Elements in Oral Health Programs

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ABSTRACT

Demographically, dental caries remains the single most common disease of childhood. Various campaigns have been carried out to promote and to improve the oral health of children. However, the prevalence of dental caries was still more than 50% in many communities. This article reviews different approaches used in dental health programs in industrialized and developing countries. To build a comprehensive oral health preventive program, three elements are essential. They are oral health education/instruction, primary prevention measures and secondary prevention measures.

Demographically, dental caries remains the single most common disease of childhood.\(^1\) According to the Report of the U.S. Surgeon General in 2000, tooth decay is five-times more common than asthma and seven-times more common than hay fever. It affects more than one-fourth of U.S. children ages 2 to 5 and half of those ages 12 to 15.\(^2,3\)

The World Health Organization (WHO) also considers dental caries the most important global oral health burden. And a global strategy for preventing oral health diseases was formulated and endorsed in 2000 by the Fifty-third World Health Assembly.\(^4,5\) Before that, the WHO had partnered with the Fédération Dentaire Internationale (FDI) to formulate global goals for oral health to be achieved by the year 2000.\(^6\) One of the goals was to declare 50% of 5- to 6-year-olds free of dental caries. Various campaigns have been carried out to promote and to improve the oral health of children to reach the goal. However, the prevalence of dental caries was still more than 50% in many communities.

It is not only children in developing countries, but those in developed countries with low socio-economic status as well who suffer from a similar pattern of dental decay. For instance, in the United States, about half of all children and two-thirds of children ages 12 to 19 from low-income families have had dental decay.\(^7\) Nevertheless, many reports suggest there was a decline in dental caries in the past decades observed in many developed countries as a result of a number of public health measures, coupled with changing living conditions, lifestyles and improved self-care practices. However, it must be stressed that dental caries, as a disease, is not eradicated but only controlled to a certain degree.

Oral Hygiene in Children

Poor oral hygiene leads to the development of gingivitis. Epidemiological studies have found that oral hygiene in children is worse in developing countries and in low socio-economic groups.\(^7,8\) Gingivitis can be prevented by practicing good personal oral hygiene practices, including brushing and flossing, which are also impor-
tant in controlling the advancement of periodontal lesions. The 2001 Grant Makers in Health Issue Dialogue observed that “One proven strategy for reaching children at high-risk for dental disease is providing oral and dental health services in school-based health centers.”

The American Dental Association (ADA) also addresses the fact that tooth decay remains the single most common chronic disease of children. Resolution 38H-2010, passed by the ADA House of Delegates, recognizes the benefits of school-based oral health programs in preventing and controlling dental caries in children and adolescents. In fact, a number of community oral health programs for children have been conducted in school/kindergarten. Some examples are the ones in Milwaukee, WI, Brazil and Ecuador. To facilitate the operation of these community oral health programs, the involvement of school staff, community clinics, dental hygienists and health educators is feasible and appropriate.

**Elements in Oral Health Programs**

There are three main elements in most oral health programs. They are: oral health education/instruction; primary prevention measures, which can be chairside and non-chairside; and secondary prevention measures, which refer to early detection and treatment. Frazier and his co-workers surveyed prevention programs for children in Japan, Singapore, Sweden and the United Kingdom and concluded that it is essential to include these three program elements to build a comprehensive oral health preventive program.

**Oral Health Education/Instruction**

Oral health education/instruction usually refers to oral hygiene instruction and/or oral health education. These instructional activities aim to promote oral health practices and to improve awareness and attitudes toward dental health. They target not only children, but also their parents, teachers and health workers. Oral health education and instructional activities for children, parents, teachers and health workers are commonly carried out in schools and clinics. Reinforcing and teaching toothbrushing is generally accepted to be a main component in oral hygiene instruction. Oral health education is usually carried out through presentations, games or printed materials. Schools are often selected because they provide good access to children, parents, teachers and health workers. The WHO supports programs carried out in schools. Arguments in favor of promoting dental health through schools include:

- Students can be accessed during their formative years, from childhood to adolescence. These are important stages in people’s lives, when lifelong oral health-related behaviors, as well as beliefs and attitudes, are being developed.
- School can provide a supportive environment for promoting oral health. Access to safe water, for example, may allow for general and oral hygiene programs. Also, a safe physical environment in school can help reduce the risk of accidents and concomitant dental trauma.
- The burden of oral disease in children is significant. Most established oral diseases are irreversible and will last a lifetime and have an impact on the quality of life and general health.
- School policies, the physical environment and education for health are essential for attainment of oral health and to control risky behaviors, such as the intake of sugary foods and drinks, use of tobacco and alcohol consumption.
- Schools can provide a platform for providing oral health care, that is, preventive and curative services. Oral health education is considered important to preventing and treating oral diseases as evidenced in the Knowledge Attitude Behavior (KAB) model. The Health Belief Model (HBM) also posits that individuals must perceive themselves to be at risk before they will take actions to reduce risky behaviors or to engage in healthy alternative behaviors. Through education, people can acquire the knowledge to identify their risk and the impetus to practice healthy alternative behaviors.

