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Vol 38 N°10

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FEATURES

OF THE CALIFORNIA DENTAL ASSOCIATION

Journal

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CDA JOURNAL, VOL 38, Nº10

Who's at the Table?

KERRY K. CARNEY, DDS

In the past two years I have heard one metaphor often used to illustrate the predicament of organized dentistry in the discussions of access to care for the 30 percent of the population that encounter barriers to receiving dental services.[1] It usually runs something like this, "If we don't take a seat at the table, we will find ourselves on the menu."

If we don't take a seat at the table, we will find ourselves on the menu.

The point of the metaphor is that if organized dentistry does not engage policymakers, think tanks, foundations, and advocacy organizations in discussing strategies for reducing barriers to care, then we will be left out of decisions that may determine the role of organized dentistry in the future of oral health care delivery in America.

At a national gathering of dentists in Washington, D.C, I heard a variation of this metaphor. It went something like this, "Let's not sit at their table. Let's build our own table!"

Using this variation of the metaphor, the audience of dentists was exhorted to disregard other concerned parties and wrench away from any other group the power to determine our destiny (or the role of dentistry in the future of oral health). This is a stirring emotional appeal. Who does not want to determine his/her own destiny? I know I do.

That is why I made decisions about going to college, becoming a dentist, living in California, and practicing dentistry in a small town. All these steps toward determining my destiny were made based on the cultural and political landscape in which I grew up and live. If I had decided to seize my destiny and practice dentistry without regard to that landscape, I would be functioning in an alternate reality. I am subject to laws and cultural constraints. I can maximize my potential, but I must operate within the context of those laws and that culture.

We can work to change the constraints on our destiny but that always requires that most difficult of tasks: working with others. So now we come back to that "seat at the table" versus "building our own table" metaphorical variation. If we choose to engage in the discussion, we can understand other perspectives and have the opportunity to provide an evidence base for our own perspective. We can also illustrate the successful components of a system that has delivered oral health care to 70 percent of the population and participate in determining the best avenues to address the many barriers that limit access to care for the affected 30 percent.

If we are going to sit at the table and engage in the discussion, it helps to know who else has already taken a seat around that table. There are those stakeholders one would expect: other members of the dental team, policymakers, and educators. However, foundations, research organizations, and advocacy organizations have also taken seats at the table. The Institute of Medicine (IOM), the W.K. Kellogg Foundation, the Pew Charitable Trusts, and the Josiah Macy Jr. Foundation have all taken an interest in access to oral health care.

Three of these organizations are the philanthropic progeny of commercial giants. According to its website, the Pew Charitable Trusts derived ultimately from four of the heirs to Sun Oil. Their prospectus for 2010 shows Pew's assets are a little more than $4.5 billion.[2]

The Josiah Macy Jr. Foundation was established on donations of an heir to the Macy maritime merchant fortune. The Macy family later established the first oil refinery in New York. Eventually, Standard Oil acquired the refinery. According to their 2009 annual report, the Josiah Macy Jr. Foundation assets were more than $120 million.[3]

Its namesake, the younger of the two Kellogg brothers, endowed the W.K. Kellogg Foundation. Will Keith Kellogg established the cereal company based on grain flakes. According to the Foundation Center, the W.K. Kellogg Foundation had assets in excess of $6.8 billion and ranked fifth in United States foundations by asset size in 2009.[4]

"The Institute of Medicine is an independent, nonprofit organization that works outside of government to provide unbiased and authoritative advice to decision makers and the public. Established in 1970, the IOM is the health arm of the National Academy of Sciences, which was chartered under President Abraham Lincoln in 1863. The Institute of Medicine serves as adviser to the nation to improve health."[5]

CONTINUES ON 712

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EDITOR, CONTINUED FROM 709

It is clear from their own literature that each of these organizations has an interest in improving the oral health care for the 30 percent of the population that is not receiving oral health care now. The IOM has produced a report on "The U.S. Oral Health Workforce in the Coming Decade."[6] Recently, the IOM has also convened two expert panels that are looking at various aspects of the dental delivery system. These panels began meeting in early 2010 and will continue their work throughout the year.

The Pew Charitable Trusts published "Help Wanted: A Policy Maker's Guide to the new Dental Providers" in 2009. The W.K. Kellogg Foundation is promoting a new dental provider to add to the dental workforce in five states: Vermont, Ohio, New Mexico, Washington, and Kansas. Both the Josiah Macy Jr. Foundation and the W.K. Kellogg Foundation have partnered to grant funds to the American Association of Public Health Dentistry to develop a two-year dental therapist curriculum to provide basic restorative dental care.

These are some of the players and they are not waiting to be invited to sit down at any table organized dentistry may build. They are eager to find solutions now for that 30 percent. Ignoring the input of the members of a delivery system that works well for almost three-quarters of the population of the United States is risky. However, when we, as members of organized dentistry, fail to acknowledge that there are many barriers to care that merit attention, then there is not much point in inviting our input.

It is easy to see why many dentists in private practice might find it hard to believe that there is any access to care problem. It is difficult to imagine reality beyond one's experience. Our experience is: we provide care to the 70 percent who can successfully access oral health care in our offices. We come to our offices, provide the very best care we can for our patients, and then we go home to our families and friends. This is what we know.

With a complex issue, the less one knows, the more certain one is. The multifactorial barriers, which some people face in trying to get to our offices, are a complex issue. Our profession is grounded in science. We cannot be afraid to gather the facts, examine and analyze the findings, lend our expertise, and participate in the decision-making. We need to take a seat at that table. If we are lured into "building our own table," we may find ourselves with very congenial tablemates and dulcet conversation but over at the other table, they will be getting down to designing systems to address oral health care disparities — without us. ■■■■

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Matt Mullin

Hippocratic Oath

BY DAVID W. CHAMBERS, PHD

In the 5th century B.C. Western world, the leading school was located on the island of Cos, just off the coast of what now is Turkey. Its "dean" is known to us as Hippocrates. About 1,000 pages of notes from the curriculum have been preserved in what now is called the Hippocratic Corpus. These describe the structure, functioning, and treatment of glands, fistulas, ulcers, etc. From this we can tell that the Hippocratic approach was medical, rather than surgical, with the goal being to preserve or restore the natural balance of the body. These old Greeks would have thought remineralization was just the thing.

There must have been a practice management course as well since we have short tracts on how the physician is to comport himself. Advice is given on how the professional should smell, how to

CONTINUES ON 715

New Technology May Reduce Need for Handpieces

A dab of peptides could, one day, eliminate or reduce the need for fillings or drillings, according to a new study published in *ACS Nano*.

This first-of-its-kind technology uses peptides embedded in soft gel or a thin, pliable film. When positioned next to a cavity it "encourages cells inside teeth to regenerate in about a month," according to the study.

"It's not like toothpaste," which prevent cavities, said Nadia Benkirane-Jessel, PhD, a scientist at the Institut National de la Sante et de la Recherche Medicale and a coauthor of a recent paper. "Here we are really trying to control cavities (after they develop)."

The film or gel containing the peptide MSH (melanocyte-stimulating hormone), and according to prior tests reported in the *Proceedings of the National Academy of Sciences*, encourages bone regeneration. So, commented Berkirane-Jessel, that instead of a drill, a quick dab of gel or a thin film against an infected tooth could heal teeth from within.

The scientists theorized that since teeth and bone are similar, MSH, if applied to teeth, should help healing. In their experiments, researchers applied either a film or gel that both contained MSH to the cavity-filled teeth of mice. After about a month, the cavities had disappeared, Benkirane-Jessel said, cautioning that the MSH-containing films or gels only treat cavities; they don't prevent them. People will still need to brush, floss and use mouthwash to help prevent cavities from forming.

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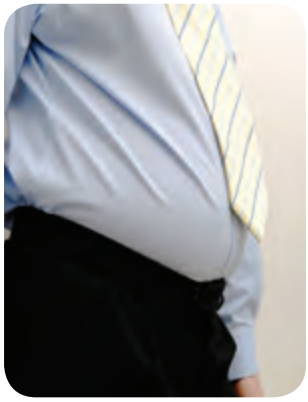

Don't Ignore Tummy Trouble

There is now more evidence why one should heed their gut feelings. In a recent issue of the *Harvard Mental Health Letter,* the "brain-gut axis" is the reason many people experiencing stress feel it in their stomach.

The brain interacts with the enteric nervous system, which aids in regulating digestion. When faced with threatening situations, the brain sets off the "fight or flight" response, which slows or stops digestion, so the body can focus its internal energy to face the threat, according to a news release. However, even less stressful situations such as public speaking, arguments, or less-than-ideal traffic situations, also can cause the digestive process to slow or cease.

According to the *Harvard Mental Health Letter,* cognitive behavioral therapy to recognize and change stress-inducing thinking, relaxation techniques to calm the body, and tummy-directed hypnosis are some methods for reducing stress and improving gastrointestinal function.

"It's a way to use genetic testing to personalize a dental treatment plan and the frequency of dental care visits of patients as it relates to oral care."

WILLIAM GIANNOBILE

Pioneering Study Utilizes Genetic Testing to Determine Gum Disease Risk

In what may be the biggest clinical study using genetic testing to evaluate the risk for perio disease, the University of Michigan School of Dentistry has signed an agreement with Interleukin Genetics Inc., with William Giannobile, professor at U-M, leading the study for the school.

"It's an exciting study because it's a way to use genetic testing to personalize a dental treatment plan and the frequency of dental care visits of patients as it relates to oral care," said Giannobile, who also is director of the Michigan Center for Oral Health Research at the School of Dentistry, of the year-long study that started in the fall. "It's a way to customize patient care."

Kenneth Kornman, president and chief scientific officer of Waltham, Mass., based-Interleukin, said "One of the goals of personalized health care is to detect disease earlier and prevent it more effectively."

