Discussion Paper

Dental Caries Management in Children and Adults

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INTRODUCTION AND BACKGROUND

From our perspective, dental caries continues to be one of the most common chronic diseases in the United States and globally, with individuals living in poverty and minorities being affected more than their more affluent peers. Dental caries (commonly referred to as “cavities”) is a complex multifactorial disease mediated by factors that protect teeth (fluoride, salivary flow, buffering capacity, and host immunity) and patient-specific factors that put teeth at increased risk (frequent exposure to dietary carbohydrates, poor oral hygiene, and a cariogenic biofilm containing bacteria capable of fermenting carbohydrates and producing a decrease in pH). As Fontana and Wolff (2011) note, it is critical to develop effective tools for prevention and management that are risk based and patient centered.

Investing in effective nonsurgical (medical) management of dental caries will pay off by reducing the need for dental surgery to remove some or all of the tooth structure. Effective nonsurgical (medical) management of dental caries, including disease prevention and interventions in its earlier stages, requires early assessment to identify individuals at risk prior to visual indications of disease occurrence (dental cavities) combined with person- and/or family–centered education about the importance of oral health and its link to overall health. We believe a person’s health literacy is especially important to consider because their understanding of the factors related to the promotion of oral health and prevention of disease will impact their ability to take action and incorporate appropriate home care as a standard routine. Health literacy as practiced is a shared responsibility of the health care provider, clinical setting, and patient/caregiver. The dental team can enhance a patient’s self-efficacy by incorporating basic health literacy principles, such as the use of clear language and the use of the “teach back” method in clinical practice.

Traditional approaches to the treatment of dental caries have focused on repairing the consequences of the disease (cavities) rather than the disease itself. From our perspective, person-centered approaches, such as individual risk assessment, active surveillance, oral health literacy, and preventive interventions/therapies, supplemented, when necessary, by surgical care (drilling, filling, extraction) are the essential evidence-based approaches for the effective management of this disease. We see that factors such as fear, total and reimbursed costs, provider availability, transportation, and even parent or caregiver characteristics, including financial distress, depressive symptoms, and limited social networks, can be barriers to care (Davis and Reisine, 2015; Kruger et al., 2015). Management techniques that effectively arrest the caries process and allow remineralization of the caries lesion can help conserve tooth structure and prevent future surgical interventions. Furthermore, in our opinion, interprofessional collaboration with risk assessment and delivery of caries preventive interventions is essential to reduce the
burden of dental caries, as it will enhance access to the population groups that suffer disproportionately from this disease process.

**Caries Lesion Detection**

To diagnose dental caries implies not only finding a lesion (caries lesion detection) but, most important, deciding if it is active, progressing rapidly or slowly, or already arrested. Without this information, a logical decision about treatment is difficult (Fontana et al., 2010). Traditional caries detection tools include visual and radiographic examination of teeth. New devices that focus on detecting early lesions use technologies that contrast areas of tooth mineral loss to healthy tooth structure and, in our opinion, can help monitor early stages of the disease process and thus monitor the effect of nonsurgical interventions over time, rather than merely initiate early surgical care.

The American Dental Association Caries Classification System proposes useful terminology for U.S. clinicians to stage caries lesions by activity, severity, and location (Young et al., 2015). We believe this system facilitates decision making regarding management of the lesion. Activity assessment determines which lesions require treatment (surgical or nonsurgical). Lesion severity is critical in deciding when to surgically intervene with a restoration or filling because true “cavity” formation allows bacteria to enter the deeper layers of the tooth. Location is a key factor because of the unique challenges associated with identification of lesions between teeth and on the occlusal (biting) surfaces of teeth.

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**Caries Risk Assessment and Clinical Decision Making**

Caries risk assessment (CRA) is the clinical process of establishing the probability that a person will develop a new caries lesion or have progression of an existing lesion in the near future (Fontana and Zero, 2006). Because of the multifactorial and chronic nature of the dental caries disease process, CRA is complex, with multiple influences at the individual, family, and community level. In general, CRA includes consideration of disease indicators (e.g., caries experience), biological risk factors (e.g., diet, saliva, plaque, genetics), and other risk factors (e.g., social capital and economic factors), as well as protective factors (e.g., oral hygiene, exposure to fluoride) that influence the caries process (Featherstone, 2003). These variables are then used to develop a caries risk profile, such as low, moderate, or high risk. In addition, some of these risk factors not only influence dental caries but also have much broader impacts on overall health and well-being (Fontana, 2015).