Kay and Locker reviewed the effectiveness of dental health education and reported that very few definitive conclusions about the effectiveness of oral health promotion can be drawn from currently available evidence. Knowledge levels can almost always be improved by oral health promotion initiatives, but whether these shifts in knowledge and attitudes can be causally related to changes in behavior or clinical indices of disease has not been established. Although there are studies conducted in China and in England reporting that oral health education had an effect in improving the dental health of children, several other studies in different countries, such as the ones conducted in Zimbabwe, Belgium and Indonesia, concluded that the involvement of primary healthcare personnel and school teachers in providing school-based oral health education had little significant effect on caries prevention in children.

**Primary Prevention Measures**

Fluoride agents are commonly used as a primary prevention measure. It is generally agreed that the use of fluorides has led
to a significant decline in dental caries.\textsuperscript{22,23} Research has shown that fluoride is most effective in preventing dental caries when a low level of fluoride is constantly maintained in the mouth.\textsuperscript{24,25} The provision of fluoride can be through drinking water, salt, mouthrinse or toothpaste, and various forms of professionally applied fluorides, such as gels and varnishes. Of these modalities, water fluoridation is considered the most cost-effective way to prevent caries formation. It has been suggested that the most potent effect of water fluoridation is not so much preventing new lesions from appearing, but remineralizing existing carious lesions and, thus, slowing down or even arresting the caries process.\textsuperscript{26}

Although there is evidence of merits in water fluoridation, health authorities in many countries still have implementation problems. The lack of a safe networked water supply system and the absence of government willingness/support are difficulties in developing countries. In industrialized countries, worry from unjustified claims of harmful effects and freedom-of-choice and autonomy arguments from anti-fluoridationists may affect the decision to add fluoride to the water.

When water fluoridation is not feasible, WHO recommends considering the use of salt fluoridation techniques to prevent dental caries.\textsuperscript{27} Unlike water fluoridation, which requires a reliable water supply, salt fluoridation is less dependent on infrastructure and can achieve wide coverage. It is a less politically sensitive issue that allows for freedom of choice. And it has been reported to have an effect on preventing dental caries. In some areas of France and Germany, domestic fluoridation salt has a market share of more than 50%.\textsuperscript{28} In Jamaica, the reduction of caries in children has been noticed since implementation of salt fluoridation.\textsuperscript{29} Although there is increased use of fluoridated salt in Europe, Central and South America, the population coverage is still not large.

The most common products for self-application are fluoride toothpastes and mouthrinses. A review of fluoride toothpaste by Cochrane Collaboration, using random effects meta-analyses, found that fluoride toothpaste is efficacious in preventing caries in children.\textsuperscript{30} The review also found that the effect of fluoride toothpaste increased with higher baseline levels of D(M)FS, higher fluoride concentration, higher frequency of use and supervised brushing. Fluoride toothpaste can be used in community-based preventive programs. A study in China found that brushing with fluoride toothpaste for three years arrested 45% of the proximal and 23% of the buccal and palatal carious lesions in primary anterior teeth.\textsuperscript{31} It demonstrated that daily toothbrushing with fluoride toothpaste could be an effective program to control the caries problem in children. Since the use of fluoride toothpaste in developing countries like China, especially in rural areas, can be inhibited by its relatively high cost and poor distribution, the development of the fluoride toothpaste market in these countries presents a challenge to manufacturers and to dental public health workers.\textsuperscript{32}

Although fluoride mouthrinse is not as popular as fluoride toothpaste for self-application, there are studies that report that mouthrinse is effective in caries prevention in children. A meta-analysis conducted by Cochrane Collaboration suggested that the supervised regular use of fluoride mouthrinse reduced caries incrementally in children.\textsuperscript{33} However, fluoride rinses may not be suitable for young children, because they are likely to swallow the solution posing a risk for fluorosis. On the other hand, rinsing appears to have a greater effect in older children aged 10 or above.\textsuperscript{34,35}

Fissure sealant application is another procedure that has been demonstrated to be effective in preventing caries in children. Although the prevalence among U.S. children and adolescents of one or more sealed permanent tooth surfaces increased about 13% during the period 1988-1994 to 1999-2002, it is still well below the objective set by the Healthy People 2010 document, which is 50% of sealant use among this population.