Kornman said the study will use Interleukin's PST test as one part of a periodontitis risk assessment. Genetics, as shown through research, is a key factor in gum disease; other research hints at gum disease as a risk factor for other chronic disease complications, such as low birth weight or heart disease.

Fifteen years of patient clinical outcome will be examined by U-M researchers who then will recruit at least 4,000 of those patients and get their genetic information using the PST, said Giannobile. Scientists will combine this genetic information with two other common risk factors, smoking and diabetes, and measure tooth survival rates to see how those results lined up with the treatment plans people received over the 15 years. Some patients may have needed more dental visits, some may have required less, Giannobile said.

The PST genetic test identifies genetic variations that are predictive of severe gum disease and tooth loss in some patients, according to a news release, and may be used on all ethnic populations but only must be given once in a lifetime to identify at-risk patients. The test specifically identifies genetic variants that regulate a protein that when overexpressed, is thought to be associated with the destruction of soft-tissue attachment and bone, and increased severity of gum disease in certain patients.

HIPPOCRATIC OATH, CONTINUED FROM 713

"maintain a serious but not harsh countenance," and "looking as plump as nature intended him to be."

There is also a segment of about 250 words speaking directly to professionalism that we know today as the Hippocratic oath. It is chiefly known for a famous line about not causing harm that may well be the most frequently used title for editorials in the dental profession. More on that in a minute.

The oath specifically forbids three procedures: physician-assisted suicide, abortion, and surgery for gallstones. The latter is to be referred to specialists, something that we find in the American Dental Association Code of Professional Conduct, 2B. Confidentiality is strongly urged: see 1B in the ADA Code. The oath also prohibits "all mischief and in particular of sexual relations with both female and male persons, be they free or slaves." This one the ADA House decided not to take a position on a few years ago.

One element of the Hippocratic oath that dental educators have always envied is the ancient admonition that young physicians be treated as "the nephews" of practitioners, to be welcomed into the profession, and given financial support. Even more, those who take the oath agree to teach without fee. Only a few today honor that commitment through teaching in dental schools or speaking at scientific sessions without honoraria.

Now about that well-known line: "First, do no harm." It is not in the Hippocratic oath. "Premum non nicere" is Latin, and as nearly as anyone can work out, it is only several hundred years old. It is actually a fairly dim view of professionalism, sounding more like something a lawyer would say to protect the dentist rather than encouragement of public service. The phrase in the Hippocratic oath that is sometimes pointed out says "I will use my medications for the benefit of patients and not to harm them." Loose translation, "I will not poison anyone."

The nub:

1. The ethical foundation of the healing professions is ancient.
2. Volunteer to teach in a dental or dental hygiene school nearby or write a check to the CDA Foundation.
3. If you want to practice evidence-based dentistry, first, check your references.

David W. Chambers, PhD, is professor of dental education, Arthur A. Dugoni School of Dentistry, San Francisco, and editor of the Journal of the American College of Dentists.

UPCOMING MEETINGS

2010	
Oct. 9–12	ADA 151st Annual Session and World Marketplace Exhibition, Orlando, ada.org/goto/session.
Oct. 22–24	California State Association of Endodontists, 2010 biennial session, San Francisco, 415-577-2760, csaendo.org.
Oct. 24–27	National Primary Oral Health Conference, Kissimmee/Orlando, nnoha.org/conference/npohc.html.
Nov. 7–13	United States Dental Tennis Association, Grand Wailea, Hawaii, dentaltennis.org.
2011	
April 6–10	California Society of Pediatric Dentistry 36th annual Session/Western Society of Pediatric Dentistry ninth annual session, San Francisco, 831-625-2773, drrstewart@aol.com.
April 10–16	United States Dental Tennis Association, Tampa, Fla., dentaltennis.org.
May 12–14	*CDA Presents* the Art and Science of Dentistry, Anaheim, 800-CDA-SMILE (232-7645), cdapresents.com.
June 16–18	ADA New Dentist Conference, Chicago, (800) 621-8099, ext. 2779, ada.org/goto/newdent.
Sept. 22–24	*CDA Presents* the Art and Science of Dentistry, San Francisco, 800-CDA-SMILE (232-7645), cdapresents.com.
Sept. 22–24	United States Dental Tennis Association, Palm Desert, Calif., dentaltennis.org.

To have an event included on this list of nonprofit association continuing education meetings, please send the information to Upcoming Meetings, CDA Journal, 1201 K St., 16th Floor, Sacramento, CA 95814 or fax the information to 916-554-5962.

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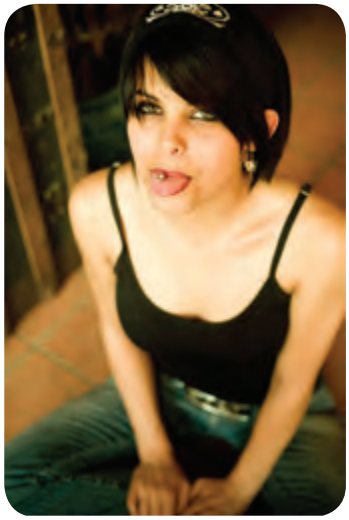

Gap Between Teeth Linked to Tongue Piercings

According to a new study at the University of Buffalo in New York, "playing" with a pierced tongue stud could lead to a gap between the front teeth.

Researchers asserted that those with tongue piercings were likely to push the metal stud up against their teeth and consequently cause gaps and other problems to arise, such as unnecessary orthodontic issues.

Nigel Carter, DDS, chief executive of the British Dental Health Foundation, said the study highlighted the risks that tongue piercings have on oral health. "It's certainly something to think about before going out to get a tongue piercing. The temptation of playing with the stud in the mouth would be very high and in time, this could lead to hundreds of pounds worth of corrective treatment. The results of this study stress the risks that are associated with tongue piercings. ... In order to avoid such health problems in the future, along with the spiraling costs of any related treatment, I would advise people to stay clear of tongue piercings."

Sawsan Tabbaa, a professor of orthodontics at the University of Buffalo's School of Dental Medicine and lead author of the study, said that "force, over time, moves teeth" and that the results are caused by people playing with their studs crop up in a "very high percent of the cases."

Discus Hero Pit & Fissure Sealant
Hero, Discus Dental's new pit and fissure sealant features Embrace technology. This technology allows the sealant to bond to slightly moist teeth. The exceptional bond strength provided by the unique chemistry of Hero will deliver improved caries prevention to patients. Hero is available as a two-syringe package with 25 .22-gauge tips and a syringe of Discus' Matrix Etchant. For more information go to discusdental.com.

Honors

Representatives from the Arthur A. Dugoni School of Dentistry, including **Patrick J. Ferrillo Jr., DDS,** interim provost for University of the Pacific, met with dental education leaders at two schools in China to discuss the best practices and trends in dental education. Joining Ferrillo were **Nader Nadershahi, DDS**, acting dean of the Dugoni School of Dentistry; **Anders Nattestad, DDS,** professor of oral and maxillofacial surgery and the school's director of global initiatives; **Gary Mitchell,** president of the Pacific Dugoni Foundation; and **Colin Wong, DDS,** member of the Foundation board and former president of the school's Alumni Association.

The group also visited the School & Hospital of Stomatology at Wenzhou Medical College in Wenzhou, where the Dugoni School and Wenzhou signed a collaborative agreement to work together to create a student/faculty exchange initiative between the two institutions.

Meetings and lectures at the Guanghua School of Stomatology at Sun Yat-sen University in Guangzhou were highlights of a Dugoni School of Dentistry trip to China.

Periscope offers synopses of current findings in dental research, technology, and related fields.

IMPLANTS

RICHARD T. KAO, DDS, PHD, AND DAVID W. RICHARD, DDS, PHD

Bone loss occurred in all regions of the maxilla and mandible, but the most common region is the lower anterior segment.

Fransson C, Wennstrom J, et al, Extent of peri-implantitis-associated bone loss. *J Clin Periodontol* 36:357-63,2009.

AIM: Retrospective chart review to describe the extent of peri-implantitis-associated bone loss with regard to implant position.

METHOD: A review of 182 subjects that involved radiographic analysis of 1,070 implants of which 419 implants exhibited peri-implantitis-associated bone loss.

RESULTS: Approximately 40 percent of the implants were affected by peri-implantitis-associated bone loss (282 had <2 mm bone loss and 137 had >2 mm) . These problematic implants were found in different jaw positions and the most common position was the lower front region. The affected implants were found mostly among "mid" rather than "end" abutments irrespective of supporting fixed complete or fixed partial dentures.

CONCLUSION: This study suggests that peri-implantitis can occur at all jaw positions and the "end" abutment position is not associated with increased risk for peri-implantitis.

CLINICAL RELEVANCE: Bone loss occurred in all regions of the maxilla and mandible but the most common region is the lower anterior segment. Interestingly, this study indicates that "end" abutment position in a fixed implant prosthesis is not associated with an enhanced risk for peri-implantitis.

TECHNOLOGY

NATASHA A. LEE, DDS

Findings do not indicate a benefit of utilizing either the ViziLite Plus with Tblue or VELscope as an adjunct to conventional oral cancer screening methods.

Mehrotra R, Singh M, et al, A cross-sectional study evaluating chemiluminescence and autofluorescence in the detection of clinically innocuous precancerous and cancerous oral lesions. *J Am Dent Assoc* 141(2):151-6, February 2010.

PURPOSE: To compare two light-based oral cancer screening devices with conventional visual screening methods to aid clinicians in determining the necessity of further evaluation of seemingly innocuous oral lesions.

METHODS: Patients were screened and innocuous lesions were then examined with the ViziLite Plus with TBlue or VELscope. The lesions were then biopsied and the results of the tissue analysis were compared with the results indicated by the two screening devices.