Several strategies and tools that differ by age group are available for CRA, ranging from informal assessments to the use of structured forms (e.g., tools from the American Dental Association, American Academy of Pediatrics, American Academy of Pediatric Dentistry, and California Dental Association) and computer-based programs (e.g., Cariogram). Although a dentist’s overall subjective impression of the patient is a relatively good predictive for caries risk (Disney et al., 1992), we believe that more objective, easy-to-implement, and validated CRA instruments are desirable. Most studies have been conducted in children and adolescents, concluding that multivariate CRA models are more accurate than using a few or single factors. In
the case of adults, little evidence validating CRA models is currently available, but we do know that, unfortunately, past caries experience is still one of the most powerful predictors of future caries development, and the use of additional risk factors does not seem to markedly improve the prediction (Twetman and Fontana, 2009). CRA tools are an integral component of modern caries management; they not only aid in prediction but also, and more important, can act as a framework for individualizing preventive therapies and treatment plans.

CARIES MANAGEMENT

In our opinion, after thorough clinical and radiographic examination and assessment of a patient’s caries risk, decisions for therapeutic nonsurgical or surgical/restorative care should be based on caries lesion activity and whether the lesion is likely to have a “cavity” that will expose the deeper layers of the tooth to bacteria. With reduced risk of caries and effective disease management, some caries lesions do not progress or may arrest by a process called “remineralization.” The term “active surveillance” has been used in dentistry to describe strategies that monitor initial and small caries lesions, while the patient and dentist engage in shared decision making to implement a disease management plan on the basis of the patient’s individual factors. Patient strategies for disease management may include brushing at least twice daily with fluoridated toothpaste, reducing the frequency of sugar consumption, and using more intensive therapeutic agents if one is at higher caries risk. We recognize that behavior change is challenging. Efforts for engagement at the community, family, and individual level, based on delivery of information and skill training, have had mixed results to date (Albina and Tiwari, 2016). A number of studies involving motivational interviewing, which is a nonjudgmental approach that taps into the relevant factors that motivate the individual, are currently under way.1 Dentist strategies include the use of professional topical fluoride treatments, dental sealants to prevent caries lesions or arrest progression of early caries lesions on tooth fissures, and the ongoing reassessment of caries risk with appropriate strategies for follow-up, recare, and recall.

INTERPROFESSIONAL COLLABORATION

With help from colleagues in the medical community, effective prevention and treatment of dental caries can have a greater impact. Most children see a physician numerous times before their first birthday, but only 2 percent of 1-year-olds see a dentist (American Academy of Pediatrics, 2010). If primary care providers can engage in oral health screening and anticipatory guidance (brushing with a fluoride toothpaste as soon as the first tooth erupts and following dietary recommendations), apply fluoride varnish, and direct children at high risk of caries to a dental home, then there is an opportunity for the disease to be prevented and early caries lesions arrested or remineralized before more extensive and irreversible damage occurs (Moyer, 2014).

Collaborative care has already shown a decrease in the cost of managing diabetes through improved oral health (Simpson et al., 2015), and we believe a similar approach may achieve improved caries management. In our opinion, collaborative care delivered via an interprofessional team has the potential to identify patients at caries risk early so they can benefit from effective caries management strategies to avoid a lifetime of dental caries disease and associated quality-of-life sequelae and health care costs.

1 See, for example, studies on the topic “motivational interviewing and caries” cited at ClinicalTrials.gov.
CONCLUSION

Caries is a disease process that, if diagnosed early, often can be managed nonsurgically to prevent loss of tooth structure and potential localized or systemic infection. We propose that effective management of the disease process will not only involve the clinical skill of the dental clinicians but also employ the principles of shared decision making. This management will involve the use of clear language to convey to patients and their families information and strategies for effective oral hygiene practices. We believe that oral health will be positively affected through improved health literacy; education; patient-specific care; interprofessional collaboration; reduction of caries risk factors, such as minimizing dietary carbohydrate consumption including sugar-laden beverages; and increased exposure to protective factors, which include routine contact with fluoride and engagement in good oral hygiene.

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REFERENCES


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