in Arizona in 1989 (21). Data were collected from dentists, physicians, physician assistants, pharmacists, dental hygienists, and nurse practitioners. Substantial proportions of all provider groups had a low level of knowledge about prescribing fluoride supplements. Overall, those who prescribed identified the correct dosage schedule for children only 32 percent of the time. Incorrect doses were selected 38 percent of the time and respondents indicated "not sure" 30 percent of the time. Of all health care providers, pediatricians were the most knowledgeable about prescribing fluoride supplements. Providers who reported to be adequately informed to prescribe or advise about fluoride supplements were twice as likely to correctly identify the optimal level of fluoride in drinking water and the correct fluoride dosage

TABLE 1
Knowledge, Opinions, and Practices of Providers Regarding Dietary Fluoride Supplementation, 1980–92

Authors (Ref.)	*N*	Response Rate (%)	% Who Prescribe	MD	DDS	Other
Margolis et al. (15)	2,604	49	Varied	X		
Gift & Hoerman (17)	4,000	75	79	X		
Gift & Hoerman (17)	2,000	49	60		X	
Siegle & Gutgesell (16)	238	56	35	X		
Jones & Berg (20)	153	62	96	X		
	47	66	96		X	
Kuthy & McTigue (19)	2,403	60	77	X		
Dillenberg et al. (21)	350	40	70	X		
	450	50	—		X	X

schedules.

A study conducted by Rigilano and colleagues (22) among military physicians found that pediatricians were more likely than family practitioners to prescribe fluoride supplements correctly for infants, toddlers, and children. Pediatricians also were more likely than family practitioners to know the concentration of fluoride in the drinking water and they were more likely to prescribe fluoride.

Levy and colleagues (23) determined provider compliance with a recommended dietary fluoride supplement protocol. Results of their study showed that about one-third of the child patients and 42 percent of their siblings did not receive the recommended fluoride dosage.

Only one published study was designed to determine if fluoride-prescribing practices of physicians could be changed (24). A pretest/posttest design was used with randomized groups and interval testing to assess the effect of two educational interventions. Family practice medical residents either viewed a videotape describing preventive dental regimens or received a specific set of instructions about the use of fluoride supplements. Physicians' knowledge about fluoride supplements was increased and maintained; however, daily chart audits showed no substantial increase in correct prescribing practices for either group. Appropriate prescribing was achieved only through individual resident monitoring by assigning a faculty member to each resident—a form of one-to-one education. Another study found that in a family practice setting, using a protocol and team approach was successful in appropriate fluoride-prescribing practices (25).

This review is not a critical analysis of these studies. The collective findings, however, suggest that many US physicians and dentists lack appropriate knowledge about dietary fluoride supplements and are not prescribing appropriately. Inappropriate prescribing practices are not unique to fluoride supplements; ample evidence shows that inappropriate prescribing practices are relatively common for drugs in general (26-29). According to a survey among pharmacists, the most common prescription error is the failure of those who are prescribing to specify dosage strength. The second most common error is the failure to provide correct directions for taking the prescription item (26). Major reasons for errors in prescription practices reported by pharmacists include: prescriber is too rushed, references are not checked, misunderstandings exist between pharmacist and nurse/receptionist, prescriber relies on pharmacist to catch errors, and similar-sounding drug names are confused.

Most research on the effective use of prescribed medications has focused on the compliance of patients with a specific regimen (30-33). An underlying tacit assumption of research focusing on patient compliance is that health care providers prescribe appropriately. More recently, increased attention has been directed to both the general public and health care providers on the need for appropriate prescriptions as well as compliance with the regimen on the part of the public.

This generalized problem of prescribing errors has been responded to by numerous attempts to change prescribing practices. Continuing medical education (CME) was initiated as one method of providing current knowledge on a broad variety of topics to busy health care providers. Traditional CME, however, has been widely criticized as ineffective for changing physicians' behaviors (34-36). More recently, attention has focused on providing individualized CME.

Studies have reported positive correlations between physician age, rural location, family or general practice, and lack of board certification and inappropriate or excessive prescribing practices (13,14). Attempts to change physicians' prescription-writing practices have had varied and sometimes disappointing results (24). The results of one study indicated that the rate of prescribing change by physicians was independent of their background characteristics including age, board certification, specialty, and location (rural vs urban) of practice (37). A recent report suggests that many physicians learn about new drugs from company sales representatives and journal ads, rather than from more formal means of education, such as continuing education (35). While this latter report disclosed questionable behavior on the part of physicians because they were receiving special favors in the form of free trips for themselves and their families, it did support the concept that direct, one-to-one "instruction" has a positive impact on prescribing behavior. The concept of using educational detailers is not new (3). Several experimental studies have provided CME in which "experts" have been used to provide education via conference telephone calls and individualized feedback via mail (38). Other studies have shown that continuing education in the form of individual feedback to physicians regarding their prescribing practices can be effective in changing prescribing behavior (39-43).

