Management of High Caries-Risk Patients: Part 2—Treatment

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The American Dental Association (ADA) advocates the prevention and treatment of caries based on an analysis of the presence or absence of risk factors. Past experience of the disease itself is the most prominent risk indicator. Because surgically removing and replacing the diseased part of the tooth does not decrease the risk of future disease, alternate treatment protocols must be adopted. Studies comparing the appropriate preventive and interventional protocols for caries management following a caries risk assessment have been used for the validation of caries risk assessment models. Because dental caries is a biofilm-mediated disease, the current evidence-based prevention methods include diet modifications, good oral hygiene practices, and application of therapeutic agents. In individuals at high risk for caries, the treatment is divided into an initial control phase that includes therapeutics and surgical removal of the infection and placement of provisional restorations until the disease status is stable. This initial phase is followed by a secondary maintenance phase in which more permanent restorative treatment and preventive regimens are followed.

In the initial phase, a diet analysis is performed. In addition, salivary pH, buffering capacity, and bacterial levels must be recorded. Sugar plays an important role in the initiation and progression of the caries process, so harmful dietary patterns such as sugary drinks with low pH, frequent snacking, and inadequate oral hygiene measures are isolated. Patient compliance is often the biggest factor reducing the success of caries control therapy. Motivational interviewing, a patient-centered counseling technique, has been proven effective in reducing caries in high-risk young children. The approach includes techniques such as open-ended questions, reflective listening, affirmation, and summarization to help individuals express their concerns about change.

The primary causative agent for caries is the resident oral flora. The goal of the control therapy is to reduce the number of bacteria without completely eliminating the flora. Mechanical removal of plaque by itself has proven inadequate without the use of adjunctive chemical methods. Chemotherapeutic antiplaque agents can be classified on the basis of their mode of action. The primary modes are inhibition of microbial colonization, inhibition of microbial growth, disruption of mature plaque, and modification of plaque biochemistry and ecology. A review of all the chemical agents available is beyond the scope of this brief paper, but a few agents with a building evidence base for efficacy against caries are discussed.

Fluoride-containing products are considered as the mainstay of caries management. Fluoride works via remineralization, fluoroapatite formation, antimicrobial action, and prevention of ionic bonding of pellicle to tooth. The effectiveness of fluoride is limited by the patient's overall burden of risk factors. Fluorides are available for topical applications as mouthrinses, gels, or varnishes, and dentifrices, or systemically through water fluoridation and milk. Toothpastes containing fluoride

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between 1,000–1,100 ppm have been proven effective, whereas concentrations below 600 ppm have shown to be of limited value. The overall reduction in caries reported with their use is between 20% and 35%. Fluoride-containing oral rinses, when used along with brushing twice daily with fluoridated toothpaste, further reduce caries by 10%. Although both of these forms of fluoride delivery depend on patient compliance, professional application intervals of fluoride varnishes (5% NaF) at regular intervals have been proven to be efficacious and do not rely on patient compliance.

Nonfluoride-containing preventive products are also available. The ADA Council on Scientific Affairs issued a report in 2011 presenting clinical guidelines for nonfluoride preventive agents. The expert panel's recommendations were based on a review of evidence on currently available agents such as polyol sugars, chlorhexidine (CHX), arginine, and probiotics. The regular use of xylitol as mints or chewing gums might prevent caries by increasing salivary flow through mastication, reducing colonies of mutans streptococci (MS), and reducing plaque acidogenesis. The altered pH resulting from reduced acidogenesis possibly aids in promoting the remineralization of subsurface enamel lesions. Xylitol also has the unique ability to select for an MS population with weakened virulence factors. Recommended doses are 5–7 g of xylitol at a frequency of at least three times per day, although there is not a clear consensus on dosage. Xylitol is available in many marketable forms such as sugar-free chewing gum, lozenges, and hard candy. The ADA recommends 10–20 minutes of chewing of sucrose-free polyol gums after meals as possible adjuncts to reduce the incidence of coronal caries.

CHX has a well-established evidence base as an antiplaque agent that affects both gram-positive and gram-negative bacteria. However, its effect on gram-negative bacteria is weak. Currently, only mouthrinses containing 0.12% CHX are marketed in the United States. Two independent reviews of literature concluded that the evidence for the efficacy of CHX rinses in reducing caries is inconclusive. Hence, CHX rinses alone cannot be recommended for caries control. The expert panel at the ADA Council for Scientific Affairs stated that a 1:1 mixture of CHX/thymol varnish may be efficacious in the prevention of root caries. More evidence is required regarding application frequency and long-term effectiveness. If a CHX rinse is also being used, a sodium lauryl sulfate (SLS)-free formulation of the fluoride toothpaste should be prescribed because there is conflicting evidence regarding the antiplaque efficacy of CHX mouthrinse in the presence of SLS. (SLS is a foaming agent commonly used in toothpastes.)

Probiotics are currently under investigation, and their safety and effectiveness have not been tested satisfactorily. Also, genetically modified biomolecules aimed at preferentially targeting cariogenic species in biofilms have been engineered. Ongoing research in these "smart molecules" against specific bacteria is encouraging; however, further investigation is necessary before they can be widely used.

Along with the use of these products, all active lesions should be removed and restored with provisional glass ionomer materials. The use of prescription-strength fluoride toothpaste three times a day helps to recharge the restorative material to provide a continual benefit.

At the end of the control phase the salivary pH, buffering capacity, and bacterial counts are recorded again, and therapeutic treatment is recommended until a change in caries balance is observed. Permanent restorative therapy is attempted thereafter and the patient is placed on a maintenance regimen of hygiene recalls every 3 months, topical fluoride application, and fluoride mouthrinses.

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