RESULTS: The ViziLite failed to detect the three dysplasias and one malignancy found in 102 biopsied lesions. The VELscope failed to detect six of the 11 dysplasias and one malignancy in a different group of 152 biopsied lesions.

CONCLUSIONS: The findings of this study do not indicate a benefit of utilizing either the ViziLite Plus with Tblue or VELscope as an adjunct to conventional oral cancer screening methods. The author recommends further study.

RELEVANCE: Clinicians should be concerned about the high rate of false-negative results found with these devices and the false sense of security that a negative result may bring to both the patient and the dentist. The dentist must also consider the cost of the technology to the patient in light of findings that currently do not indicate a significant benefit over conventional methods of screening.

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ENDODONTICS

W. CRAIG NOBLETT, DDS, MS, FACD

Efforts aimed at forcing material into lateral canals is unnecessary and will not lead to an improved prognosis for endodontic treatment.

Ricucci D, Siquiera JF, Fate of the tissue in lateral canals and apical ramifications in response to pathologic conditions and treatment procedures. *J Endod* 36(1):1-15, 2010.

AIM: The purpose of this observational histologic study was to examine the status of tissue present in lateral and accessory canals in both untreated and endodontically treated teeth, and if lateral canals are actually "filled" during endodontic treatment.

METHODS: Serial sections from 493 human teeth were examined by light microscopy to determine the presence of lateral canals or apical ramifications and to characterize the status of the tissue present. Both endodontically treated and untreated teeth were included in the study as well as teeth diagnosed as having vital or necrotic pulps at the time of treatment or the time of extraction.

RESULTS: The tissue present in the lateral canals reflected the same status as the tissue in the main canal in those teeth without previous endodontic treatment. In teeth that had endodontic treatment prior to extraction, tissue remained in the lateral canals and ramifications, regardless of radiographic evidence of sealer or gutta percha present. In those teeth with vital pulp tissue prior to treatment, vital tissue persisted with varying degrees of inflammation, regardless of the presence of sealer or gutta percha forced into the space. In those teeth with a pretreatment diagnosis of necrotic pulp, necrotic debris remained intermixed with any sealer or gutta percha present in a lateral canal or apical ramification.

CONCLUSIONS: The radiographic appearance of sealer and/or gutta percha in a lateral canal does not represent actual "filling" of that lateral canal. In view of these findings, the "filling" or demonstration of lateral canals or apical ramifications with sealer or gutta percha has little or no influence on the prognosis.

CLINICAL RELEVANCE: In light of these findings, efforts aimed at forcing material into lateral canals is unnecessary and will not lead to an improved prognosis for endodontic treatment. Instead, future efforts should be aimed at better disinfection of root canals, particularly in the presence of a necrotic pulp.

PERIODONTICS

GERALD I. DRURY, DDS

Inflamed periodontal surfaces are related to control of diabetes.

Nesse W, Lindhe A, Dose-response relationship between periodontal inflamed surface area and HbA1c in type 2 diabetics. *J Clin Periodontol* 36:295-300, 2009.

BACKGROUND: The aim of this study was to assess a dose-response relationship between periodontal inflamed surface area (PISA) and HbA1c levels in type 2 diabetics.

METHODS: Forty consecutive dentate type 2 diabetics visiting their general practitioner for regular check-up underwent full-mouth pocket depth (PPD) and bleeding on probing (BOP) assessment. From these data, PISA was calculated. HbA1c levels were retrieved from the patients' medical files. The dose-response relationship between PISA and HbA1c levels was assessed using multiple linear regression analyses, controlling for factors that might influence PISA or HbA1c levels.

RESULTS: The study population consisted of mainly female type 2 diabetics. Only 10 percent out of the 40 included patients had a healthy weight. HBA1c ranged from 4.9 percent to 14.2 percent, with 60 percent of the study population having an HbA1c above the recommended 7.0. The higher the PISA of type 2 diabetic, the higher their HbA1c levels were. On a group level, an increase of PISA with 333 mm^2 was associated with a 1.0 percent increase of HbA1c, independent of the influence of other factors.

CONCLUSIONS: This study shows that there is a dose-response relationship between HbA1c levels and PISA in type 2 diabetics. This dose-response relationship might be an indication of a causal relationship between PISA and HbA1c. This study suggests that PISA is a useful tool to assess dose-response relationships between the amount of inflamed periodontal tissue and HbA1c.

BOTTOM LINE: Inflamed periodontal surfaces are related to control of diabetes.

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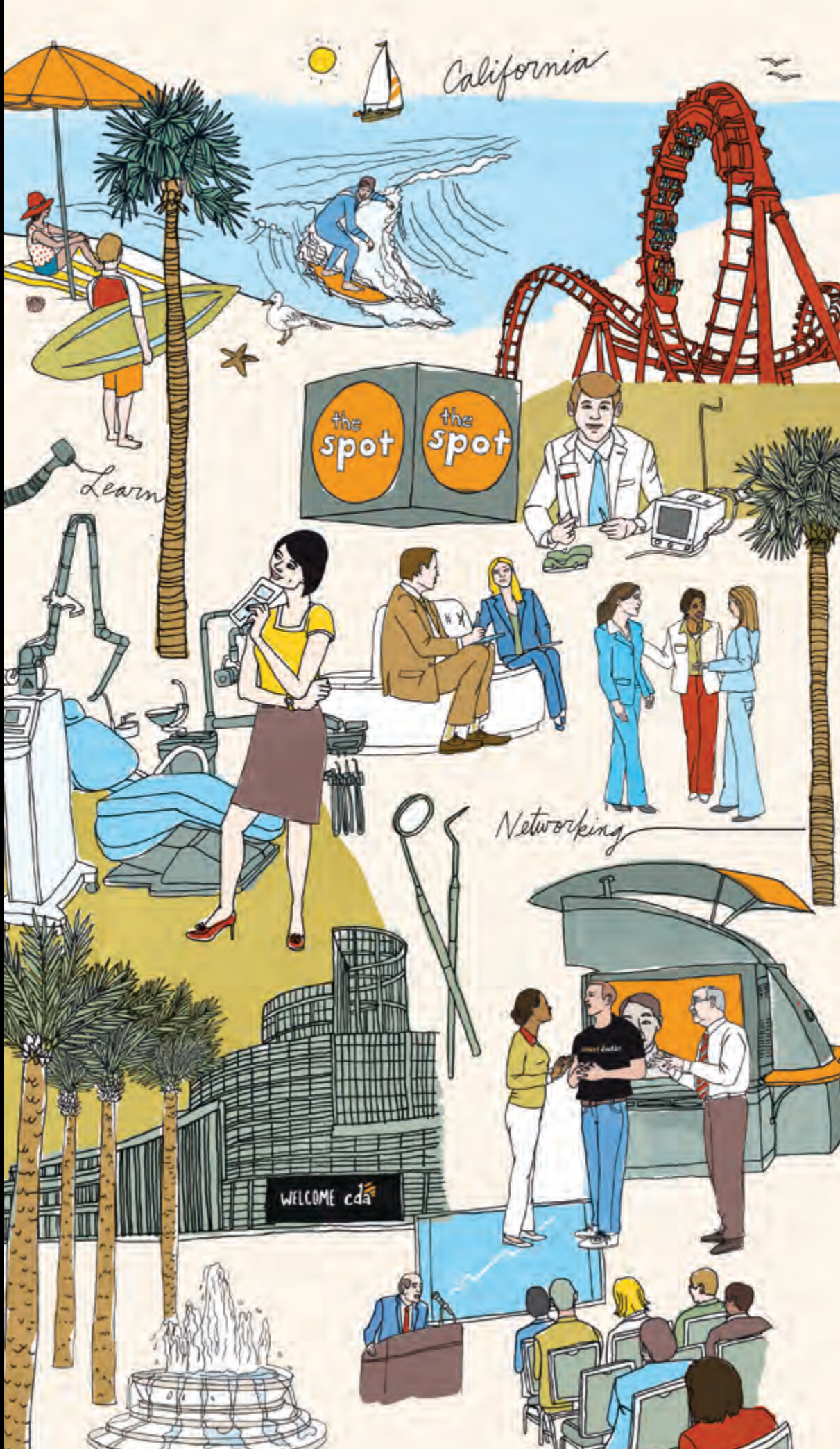

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GUEST EDITOR

Paul Reggiardo, DDS, is a practicing pediatric dentist in Huntington Beach, Calif. He currently serves as the public policy advocate for the California Society of Pediatric Dentistry and maintains a faculty appointment in the Department of Pediatric Dentistry at the University of Southern California. He chaired the 2008 CDA Sealant Utilization Workgroup.

Dental pit and fissure sealants have been extensively studied and are today universally recognized as a cost-effective and proven evidence-based method of reducing the incidence of dental caries in susceptible teeth and high-risk populations. Yet, sealant utilization in California remains low, especially among population groups with the highest caries assessment risk.

Healthy People 2010, the national framework for health prevention strategies, managed by the Office of Disease Prevention and Health Promotion of the U.S. Department of Health and Human Services, sets an objective of increasing the proportion of third-grade children receiving sealants on first permanent molars from 23 percent to 50 percent. Yet, the 2006 California Smile Survey, "An Oral Health Assessment of California's Kindergarten and Third-Grade Children," by the Dental Health Foundation, reported only 28 percent of California third-graders had received protective sealants. While this is a definite improvement over the 12 percent reported in a similar 1993-1994 California survey, it still falls far short of what is needed to make a substantial difference to vulnerable populations. Compared to 25 other states that have conducted similar surveys, only Arkansas had a higher prevalence of decay among third-graders, and 19 of these 25 states reported a higher rate of children receiving dental sealants than California.