In a randomized controlled study, Avorn and Soumerai (41) showed that pharmacists can be effective individual educators in changing physicians' prescribing practices. In contrast, Manning and colleagues (42) found that physician-educators were better than pharmacist-educators in changing the prescribing practices of physicians. Major limitations of this study were that all the physicians included in the study were volunteers and the sample size was small.

Because fluoride prescriptions being provided for patients have recognized deficiencies, we need a written plan of action to implement appropriate prescribing practices—whether the dosage schedule is revised or remains the same. This plan must include and be relevant to all user groups. Its overall goal, specific objectives, and responsibilities need to be spelled out and agreed upon. Methods and approaches should focus on what is known to be effective; conversely, activities known to have little or no effect on changing practitioners' prescribing practices should not be used (44). The cornerstone of this health promotion effort must be appropriate education for all user groups including the general public, health care providers and students of each discipline, members of organizations, and relevant decision makers.

Health care providers cannot be expected to prescribe fluoride supplements appropriately when they lack knowledge about how to do so. Providers should be in a position to make informed and intelligent decisions about prescribing dietary fluoride supplements. Because education alone may be insufficient to achieve long-term change, policy and regulatory supports also should be considered at all appropriate levels (45).

Educational Approaches

Professional Schools and Teaching Hospitals. Schools and teaching hospitals for health care providers are primary gatekeepers of information for both undergraduates and graduates (46-48) (Table 2). These institutions are in a position to influence significantly the appropriate use of caries-preventive measures, including dietary fluoride supplements. Limited evidence suggests that graduates of a dental school in which the students are thoroughly indoctrinated in caries-preventive procedures report high use of the procedures in practice (49). All pre- and postdoctorate physicians and dentists should receive adequate didactic information, as well as opportunities to practice prescription writing and learn ways of educating patients to use fluoride supplements. Compliance with the regimen is fostered when providers communicate with their patients about the need for and importance of the prescription (50). All students need to know how to determine the concentration of fluoride in a patient's drinking water. Ideally, professional schools should have equipment to test the fluoride concentration of water samples. They also are major centers for providing continuing education; thus, courses on caries prevention or prescription writing could include information on dietary fluoride supplements. These skills and practices should be reinforced and emphasized during internships and residencies for health care providers who treat children.

Schools and teaching hospitals also should teach their students and graduates to take fluoride histories routinely for children from birth through the teen years (51). The purposes of this activity would be to help ensure that all children currently taking fluoride supplements are using the appropriate dosage and children who are not using fluoride supplements but should are provided a prescription. Further, students should learn how to counsel parents and children about the appropriate dosage schedule and their course work should include the importance of fluoride supplementation for achieving healthy teeth for a lifetime.

Industry. Industry has played a significant role in educating a variety of health care providers about the use of dietary fluoride supplements. To implement a revised fluoride dosage schedule or to use the current schedule appropriately, industry must continue its past efforts and improve or enhance specific practices (46). For example, firms that produce and market dietary fluoride supplements must implement effective educational and training sessions for their detail persons. This strategy is critical because detail people are influential regarding prescribing practices. In addition, industry should provide patient and practitioner inserts, provide alerts for dissemination via computer networks, and support scientific sessions regarding the revised dosage schedule at major relevant professional meetings as well as publication of subsequent proceedings.

TABLE 2
Strategies for Implementing a New Dosage Schedule

Education
- General public
  —Prescriptions Month (October), patient counseling, package inserts, articles in lay magazines, health newsletters
- Students of professional educational institutions and teaching hospitals
  —Emphasize in curriculum, including water analysis, prescription writing and patient counseling
- Members of Professional Organizations
  —Seminars, published articles, editorials, policy statements
- Industry
  —Staff (detail men and women) training, conferences, patient inserts

Advertisements

Policy, Regulation, and Organization
- Government—local, state, and federal
  —State, regional, and national boards
- Profile providers' prescriptions practices
- Require computer cross-checking programs in pharmacies
- Policies of professional associations
- Require education with prescriptions

Pharmacists and Pharmacies. Because pharmacists are the most accessible of all health care providers to the public, they can be primary gatekeepers to help prevent inappropriate prescription practices (52). Pharmacists can be important in ensuring appropriate drug therapy by identifying adverse drug effects and drug interactions and monitoring drug therapy (53,54). Their role in educating the public about prescription items has increased dramatically over the past few years. Most states apply the 1990 Omnibus Budget Reconciliation Act (OBRA) standards for individual patient counseling to all patients, not just to the required Medicaid patients. At least one state (California) has enacted legislation that requires mail-order prescription firms to provide counsel to patients about their medications (55).

This gatekeeping role might be in the form of educating prescribers and the general public (51). Other gatekeeping roles might include using computer software and networks. Although no objective in Healthy People 2000 is directly related, one objective (#12.5) related to our task is to "increase to at least 75 percent the proportion of pharmacies and other dispensers of prescription medications that use linked systems to provide alerts to potential adverse drug reactions among medications dispensed by different sources to individual patients" (56). Approximately 85 percent of all pharmacies now use computers to some degree in their operations. Moreover, software is available that could include fluoride prescriptions. Pharmacies that have computerized drug cross-checking programs should consider including dietary fluoride supplements. A program can be developed that cross-checks the age of a

child, amount of fluoride in the drinking water, and the dosage schedule. Computer programs used in pharmacies and in medical and dental offices also can help monitor compliance with the procedure by reminding providers to prescribe and parents when to refill a prescription, as well as providing educational messages about fluorides (52).