Many states have used government money to initiate sealant utilization programs to meet the objective delineated in the Healthy People 2010 document.\textsuperscript{36} Examples of community-based sealant promotion programs targeted to high-risk school children include Sealant Saturdays in Salt Lake City, UT, and the Dental Initiatives of the Academic Health Center at the University of Minnesota; Dental Sealant Program of the Department of State Health Services, Texas; Seal a Smile Program of Wisconsin Oral Health Program; Dental Sealant Grant Program of Illinois Department of Public Health; and the Rural School-Based Oral Health Program for South Texas.\textsuperscript{37} School-based dental sealant programs also have significant accomplishments. Those programs in Arizona, Illinois, New Mexico, Michigan and Ohio have been named as successful practices in the Association of State & Territorial Dental Directors May 2011 Report.\textsuperscript{38}

Secondary Prevention Measures
Dental screening is the usual strategy used in early detection and treatment service. A study in Sweden pointed out the importance of early detection and prevention of caries in the primary dentition.\textsuperscript{39} In industrialized countries, dental treatments are often carried out in either standing dental clinics or provided through a "mobile dental clinic" housed in a van that travels to various places. These methods are neither available nor affordable in developing countries,\textsuperscript{40} where the cost of basic sets of instruments, dental materials and infection control products is too high and training for primary health workers to undertake basic oral care is inadequate. In these situations, a new approach to oral healthcare is needed.

The Commonwealth Dental Association (CDA) and the WHO held a workshop in 1996 on equity in oral health. One of the many challenges addressed at the workshop was how to provide funding to treat the massive amount of caries in children in developing countries.\textsuperscript{41} Managing caries through minimal
invasions and low-cost methods is imperative. Caries-arresting treatment that aims to halt or slow down disease progression is a practical solution to minimize children’s discomfort and other problems due to dental caries.

Studies on xylitol chewing gum showed the effect of the gum on arresting caries in children.42,43 Other studies showed similar results from using chlorehexidine varnish.44,45 Moreover, a minimal intervention treatment using professionally applied topical silver fluoride, followed by stannous fluoride solution, was found to be effective in arresting caries in primary molars.46 The School Dental Service in Western Australia has used a 40% silver fluoride solution as the standard treatment for deep carious lesions in primary teeth with good results.47 In China and Japan, silver ammonia fluoride or silver diamine fluoride (SDF) has been used successfully for arresting caries in children for many years.48,49 A recent review found that SDF is a simple and cost-effective agent that has significant and substantial benefit in arresting and preventing caries.50

Another systemic review by Rosenblatt concluded that SDF appears to meet the criteria of both the WHO Millennium Goals and the U.S. Institute of Medicine’s criteria for 21st century medical care.51

The use of glass ionomer in atraumatic restorative treatment (ART) is another useful method for treating dental caries in preschool children in developing countries. The short treatment time and simple and minimal armamentarium of ART makes it affordable for treating children. An evaluation of ART restorations placed in children in China showed promising results.52 Another study in Tanzania reported a good success rate with ART over six years.53 The WHO Collaborating Centre performed a meta-analysis and found it appears there is no difference in survival results between single-surface ART restorations and amalgam restorations in permanent teeth over the first three years.54

The advantages of ART sealants and restorations then are: it requires simple instruments and materials; the cost is low; it is flexible; and it is user friendly, especially for children. Dr. R.G. deAmorim commented in a journal article that the accumulating evidence of ART has suggested that it can be as good as or even better than conventional treatment.55

**Conclusion**

In summary, most articles on prevention describe how the programs were run; few studies have proper evaluations. Evidence-based studies are essential to evaluate the outcome of these programs. It is difficult to have appropriate study design for evaluation; and a randomized clinical trial model may not be applicable because of ethical issues. However, as there are a number of effective prevention methods available, we can provide feasible

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**Date: June 13 & 14, 2014**

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prevention care to children after careful consideration of the cultural, social, economic and healthcare settings in which they live.

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REFERENCES