Recently, the Council on Scientific Affairs of the American Dental Association provided valuable assistance to the clinician by convening a panel of experts to evaluate the collective body of information and develop evidence-based clinical recommendations on pit and fissure sealant placement. The report of that panel, "Evidence-based Recommendations for the Use of Pit and Fissure Sealants," published in the *Journal of the American Dental Association* in March 2008, presents a critical evaluation and summary of the relevant scientific information regarding sealant placement indications. Of strategic importance was the panel's identification of two independent risk scenarios to be considered by the clinician:

Individual Risk — Caries susceptibility based on the anatomic findings of a clinical examination of the dentition (e.g., deep occlusal anatomy or open occlusal grooves).

Population Risk — Caries susceptibility based on demographic information identifying high caries risk (e.g., children eligible for the federal Free and Reduced School Lunch Program) or oral health practices (e.g., those elementary school-age children whose parents or caregivers take little interest in and provide even less participation in their oral hygiene efforts).

Other key findings and recommendations from the report include:

- Pit and fissure sealants should be placed on incipient carious lesions of enamel in children, adolescents, and adults to reduce the percentage of lesions that progress to cavitated lesions.
- Resin-based sealants are the first choice of material, but glass ionomer cement may be used as an interim preventive agent when moisture control cannot be assured, such as with a newly erupted tooth or secondary to issues of patient compliance.
- Routine mechanical preparation of enamel before acid etching is not recommended.
- A four-handed technique enhances sealant integrity and, where possible, should be utilized.

The California Dental Association has a strong history supporting increased sealant utilization. CDA's 1985 policy on "Pit and Fissure Sealants for Children Served by Medi-Cal" directs the association to "vigorously pursue all legislative and/or regulatory avenues for achieving its stated policy of making pit and fissure sealants available as a preventive measure to all children served by the Medi-Cal program." Additionally, a 1994 policy, "Solicitation of Patients at Schools," stated "... programs promoting dental health, such as dental screening, mouthguard programs and application of sealants, provide a valuable service to the public and should be encouraged."

Goal 8 of CDA's 2007-2010 Strategic Plan, approved by the 2008 House of Delegates, to "increase care for underserved populations, particularly children, the elderly, and people with special needs through targeted policies and strategies," includes an objective to increase sealant utilization by 10 percent statewide.

In support of this goal, in 2008 CDA's Policy Development Council authorized the formation of a Sealant Utilization Workgroup charged with identifying strategies to increase sealant utilization for children, adults, and seniors in California. That workgroup, composed of Drs. Irene Hilton, Robert Isman, John Pisacane, Ariane Terlet, and Joan Greenfield, RDA, chaired by this author, concluded that the management of dental caries through an increase in sealant utilization will require a collaborative effort to increase sealant promotion by clinicians, sealant demand by patients, and sealant availability in school-based programs. Looking at population risk as well as individual risk will be important to assure that initial efforts focus on reducing dental disease in those most vulnerable to dental disease — low income and minority children — while not overlooking the population seen regularly in private offices.

As a result of the workgroup's recommendations, the 2009 CDA House of Delegates approved a resolution:

- Supporting the use of dental sealants for all Californians at risk of developing caries;
- Promoting the ADA's 2008 sealant guidelines and evidence-based recommendations;
- Supporting improved dental benefit coverage for sealants on primary and permanent teeth of children and adults; and
- Informing members about the benefits of sealants through CDA educational and communication channels.

This theme issue of the *Journal of the California Dental Association* responds to these challenges by presenting four articles intended to increase the dental professional's comfort level in making appropriate contemporary sealant recommendation and placement decisions. In these articles, Dr. Michael Ignelzi discusses the science related to sealant application, reviews the rationale for routine sealant placement, synthesizes the sealant recommendations of the American Dental Association and the American Academy of Pediatric Dentistry, and provides suggestions to achieve optimal sealant clinical technique. In another article, Drs. Issa Sasa and Kevin Donly compare the types of sealant materials available today and the placement of the sealant, including appropriate tooth preparation, acid-etching, polymerization, and the use of adhesives prior to sealant placement. Dr. Robert Isman, in a third article, examines some of the similarities and differences between sealant use in private practice and in public health settings, such as schools, as well as the effectiveness and economic aspects of school-based sealant programs. In discussing the oral health status of children in California, he looks at some of the reasons why sealants are underutilized, including current reimbursement levels. Finally, Dr. Francisco Ramos-Gomez and co-authors focus on caries risk assessment for infants and young children, which is the basis for the ADA's evidence-based sealant recommendations in the primary dentition. ■■■■

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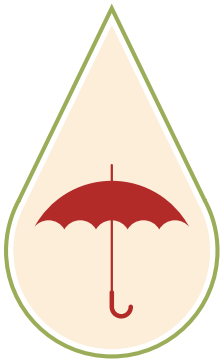

Pit and Fissure Sealants — An Ongoing Commitment

MICHAEL A. IGNELZI JR., DDS, PHD

ABSTRACT The purpose of this article is to provide the dental health professional with sound science related to sealants so that he/she can provide the best care to his/her patients. This article will synthesize the recommendations made by the American Academy of Pediatric Dentistry and the American Dental Association, review the rationale as to why sealants should be placed on a routine basis, and provide practical suggestions on how to optimize sealant placement.

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In 2005, the American Academy of Pediatric Dentistry convened the Symposium on the Prevention of Oral Disease in Children and Adolescents. Experts with diverse expertise, including dental sealants, were asked to review the literature and make recommendations that would lead to improved oral health for children and adolescents. In 2006, the American Dental Association's Council on Scientific Affairs convened a panel of experts on dental sealants with similar goals. These expert panels were created because pit and fissure caries continues to be a significant oral health burden and because sealants have been shown to prevent pit and fissure caries. Both expert panels thoroughly reviewed the literature and developed practical recommendations that are based on sound science; these recommendations represent the state of the art and should be adopted by anyone who places dental sealants.[1,2]

Approximately 90 percent of caries in permanent teeth occurs in the pit and fissures and caries in pit and fissures increases dramatically in permanent teeth between the ages of 11 and 19. Twenty-one percent of 11-year-olds have caries in their permanent teeth, whereas 67 percent of 19-year-olds have caries in their permanent teeth.[3] This dramatic increase in permanent tooth caries during the teen years is principally the result of a lack of sealants on first and second permanent molars and, to a lesser extent, premolars. Resin-based sealants are very effective at preventing pit and fissure caries. Long-term studies have shown that as long as a pit and fissure system is filled with sealant, caries will not occur. Sealant retention equates with caries

TABLE 1

A Best Practices Protocol to Place Sealants

1. Clean tooth with oil-free pumice or air abrasion, rinse tooth with water, and dry tooth completely;
2. Isolate tooth to prevent moisture contamination;
3. Total etch using 37-40 percent phosphoric acid (H_3PO_4), etch tooth for 30 seconds;
4. Rinse thoroughly with water and dry;
5. Place a thin layer of bonding agent that contains an adhesive and primer (but does not contain an etchant), gently thin bonding agent with air, cure according to manufacturer's instructions;
6. Place a thin layer of resin-based sealant in all pits and fissures, cure according to manufacturer's instructions;
7. Adjust occlusion as necessary, and
8. Evaluate integrity of sealant on a routine basis and add sealant as needed.

prevention, but studies clearly show that sealant material is lost over time. On average, sealants prevent 86 percent of caries after one year, 79 percent after two years, and 59 percent after three years.[4,5]

If sealants are so effective at preventing pit and fissure caries, then, why do so few dentists place sealants on a routine basis? A fact that is both shocking and disheartening is that only 30.5 percent of permanent molars in children aged 6-11 years have been sealed in this country.[3] This rather low utilization rate of sealants suggests that many practitioners are not convinced that sealants are in their patients' best interests.

Let us consider two possibilities that would explain why some dentists, who genuinely have their patients' best interests at heart, do not place sealants on a routine basis. The first possibility is that practitioners are concerned that they will inadvertently seal over caries and that the trapped caries will spread. Griffin and colleagues combed the literature to identify well-done studies that examined what happened when sealants were placed over noncavitated carious lesions. In a meta analysis (a well-regarded technique that combines the results of several similar studies to draw conclusions that are more powerful than the conclusions of any single study), Griffin concluded that the median annualized probability of progression for noncavitated carious lesions that had been sealed was very low (2.6 percent).[6] When bacteria become trapped underneath an intact sealant, they are deprived of fermentable carbohydrates. When bacteria are deprived of nutrients, they are unable to produce acid and caries cannot progress.

The concern that undetected caries will be trapped underneath a sealant and progress also explains why many dental health professionals perform enameloplasty as a routine procedure prior to sealant placement. Mechanical preparation of noncavitated carious lesions that are confined to the enamel should not be a routine procedure prior to sealant placement. In their review of the literature, Feigal and Donly reported that there were no long-term clinical studies that showed sealant retention was improved as a result of enameloplasty.[1] Only two clinical studies, both of which were short in duration and small in terms of sample size, have explored the effect of enameloplasty on retention of sealants and both demonstrated that retention with enameloplasty is equal to, but no better than, retention without enameloplasty.[7,8] Because enameloplasty of pits and fissures may weaken the tooth, and has no demonstrable benefit, enameloplasty is not recommended as a routine procedure.