Educating the Public. Ample evidence exists to demonstrate that the US adult public is not very knowledgeable about fluorides in general (57,58), nor about dietary fluoride supplements in particular (59). Although the focus of this paper is on health care providers, it would be a major error to omit comments on the role of the public in reducing errors in prescribing practices. Today, patients are urged by multiple sources to ask their providers about the purpose, dosage, side effects, if any, and specific instructions regarding frequency and duration of taking any and all prescriptions. This approach of educating patients about fluoride prescriptions can only enhance the appropriate use of dietary fluoride supplements. Parents of children have a right and need to know what fluorides are, how they work, and the frequency and duration of their use. From the perspective of patient compliance, informed parents and children are more likely to comply with the lengthy regimen than those who are uninformed.

One event that might be used to link all user groups is "Talk about Prescriptions Month." This event is sponsored by the National Council on Patient Information and Education (NCPIE) and could be used to educate about the correct use of dietary fluoride supplements. This activity is the only national public health observance designed to improve communication between health care professionals and patients about prescriptions and their use. It is one approach that could help all user groups focus on the appropriate use of dietary fluoride supplements. "Talk About Prescription Month" should be considered by all of us as a means of creating awareness and providing correct information about fluoride preparations for the public and all health care providers.

Environmental Supports

In the context of health education and health promotion, environmental supports refers to the social, political, economic, organizational, policy, and regulatory factors that help achieve the desired behavior, which in this case is appropriate prescription writing (45). While there is some reluctance to using policy and regulatory measures to increase appropriate prescription writing practices, such measures currently are being considered or are already in place.

Licensure of Health Care Providers. One approach to increasing the likelihood of appropriate prescribing practices is to include the content area and skill in state, national, and regional board examinations of each respective discipline. In addition, appropriate medical and dental specialty boards could include questions about fluoride-prescribing practices. Without this emphasis the message is clear—the subject is just not important. Similarly, to help foster the use of the revised dosage schedule, states could require a special course on the topic prior to licensure renewal. Licensure boards also might be involved when prescription audits are used to monitor the appropriateness of prescriptions. This approach has been suggested and already may be in use in some states for physicians who treat elderly patients. Further, the ability to profile providers' prescribing behaviors can be a powerful tool of reinforcement, one that could improve the quality of fluoride prescriptions and ultimately the oral health of those who take supplements.

Other Environmental Supports. Other environmental supports that could affect fluoride-prescribing practices include regulation, legislation, or policy. For example, medical and dental associations might develop and distribute policy statements on the use of dietary fluoride supplements. Those organizations that have policy statements on fluoride supplements should revise them. States could require a water analysis before providing a prescription for dietary fluoride supplements when the fluoride concentration in drinking water is not known. Further, states could provide water assay services at or near cost. And states might consider requiring mapping of the fluoride concentration of independent water sources in their state.

Federal guidelines in all agencies that address health for children—for example, Head Start in the Department of Health and Human Services; the Women, Infants, and Children Program in the Department of Agriculture; and health clinics for dependents in the Department of Defense—could require specific training of health care providers vis-à-vis the new dosage schedule. In addition, these guidelines could require that water analysis be performed before providing a prescription in all cases where the fluoride content of the water is unknown. Coverage and reimbursement policies for fluoride supplements also might include requirements for water analysis where the fluoride content is not known.

Summary

Numerous studies have shown that prescribing errors, in general, are a problem in the United States. In addition, several studies have shown that physicians and dentists do not always prescribe fluoride supplements appropriately and do not necessarily have correct information about this preventive procedure. Whether there is a revised dosage schedule is recommended by this group or not, educational interventions are required for health care providers. Relatively few providers prescribe dietary fluoride supplements; fewer still adhere to a recommended protocol. Thus, to foster optimal use of dietary fluoride supplements, educational efforts must be directed to those who currently prescribe and those who do not.

The public at large is equally ill informed and deserves information for purposes of self-enlightenment as well as self-protection. Both educational and environmental supports are likely to be used increasingly in an era of health care reform that places emphasis on primary prevention. But we should not wait. The development and implementation of a plan is recommended for improving fluoride prescribing practices and concomitantly implementing a revised dosage schedule. This plan should be developed and implemented by all of us who are responsible for the public's health. Planned educational efforts appropriate for each target group with appropriate reinforcements are recommended at all levels for all publics, including detail persons, health care providers (including physicians, dentists, physician assistants, nurses,

nurse practitioners, dental hygienists, pharmacists), and the public. In addition, environmental supports in the form of regulations, standards of care, policies, or laws are suggested for consideration.

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