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Oral hygiene: past history and future recommendations

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Abstract: Review of the dental literature reveals a changing emphasis attached to maintenance of optimal oral hygiene among patients over time. Moreover, a different relationship to this topic has been evident in the USA, Britain and Scandinavia. These changes, differences, and the rationale behind them, are described. The age of initiating oral hygiene practice and the optimal frequency of dental cleaning is discussed. Finally, recommendations are offered concerning oral hygiene promotion, both at the individual and community levels.

Key words: dental public health; oral hygiene; preventive dentistry

Introduction

Since the beginning of modern day dentistry, emphasis has been placed on the importance of oral hygiene. In fact, the single most continuous, cornerstone of preventive and public health dentistry has always been the cleaning of teeth. Despite this consensus, there have been changes in the importance attached to oral hygiene over time. Concurrently, different perceptions of the subject have been noted in different parts of the world.

The history of oral hygiene

The first toothbrushes can be traced as far back as 1000 CE in China, but the more common bristle brush was reinvented in the late 18th and early 19th centuries (1). By 1890, W.D. Miller, had performed extensive research on dental problems. His work culminated in establishing the aetiology of dental caries: oral bacteria, feeding on food particles, produced acids that caused tooth decay. Armed with this knowledge the era of prevention had begun. Empowered with a new slogan 'A

clean tooth never decays', dentists initiated periodic dental prophylaxis. Patients were urged to brush twice a day and the public was encouraged to improve their oral hygiene habits.

A change in the conception of the role of oral hygiene became evident in the 1970s and 1980s. This trend has been dissimilar and often opposite in different parts of the world, notably the USA, Britain and Scandinavia. A marked skepticism could already be noted in 1958, as expressed in the book 'Dentistry for Children' (2), where Massler questioned the feasibility of oral hygiene among young children. He wrote that 'Tooth brushing performed at the beginning or the end of the day serves a real cosmetic function but bears little relation to the prevention of dental caries. Children in general do not use the toothbrush frequently or effectively.' No reference to the importance of oral hygiene in preventing gingival disease was made and in fact the author states that 'gingivitis is common in the adult but rare in the healthy child'.

In the 1960's and 70's, in the USA, there had been a strong emphasis on cleaning teeth to prevent tooth decay and periodontal health. In schools and dental clinics, state health departments urged teaching children to 'dry brush', as the content of toothpaste was considered to be insignificant. This concept soon changed dramatically.

By the 1980's, dental public health literature placed increasing emphasis on caries as the primary concern and on fluoride in general, and fluoridated dentifrice in particular, as the almost universal panacea. Scientific articles describing preventive dentistry and health education were therefore dominated by emphasis on the role of fluoride (3–6). This decreased emphasis on the role of oral hygiene education and promotion among children was particularly evident in the literature originating from the USA. These texts did not eliminate or ignore the role of oral hygiene and gingivitis, but mention of these topics was marginal. The pervading message of the time was: 'Promote children's oral health with fluoride and sealants'. An ADA (American Dental association) slogan read: 'Fluoride + Sealants = Healthy Teeth'.

The British school seems to have presented an intermediary stand between that of the USA and Scandinavia. The British Health Education Authority has regularly stressed the role of oral hygiene, and in 1997 reported that 'Reduction in plaque levels almost always, but invariably, leads to reductions in inflammation and bleeding of the gingivae.' The Authority in its recommendations states 'Caries preventive efforts should be focused on children as the benefits are cumulative.' This last sentence could have rationally and scientifically included gingivitis, but did not.

This above approach (a decrease in the importance associated with oral hygiene) stemmed from a scientific and logical rationale and can be traced to the following factors:

- An acknowledgement that fluoride is the central most effective contributor to the decline in dental caries.
- Recognition that the primary public health focus group are children, that among children dental caries is the main dental health concern, and that optimal oral hygiene, among children, might be unrealistic.
- An inadequate basis of sound scientific literature, besides the Scandinavian school, associating oral hygiene with dental caries.
- Inadequate data on the cost-effectiveness of oral hygiene attempts in the prevention of caries and gingivitis (7).

The Scandinavian literature, over the same period, presented an almost completely different school of thought. Löe *et al.* (8) had demonstrated that caries could be inhibited by plaque control. Literature originating from Scandinavia reported that there was a significant association between oral hygiene and caries, especially on smooth dental surfaces (9–12). Scandinavian programmes, recognizing that the skill and perseverance needed to maintain an adequate level of oral hygiene may exceed the average ability of children, initiated supervised tooth-cleaning programmes. These efforts were documented and demonstrated a significant effect on reduction of gingivitis and caries, in children and adults (13–16). Few of these efforts to prevent both caries and gingivitis, were duplicated in the literature from other Western countries. One notable long-term school-based supervised plaque removal program in the USA, was designed to investigate this concept and examined the effect of brushing *per se* (with a fluoride-free dentrifrice). Three year results demonstrated significant reductions in plaque levels and gingivitis. Lower caries scores, especially on smooth dental surfaces, were reported in the test group (a 13% reduction), but this result did not reach statistical significance (17).

Although not all gingivitis will inevitably lead to destructive periodontal disease, it is now clear that all periodontal disease is preceded by gingivitis. The prevention of periodontal disease is therefore dependent on the prior prevention of gingivitis (18). Moreover, gingivitis, as an independent entity, is a disease causing a significant impediment to the public's well-being.