The second possibility that would explain why some dentists do not place sealants on a routine basis is the concern that the sealant will be lost and the loss of sealant will place the tooth at greater risk than if it had never been sealed. When partial loss of sealant occurs and the remaining portion of sealant appears to be acting as a plaque trap, it is tempting to conclude that never having sealed the tooth would have been in the patient's best interest. Griffin and colleagues performed a meta analysis to address the question whether a tooth with a partially lost sealant is at a higher risk of developing caries than it would have been if it had never been sealed. They concluded that the caries rate in formerly sealed teeth, with partial or complete loss of sealant, is less than or equal to the caries rate in nonsealed teeth.[9]

There are two lessons to take away from these studies. The first is that we should restore cavitated lesions but seal over the vast majority of noncavitated lesions. There will be instances — lack of patient cooperation, hypomineralized enamel, etc. — in which sealants should not be placed over noncavitated carious lesions, and that is why most guidelines, including the AAPD and ADA guidelines being discussed here, emphasize the importance of professional judgment in each clinical decision.

The second, perhaps more important lesson, is that sealants must remain intact to confer protection. A sealant should not be regarded as one-time event, but rather as an ongoing commitment to the patient because some, or all, of the sealant will likely be lost at some point. Accepting the inevitability that sealant material will need

FIGURE 1. The sealant armamentarium. Oil-free pumice (1st and Final, Reliance Orthodontics), 37 percent phosphoric acid, a bonding agent that contains an adhesive and a primer (Adper Single Bond Plus Adhesive, 3M ESPE), and resin-based sealant (Clinpro, 3M ESPE).

FIGURE 2. Sealant being placed on a primary second molar at risk for decay. The first primary molar exhibits occlusal caries and the second primary molar exhibits pits and fissures that are at risk for decay.

FIGURE 3. Excess sealant, which is pink in color prior to polymerization, is easy to remove. Clinpro sealant (3M ESPE), placed within the pits and fissures of the second primary molar, is pink prior to polymerization and white after polymerization.

to be added will require a change in perspective by some practitioners. The realization that dentists are making an ongoing commitment to the patient has led the profession to become meticulous about the technique so that sealant loss is minimized.

Our profession remains convinced that sealants are a wonderful service, but there is the realization that sealants are essentially a resin-based material being tasked to withstand a variety of compressive, sheer, and tensile forces in a rather harsh environment. It would be unreasonable to expect a sealant to last "forever." When parents ask, "Will the sealant last forever?" this author tells them something to the effect, "Nothing lasts forever. On average, 86 percent of sealants are still in place after one year, 74 percent are still in place after two years, and 56 percent are still in place after three years."[4,5] The author continues to say something like, "Sealants are like the leather soles on your shoes or the tires on your car — they wear out over time and need to be replaced." The author typically ends with, "We like to think that we are a little bit better than average and we take certain steps to improve our success. It is important to return for your regularly scheduled checkups so that we can keep a close eye on these sealants."

There are specific recommendations, made by the AAPD and ADA expert panels that should be followed when placing sealants. Many of these recommendations are summarized below, an armamentarium is shown in **FIGURE 1**, and a "best practices" protocol for placing sealants appears in **TABLE 1**.

Preventing moisture contamination during sealant placement is essential. Moisture contamination during placement is the main reason why resin-based sealants fail and advertisements for resin-based sealants that bond in a "moist environment" are absurd.[10,11] Rubber dam isolation is ideal, but good isolation can be achieved with cotton rolls, triangular shaped absorbent pads (Dri-Angles), devices such as Isolite (Isolite Systems, Santa Barbara, Calif.), and continuous suction. It is often difficult for one person to keep a tooth that is to be sealed free from moisture contamination and apply the sealant, and it is for this reason that the ADA expert panel recommends two people apply sealants whenever possible.

In the authors' practice, one staff member seats the patient and then cleans the teeth to be sealed. Once this first staff member has isolated the teeth and has begun to apply the phosphoric acid, a second staff member sits down to help. The role of the first staff member is to place an appropriate amount of sealant in all pits and fissures and the role of the second staff member is to maintain a dry field. Maintaining a dry field during sealant placement will reduce sealant failure and will ultimately save staff time because less sealants will need to be replaced. Studies have shown that sealants placed by two people exhibit greater retention than sealants placed by one person.[12]

Primary teeth, that are at risk for pit and fissure caries, will benefit from sealants.[13,14] Children, deemed to be at risk for pit and fissure caries, who are inherently cooperative or who are sedated while having other teeth restored, are good candidates for sealants on primary teeth. Conversely, children who are not cooperative are not good candidates for sealants on primary teeth. **FIGURE 2** shows a first primary molar with occlusal caries and a second primary molar with pits and fissures that are at risk for decay. **FIGURE 3** illustrates resin-based sealant being applied to the pits and fissures of the second primary molar. The sealant (Clinpro, 3M ESPE) is pink in color prior to polymerization and opaque after polymerization. The pink color allows for easy clean up of excess sealant prior to polymerization.

Clean the teeth to be sealed. Cleaning teeth with a dry toothbrush prior to sealant placement may be just as effective as cleaning with rubber cup/bristle brush and pumice or air abrasion.

Mechanical preparation of fissures prior to sealant placement is not indicated. Some practitioners opt to prepare fissures with a small round bur or "fissurotomy" bur to uncover caries not detected by visual or tactile examination and/or increase retention. The ADA expert panel addressed both rationales and concluded that neither is supported by the literature.[2] Caries that are covered by an intact sealant will not progress and mechanical preparation of pits and fissures prior to sealant placement has little to no effect on sealant retention.[7,8,15] Sealant retention is principally the result of resin tags penetrating the microporosities that occur when enamel is etched properly.

After etching, apply a bonding agent that contains an adhesive and primer to improve retention. Immediately after teeth have been etched for 30 seconds with 37-40 percent phosphoric acid, rinsed with water and dried, apply a thin layer of bonding agent that contains an adhesive and primer (a fifth-generation bonding system, e.g., Adper Single Bond Plus Adhesive, 3M ESPE, Saint Paul, Minn.). In a well-designed randomized clinical trial, Feigal and colleagues showed that applying this bonding agent will significantly increase retention and reduce microleakage.[16]

Avoid self-etching bonding agents when placing sealants on uncut enamel. Self-etching bonding agents (seventh-generation) are not acidic enough to adequately etch uncut enamel and should be avoided when placing sealants on uncut enamel.[17,18]

Resin-based sealants, not glass ionomer cement sealants, should be used in most clinical situations. Although glass ionomer cements are being marketed as sealant material, resin-based sealants are still the material of choice in the vast majority of clinical situations. Glass ionomer cements are brittle and wear under compressive loads at a greater rate than do resin-based sealants. Because they can withstand a small amount of moisture contamination, glass ionomer cements are indicated for sealants in teeth that cannot be isolated completely, e.g., partially erupted teeth that are hypoplastic. Glass ionomer cement sealants that are placed on teeth that have not yet fully erupted should be considered interim or temporary sealants.

Summary/Conclusion

Approximately 90 percent of carious lesions in permanent teeth occur in pits and fissures. Resin-based dental sealants have been shown to prevent pit and fissure caries. In the past few years, the AAPD and the ADA have convened expert panels to review the sealant literature and to make recommendations regarding sealant placement. Two main themes emerge from these expert panels. First, with some exceptions, noncavitated carious lesions in pit and fissures should be sealed rather than restored. Second, sealant placement is not a one-time event. It is normal for sealant to be lost over time and the dental health professional must make an ongoing commitment to replace sealants as they are lost. Retention of sealant equates to caries prevention and a "best practices" protocol has been described to optimize sealant retention. ■■■■

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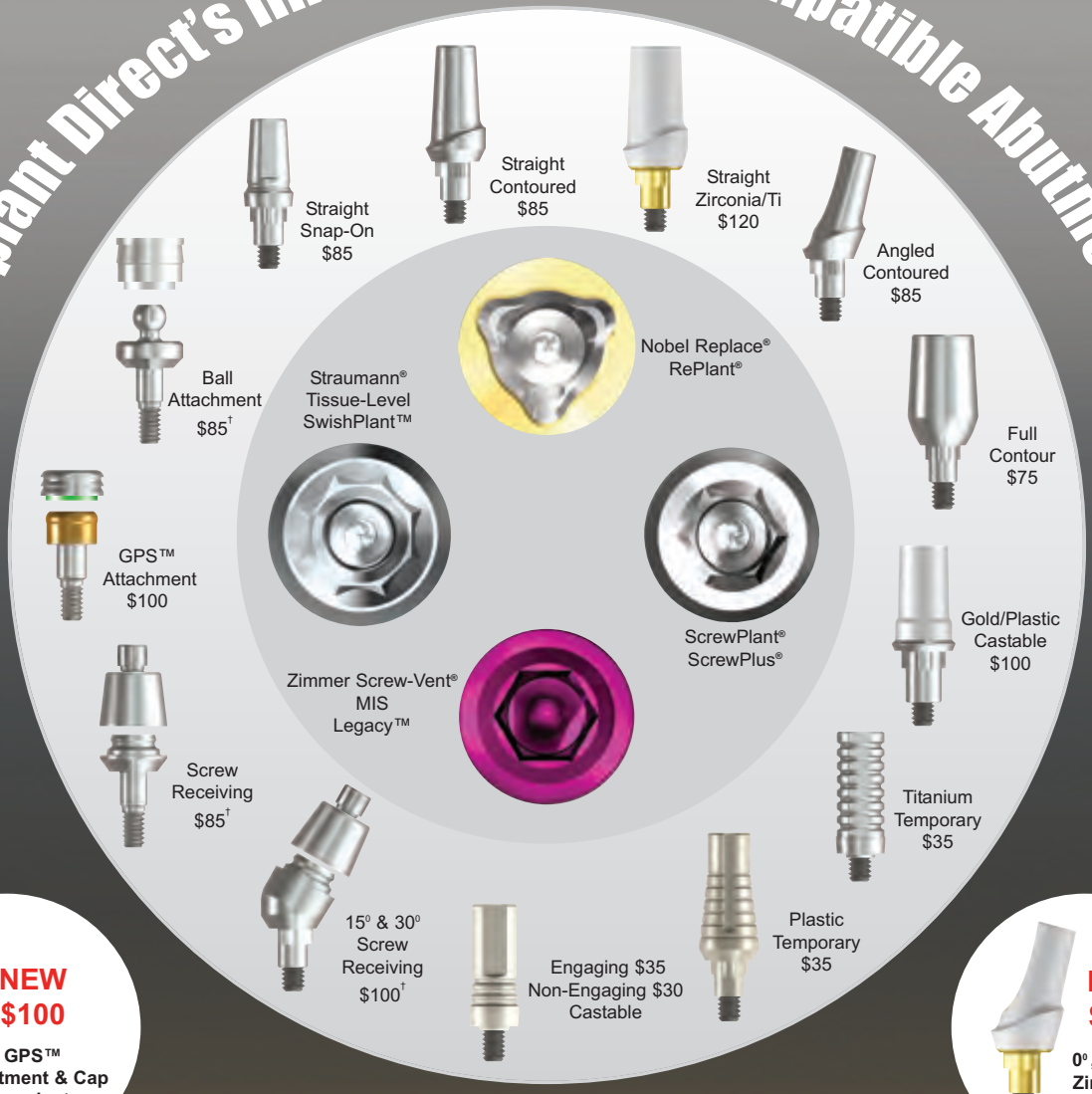