The present perception of oral hygiene importance

Oral health has to be viewed and promoted in its entirety. With the present reported decline in caries prevalence (19–21), the dental profession, and public health leaders, need to shift

their emphases to additional, previously neglected areas. Periodontal disease and dental caries have always been recognized as the two paramount dental pathologies and in fact the most prevalent diseases of mankind. The time, therefore, is ripe for dental public health to redirect its focus to including the promotion of periodontal health among children. Even if periodontal disease is less prevalent among children, it should be recognized that the disease is progressive and that appropriate prevention has to start at an early age. Recognizing the difficulty of the public in adopting optimal oral hygiene behaviour, it is even more obvious that the profession has to strive to correctly incorporate this practice at the earliest possible age.

The European Workshop on Mechanical Plaque Control adopted the following policy statement in 1998: 'Forty years of experimental research, clinical trials and demonstration projects in different geographical and social settings have confirmed that effective removal of dental plaque is essential to dental and periodontal health throughout life. Therefore, we recommend that this be reflected in the development of explicit oral health promotion policies at the national and community levels' (22). This is therefore an important new challenge for comprehensive dental public health policy.

Tooth brushing initiation and frequency

The subject concerning age of initiating oral hygiene practices and their frequency, has evolved over time. As late as the 1950s, regular tooth brushing was strongly encouraged, but only after 2.5–3 years of age, after full eruption of the deciduous dentition. Today it is usually recommended that oral cleaning commence even before and definitely immediately after tooth eruption. The British Dental Association (23) has recommended that 'tooth brushing needs to be introduced as soon as the first teeth appear. If a baby resists brushing, use a clean piece of moist gauze with a tiny spot of fluoride tooth paste, to wipe the teeth. By the age of two, although, an infant tooth brush ought to be used, with twice daily brushing'. The American Academy of Pediatric Dentistry (24) recommends providing oral hygiene counselling to parents, guardians and caregivers from birth to 24 months of age. From 24 months to 12 years, it is recommended to include the child in this counselling and from age 12 onwards only the child.

Early reports on the required frequency of tooth brushing were not always uniform in their recommendations, ranging from one to five times a day (25, 26). More scientific observations have demonstrated that gingivitis is related more to plaque age than to amount (27, 28). The first subclinical tissue changes appear after 2 days of plaque accumulation (27, 29, 30). Therefore, it has been suggested that it could be adequate to remove plaque only once a day or even once every 2 days. Longer intervals are insufficient (31–33). There is no evidence-based directive as to the exact optimal frequency demanded to prevent caries and gingivitis. However, on a didactic and practical level it is still recommended that people continue the tradition of twice daily brushing (22). There appears to be no scientific evidence basis to brushing before or after meals. Nevertheless most people appreciate the feeling of cleanliness when brushing after meals. This subjective factor is important and should be acknowledged.

Recommendations for the future

The individual level

- Parents should initiate brushing with the eruption of the first tooth. From about the age of 2–3 years, children should start being encouraged to clean their own teeth, together with their parents.
- Oral hygiene instructions should be simple and easy to adopt.
- Dental cleaning instructions should emphasize the brushing duration – for at least 2 min (34).
- Easier systems of self plaque inspection and identification need to be devised and evaluated (35).
- It is strongly encouraged that dentists and hygienists show plaque to child patients, with or without plaque disclosing solutions. The gingival margins and proximal areas should be emphasized. The patient should be showed how to detect plaque him/herself, employing a simple toothpick. There seems no reason why dentists and hygienists can see plaque and patients cannot. The same can be said for the first symptoms of gingivitis and caries.
- Dental educators should stress and show to patients the posterior and lingual dental surfaces. This is best performed in the patient's mouth. An artificial mouth model, as the next best system, should only be used when a personal oral demonstration cannot be performed.
- Mouth rinses, as adjuncts to tooth brushing should only be recommended when regular tooth brushing does not succeed in achieving optimal hygiene, or when indicated because of specific pathologies.

The community level

- For the general population, a 'whole population' rather than a 'high-risk group' strategy is strongly advised (36). A population strategy aims to 'reduce the plaque level of the whole popula-

tion; moving the distribution curve to the left' (37). Low-risk groups, by definition, are still 'at risk'. Many are in reality 'high-risk' but have not yet been successfully diagnosed as such. Moreover, the procedures for high-risk periodontal disease and caries diagnoses are complicated, often expensive and not always of high sensitivity and specificity (38).

- Non-dental education and health professionals (school teachers, nurses, general practitioner doctors, health educators, etc.) should be supplied with the materials and knowledge to provide basic information and guidance on oral hygiene promotion. In the same way that a paediatrician is not needed to explain how to clean the baby's body, one does not need a dentist or a hygienist in order to explain how to clean proximal, posterior and lingual surfaces of the teeth.
- It is advised to distribute free tooth brushes to children. These 'gifts', with or without accompanying health education, have been shown to be an effective incentive for improved oral hygiene behaviour (39, 40).
- The mass media should be utilized. Much as TV toothpaste commercials have most probably contributed more to caries prevention than much of the dental profession, this avenue should also be taken advantage of in oral hygiene promotion. National governmental health agencies should provide appropriate incentives to the commercial companies, in order to take advantage of this significant potential.
- The earlier the intervention, the more effective is the result (38). It is advised to start oral hygiene education in Mother and Child Health centres and programmes (40).

Conclusion

The dedication and commitment of the dental profession to oral hygiene promotion is obvious. This is firmly based both upon the scientific literature and clinical practice experience. Good oral hygiene is recognized as an ongoing goal of the dental health team, throughout the lives of our patients. Attainment of optimal oral hygiene is as important (if not more) for elderly patients than it is for children.

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