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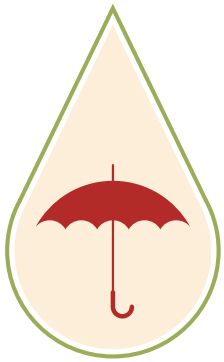

Sealants: A Review of the Materials and Utilization

ISSA SASA, DDS, MS, AND KEVIN J. DONLY, DDS, MS

ABSTRACT Dental pit and fissure sealants have been shown to be effective in the prevention of dental caries. Currently, sealants are recommended to be placed on teeth that are considered to be "at risk" to develop caries, including teeth that present with incipient enamel lesions. This paper discusses the types of sealant materials available and the placement of the sealant, including appropriate tooth preparation, acid-etching, polymerization, and use of adhesives prior to sealant placement.

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The term pit and fissure sealant is used to describe a material that is introduced into the occlusal pits and fissures of caries susceptible teeth, thus forming a micromechanically bonded, protective layer cutting access of caries-producing bacteria from their source of nutrients. Methods of caries prevention focus on pit and fissure caries because tooth surfaces with susceptible pits and fissures have always been the earliest and most prevalent of carious areas, accounting for more than 80 percent of all caries in young permanent teeth.[1] It is generally accepted that the effectiveness of sealants for caries prevention depends on long-term retention.[2] Full retention of sealants can be evaluated through visual and tactile examinations. In situations in which the sealant is lost or partially retained, the sealant should be reapplied to ensure effectiveness. Since the introduction of the first dental sealant Nuva-Seal (L.D. Caulk) in 1971, sealants have gradually become a critical component to contemporary dental practice, having demonstrated great success in the prevention of dental caries.[3] The purpose of this paper is to describe the sealant materials available and the appropriate utilization of sealants.

Types of Sealants

Basically, sealants are made of a Bis-GMA resin, introduced to dentistry by Bowen.[4] These Bis-GMA resin sealants are used in conjunction with the acid-etch technique, initially recommended by Buonocore to aid in the

retention of acrylic resins to enamel.[5]

There are resin-based sealants that have unique characteristics:

Nonfilled Versus Filled Sealants

Traditional sealants were initially Bis-GMA unfilled resin. The sealant was placed over the acid-etched enamel surface and either auto- or light-polymerized. If these sealants were slightly high in occlusion, they were easily worn down or abraded through normal masticatory function and no clinical adjustment was needed.[6]

Today, both unfilled and filled sealants are available in the marketplace. The filler content can range anywhere from minimal amounts of filler up to 75 percent filler. Dentists should be aware of the filler content in the sealant being utilized. The higher the percentage of filler, the more important it is to check and adjust the occlusion when the sealant is high in occlusion.[7] Likewise, it is important that the curing light penetrates the sealant being placed to ensure maximum polymerization. Highly filled sealants require a longer light polymerization; therefore, it is critical to follow manufacturer's instructions on the amount of the time necessary for light polymerization.

Color-Changing Sealants

Sealants that change color are available. ClinproTm (3M ESPE, St. Paul, Minn.) sealant has a pink color when uncured.[8] This allows the clinician to be sure sealant is present where desired on the tooth prior to polymerization. The pink color changes to white when the sealant is polymerized. The white color of the final sealant, due to titanium dioxide within the sealant, makes it readily visible at recall examinations.

Helioseal Clear Chroma (Ivoclar/Vivadent, Inc., Amherst, N.Y.) sealant is a clear and translucent shade; however, when it is exposed to the polymerization light, the sealant turns olive green.[9] The color change allows clinicians to determine if all caries-susceptible pits and fissures are effectively sealed. When the patient returns for recall evaluations, presence of the sealant can be easily verified upon exposure to a polymerization light.

Opaque Versus Clear Sealants

Sealants containing opaquing agents and sealants that are clear have been readily available in the marketplace.

THE HIGHER THE percentage of filler, the more important it is to check and adjust the occlusion when the sealant is high in occlusion.

Although success has been noted with sealants in general, whether opaque or clear, opaque sealants are easier to see during placement and easier to see and maintain at recall visits.[10]

Fluoridated Sealants

A number of sealants are available that contain fluoride. The premise that fluoride being released from a sealant might minimize caries at sealant margins and supply small amounts of fluoride into saliva that might be beneficial to the oral cavity makes sense. However, there are no randomized clinical trials that have documented a clinical benefit from fluoridated sealants. Certainly, fluoridated sealants have been shown to be as effective as nonfluoridated sealants, but further research is necessary to ascertain if there is an additional benefit to placing fluoride-releasing sealants.[11-15,16]

Autopolymerized Versus Light-Polymerized Sealants

Both autopolymerized sealant and light-polymerized sealants are available. When either of these types of sealants are placed in conjunction with the acid-etch technique, they are clinically effective. There does not appear to be any significant difference between the retention of autopolymerized sealants and light-polymerized sealants.[17,18]

Glass Ionomer Cement Sealants

Conventional glass ionomer cements have been evaluated for effectiveness as a sealant, as well as more contemporary resin-modified glass ionomer cements. Due to the fluoride release associated with glass ionomer cements and the setting reaction of the cement, where water is a byproduct, the use of glass ionomer cements as a sealant material seemed rational. Glass ionomer cement is hydrophilic, which is why it is suited for partially erupted teeth when a dry field cannot be obtained. The fluoride could potentially prevent caries adjacent to sealant margins and the glass ionomer cements were not as moisture sensitive as resin-based sealants. A thorough review of the literature was completed to make evidence-based clinical recommendations for the use of pit and fissure sealants.

The findings of the expert panel, brought together by the American Dental Association, reported there is limited and conflicting evidence that glass ionomer cement significantly reduces caries incidence in permanent teeth of children, when compared to resin based sealants.[3,19-23] Retention rates, particularly noted with conventional glass ionomer cements, were very poor.[24] Therefore, at this time, glass ionomer sealants are recommended as a transitional sealant material on tooth surfaces considered to be at high risk for caries development but unable to be adequately isolated to place resin-based seal-

ants.[25] Further research with resin-modified glass ionomer cements is necessary to provide more sound evidence of actual effectiveness when used as a pit and fissure sealant, compared to a resin-based sealant.

Enameloplasty Sealant Technique

The long-term caries prevention of fissure sealants depends on several factors. These factors include retention, marginal integrity, and meticulous operator technique.[26]

Several studies have shown that the enameloplasty sealant technique in which the fissure system is mechanically prepared with small burs prior to sealant application, allows a deeper sealant penetration and a superior sealant adaptation than the conventional sealant treatment without any mechanical enlargement of the fissures with a bur.[27-29] However, there is minimal clinical evidence to indicate enameloplasty prior to sealant placement improves long-term caries prevention.

Air Abrasion and Sealants

Air abrasive technology initially introduced in the 1950s, uses a high-speed stream of purified aluminum oxide particles propelled by air pressure onto the cleaned and dried tooth surface.[30]

In the early years of air abrasion, some of the manufacturers claimed that the roughening of the enamel surface with air abrasion could be a substitute for acid-etching of enamel prior to sealant placement. Research, however, has shown that air abrasion roughening of the enamel surface is not an effective substitute for acid-etching of enamel prior to fissure sealant application.[31-32]

Acid-Etching Primary and Permanent Enamel

The enamel of primary and permanent teeth should be acid-etched prior to sealant placement to obtain maximum retention. The most common acid used is 35 percent to 45 percent phosphoric acid.[33] Traditionally, it was arbitrarily believed that a 50-micron etch depth in enamel was necessary to obtain adequate retention. To achieve this etch depth with 35 percent phosphoric acid, it was necessary to etch primary enamel for two minutes and permanent enamel for one minute.[34] It was believed that primary enamel needed to be etched longer to obtain the micron etch depth because of the difference in mineralized enamel between primary and permanent teeth, including prismless enamel.[35] Research has shown that 15 seconds is actually adequate to achieve the etch necessary to provide appropriate retention of sealants in both the primary and permanent dentition.[36-38]

THERE IS MINIMAL clinical evidence to indicate enameloplasty prior to sealant placement improves long-term caries prevention.

Light Curing of Sealants

Because pit and fissure sealants bond to the cuspal inclined planes, and not to the depth of the pit and fissures, insufficient curing of the resin sealant could reduce the bond strength.[39-41] Light curing of the sealant can be accomplished with quartz-tungsten-halogen (QTH) curing units, plasma arc-curing units, laser-curing units, and light-emitting diode (LED) units. It is important to follow the manufacturer's instructions for the curing unit utilized, respectively. It is essential to periodically monitor the curing light output of the unit used to cure the fissure sealant to guarantee that adequate curing has occurred.

Some researchers have recommended the use of longer curing times (60 seconds) when using QTH units to increase sealant retention, as this longer curing time might produce a stronger enamel sealant unit, which could be more wear-resistant in the clinical environment.[42,43]

Caries Risk Assessment and Sealant Use

Strategies for managing caries increasingly have emphasized the concept of caries risk assessment. Caries risk assessment is the determination of the likelihood of the incidence of caries during a certain time period.[44,45]

It is important to analyze the risk of caries in the process of decision-making for sealants.

The application of sealants, from a maximally cost-effective view, is best applied to high-risk patients.[46,47]

The best predictors of an individual's caries risk are prior caries experience, fluoride history, fissure anatomy, and plaque load.[48,49]

In this context it also important to note that a patient's caries risk should be re-evaluated periodically, as the risk of experiencing dental caries may change across time as risk factors change. Teenagers consuming excessive amounts of sodas and energy drinks would be a prime example in which caries risk could change dramatically. Another example in which caries risk could change is patients receiving medications causing xerostomia, or those receiving radiation therapy to the head and neck region damaging the salivary glands.

Use of Bonding Agents Prior to Sealant Placement

The use of bonding adhesives has been recommended by some following acid-etching, prior to sealant placement.[3,50-52] Bonding adhesives are unfilled resins that can more easily flow into pits and fissures, but also contain dehydrating agents (i.e., ethanol, acetone) that chase water and carry the methacylate resin deep into pits and fissures. A well-controlled clinical trial reported a single bottle bonding agent, containing primer and adhesive, yielded half the risk of failure for occlusal surfaces and one-third the risk of failure for buccal and lingual surfaces.[52]

Sealant Use With Restorations

Sealants are recommended to be placed on surfaces considered to be at risk for caries development. Primary or permanent teeth can be at high risk and benefit from the placement of a sealant. Present active caries status, caries history, fluoride exposure history, parental caries history, hygiene maintenance, and special needs patients are all factors to be considered when assessing a tooth and patient for the risk of caries development. However, sealants are not only used alone, but can also be placed over caries-susceptible pits and fissures, as well as restoration margins when preventive resin restorations are being placed or sealed amalgam restorations are being placed.[53,54] Sealed amalgam restorations have been shown to be more clinically effective than nonsealed amalgam restorations.[55] Furthermore, preventive resin restorations include the use of sealant over nonprepared caries-susceptible pits and fissures.[54]

Sealants are also recommended to be placed over resin-based composite restorations and restoration margins.[53,54] Following resin placement and polymerization, restorations are finished and polished. Data has shown that the surfaces of resin-based composite restorations have the highest conversion of polymerized resin.[56] Therefore, after finishing a resin-based composite restoration, the surface should be polymerized again to ensure maximum polymerization. Finishing can also create mild imperfections at the surface of the resin restoration; therefore, placement of an unfilled resin or sealant is appropriate to fill in these imperfections and to allow the underlying surface to reach maximum polymerization.

SEALED AMALGAM restorations have been shown to be more clinically effective than nonsealed amalgam restorations.

Sealing Enamel Caries

Pit and fissure sealants are used as a prevention to caries initiation; however, they can also be placed over caries to provide a barrier that inhibits bacteria and nutrition to the pit and fissure, subsequently arresting caries progression. The evidence-based clinical recommendations for the use of pit and fissure sealants, reported through the ADA Council on Scientific Affairs, found that there was strong evidence from systematic reviews of randomized controlled trials indicating the placement of pit and fissure sealants significantly reduced the percentage of noncavitated carious lesions that progress in children, adolescents, and young adults for as long as five years after sealant placement, compared with unsealed teeth; there were no findings that bacteria increase under sealants.[3,57] In fact, sealants placed over existing caries lower the number of viable bacteria by at least hundredfold and reduce the number of lesions with any viable bacteria by 50 percent.[58]

Conclusion

Sealants are a proven, safe, and effective preventive material. Recent improvements to the clinical technique of the delivery system, combined with advancements in the chemical makeup of the sealant material have increased the success rates, by enhancing the retention and depth of penetration of these materials. ■■■■

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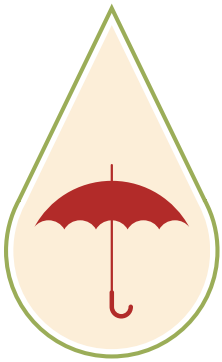

Dental Sealants: A Public Health Perspective

ROBERT ISMAN, DDS, MPH

ABSTRACT This article discusses the oral health status of California children, including sealant prevalence, and reasons why sealants are underutilized, including current reimbursement levels. The article also explains similarities and differences between sealant use in private practice versus public health settings, as well as the effectiveness and economic aspects of school-based sealant programs. Finally, the article briefly discusses the advantages of combined topical fluoride and sealant programs in public health settings.

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Pit and fissure sealants have been approved for use and recommended by professional health associations and public health agencies for many years.[1-3] Available national data show that 28 percent of 6-11-year-olds from families living below the federal poverty threshold ($21,910 annually for a family of four in 2008) developed caries in their permanent teeth, compared to 16 percent of those from families with incomes more than twice the federal poverty threshold.[4,5] However, only about 20 percent of the children from families below the federal poverty threshold received sealants, compared to 40 percent of the children from families with incomes more than twice the poverty threshold.[6]

Data from 2004 indicate that about 90 percent of carious lesions are still found in the pits and fissures of permanent posterior teeth, with higher caries prevalence among children from low-income families and those of Mexican-American ethnicity.[1] These data also indicate that around 40 percent of children aged 2-8 years have experienced caries in their primary teeth. About 44 percent of carious lesions in primary teeth are found on the pits and fissures of molars.[1]

The U.S. Public Health Service established a Healthy People 2000 objective calling for 50 percent of 8- and 14-year-old children to have received pit and fissure sealants on one or more permanent molar teeth.[7] Yet, by 1988-94, only 23 percent of 8-year-olds and 15 percent of 14-year-

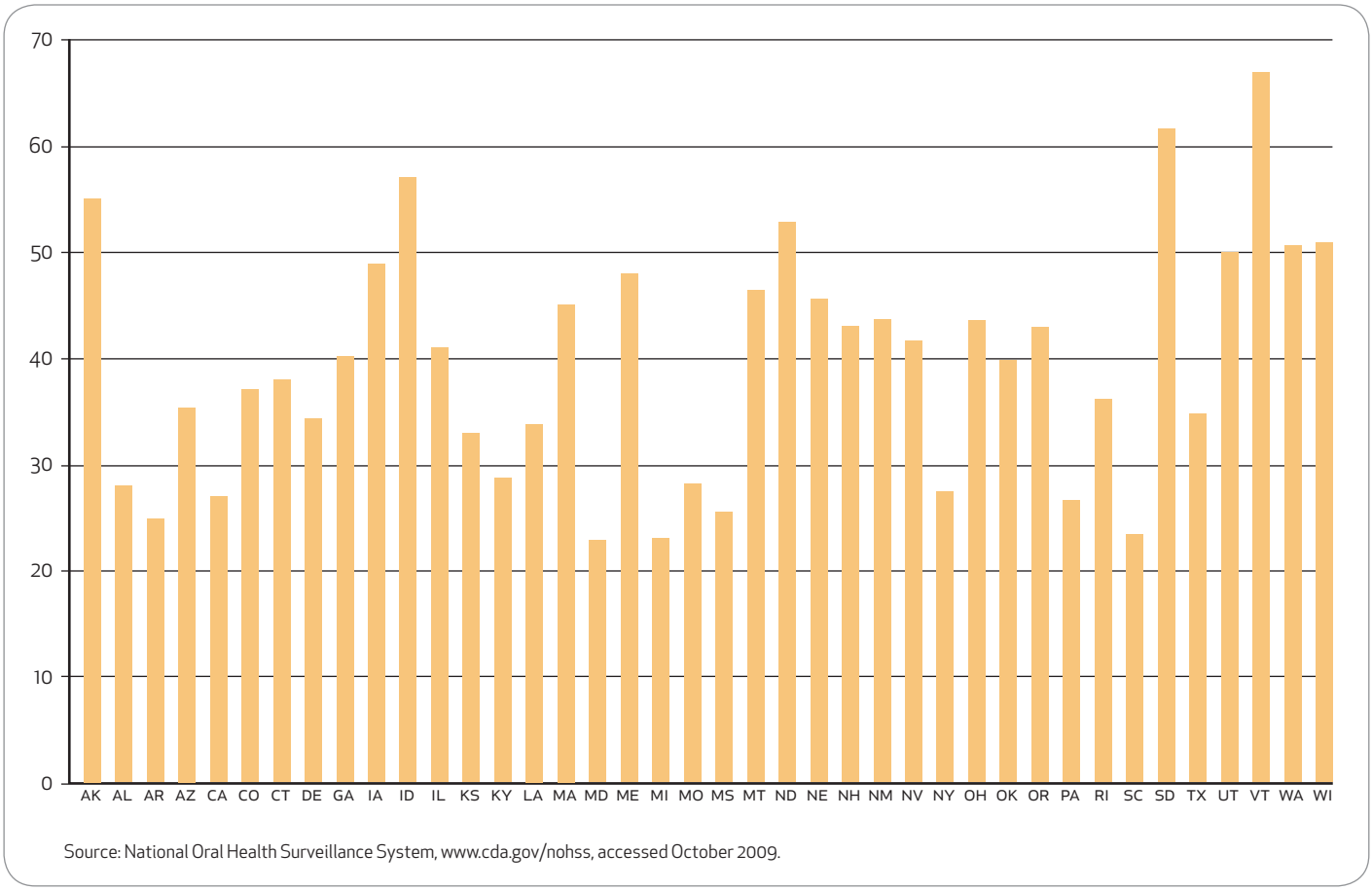


FIGURE 1. Percent of third-grade children with sealants by state.

olds had received sealants on their molar teeth. As a result of the lack of progress, the Healthy People 2010 objectives contained the same sealant objective.[8]

Between 1988-94 and 2004, sealant prevalence on first molars of 8-year-olds had increased from 23 percent to 32 percent, and for 14-year-olds from 15 percent to 21 percent, although overall the increases were not statistically significant for either age (differences, however, were significant for non-Hispanic blacks and Mexican-American 8-year-olds).[4] Draft 2020 objectives have proposed retaining a sealant objective, with subobjectives for children aged 3-5 and 6-9 years, and adolescents aged 13-15 years, although specific target levels have not yet been set.[9]

Oral Health Status and Sealant Prevalence Among California Children

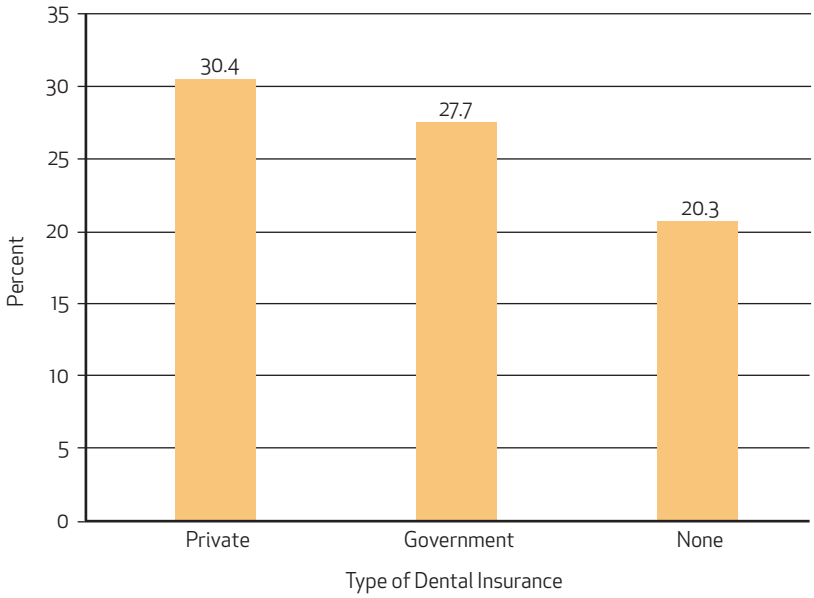
How do California children compare with their national counterparts? The most recent data on California come from examinations of more than 21,000 kindergarten and third-grade children conducted by the Dental Health Foundation in 2004-2005. This survey found that by the time children were in kindergarten, 63 percent had experienced caries, 28 percent had untreated decay, and 19 percent had rampant decay (caries experienced on seven or more teeth).[10]

Only 28 percent of third-grade children had received a sealant. Of perhaps greater concern, 13 percent of third-graders who were at risk for caries and had been to the dentist in the past year had never received a sealant.

FIGURE 1 shows the percentage of third-grade children who had received sealants in 40 states that collected comparable data on sealant prevalence in studies conducted between 1998 and 2009. California ranked 29th among these states.

Dental Insurance and Sealant Prevalence

The California survey also found that there was less variation in sealant prevalence related to dental insurance coverage than might have been expected. Among children with private dental coverage, 30 percent had received sealants, whereas among those with public coverage (Medi-



Source: Dental Health Foundation. "Mommy, It Hurts to Chew." The California smile survey: an oral health assessment of California's kindergarten and third-grade children. Oakland, Calif., Dental Health Foundation, February 2006.

FIGURE 2. Third-grade children with sealants.

Cal or Healthy Families) and no dental insurance, 28 percent and 20 percent, respectively, had received sealants (**FIGURE 2**). These data suggest that sealants are being underprovided by California dentists in both the private and public sector.

Why Are Sealants Underutilized?

The factors contributing to the adoption of pit and fissure sealants by the dental profession are complex. Mertz-Fairhurst suggested a number of reasons:[11]

- Poor or conflicting results reported from early clinical studies. Many dentists tried the first-generation sealants with poor results. This experience may have discouraged them from using later-developed sealants that showed improved results.
- Some of the barriers against the use of sealants start in dental schools, some continue to be ingrained in young graduates and older private practitioners, and some are due to lack of knowledge about sealants among patients, their employers, and their dental insurance providers.
- Some faculty and many private practitioners still prefer to wait and place a class 1 amalgam restoration rather than placing a sealant preventively.
- Some dentists are still concerned that they may inadvertently seal over caries, despite a number of clinical studies showing that sealants arrest caries.
- Some insurance companies may not offer reimbursement for sealants. As sealants are not disclosed by radiographs, insurance companies may be concerned about the possibility of fraud. In contrast, placements and replacements of class 1 amalgam restorations are reimbursed, even within a two-year period. Representatives of dental insurance companies also have claimed that the main reason for not providing sealant coverage is that there is "no demand" for such coverage. Thus, a vicious cycle continues.
- Employers may not realize how much absenteeism could be prevented if their employees' children received sealants routinely as part of their preventive dental regimen. As long as the employer, employee (with children), and the insurance companies remain uninformed about sealants, obviously no "demand" for sealants can be generated.
- Even those patients who are informed about sealants may not want to (or be able to) pay for sealants if their dentists recommend an alternative procedure (class 1 amalgam, if needed) that is covered by their dental insurance.
- Despite the preponderance of dental literature to the contrary, some dentists still tell their patients that "sealants don't work, they fall off, they are not worth the trouble and expense, you shouldn't seal a tooth with caries," etc."

Other reasons cited for the sparse use of sealants in caries prevention and management include the contention that findings from scientific studies are usually not transferred into practice, with dentists more influenced about sealants by opinions of colleagues than by findings published in research journals.[12] Some patients will rely solely on insurance coverage; hence, "If the insurance company doesn't pay for it, I don't want it."[13]

Recently some concern has been raised about the safety of bisphenol A (BPA) on reproduction and development in animals. According to a 2007 statement by the U.S. Department of Health and Human Services, National Toxicology Program, "Dental sealant exposure to bisphenol A occurs primarily with use of dental sealants [containing] bisphenol A dimethacrylate. This exposure is considered an acute and infrequent event with little relevance to estimating general population exposures."[14] The U.S. Food and Drug Administration has supported the evidence that products containing BPA are safe.[15] The ADA has also issued a statement on bisphenol A and dental materials that

TABLE 1

Selected Findings for California Children

Characteristic	Kindergarten	Third Grade
■ Caries experience (tooth decayed or filled because of caries)	54%	71%
■ Untreated caries	28%	29%
■ Urgent need for dental care	5%	4%
■ Not seen a dentist in past year	13%	21%
■ Never seen a dentist	17%	5%
■ No dental insurance	21%	24%

Source: Dental Health Foundation. "Mommy, It Hurts to Chew." The California smile survey: an oral health assessment of California's kindergarten and third-grade children. Oakland, Calif., Dental Health Foundation, February 2006.

dentists may find helpful in responding to patients' concerns about BPA in sealants.[16]

One of the strategies to increase sealant utilization proposed by a California Dental Association-appointed Sealant Workgroup is to increase demand for sealants from parents. A resolution to consider these strategies when developing sealant promotion activities of the association was approved by the 2009 CDA House of Delegates.[17]

Reimbursement for Sealants

As previously noted, one reason cited for the low utilization of sealants is that it is more lucrative to place a restoration. It has been estimated that the fee for a dental sealant is typically about one-third the cost of a permanent restoration.[17] According to the ADA 2007 Survey of Dental Fees, the median general practitioner fee in 2007 for the Pacific Region (California, Oregon, Washington, Alaska, and Hawaii) for a sealant was $48, while for a one-surface amalgam, the median fee of $110 was more than twice as expensive.[18]

In the Denti-Cal program, the difference is not quite as large: the current fee for a sealant and a one-surface amalgam are, respectively, $21.78 and $38.61, i.e., the amalgam restoration is not quite twice the cost of the sealant. However, for sealants this rate was less than the first percentile of dentists' fees in 2003.[19] This means that 99 percent or more of dentists' claims were for a greater amount. Denti-Cal fees have not increased since August 2000; in fact, they were reduced by 1 percent from the 2000 fees as of March 2009.[19] California's Medicaid fees for sealants are among the lowest in the nation, ranking 38th among the 50 states and the District of Columbia in 2008.[20]

A Public Health Approach to Sealant Promotion

The main feature that distinguishes dental public health from general clinical dentistry is its focus on communities, or population groups, rather than on individuals. Just as a general dentist begins with a diagnosis, then develops a treatment plan, and finally provides the necessary preventive and restorative treatment to bring a patient to optimal oral health; a public health dentist begins with a community assessment, then develops and implements appropriate oral health policies to address the needs identified by the assessment, and finally provides or arranges for programs and services that address the community's oral health needs.

If one looks at the entire state of California as a public health dentist's "community," one would start by looking at the prevalence of oral disease among different subpopulations. For example, TABLE 1 presents several findings from the Dental Health Foundation survey of kindergarten and third-grade children.[10] Compared with third-grade children surveyed in 37 states that collected comparable data on untreated caries prevalence between 1998 and 2009, California ranked 24th.[21]

Given these findings, some sort of intervention is clearly needed to try to prevent this level of disease. Even with the encouraging news that many more children will have dental coverage as the result of enactment of health care reform, it is unlikely that the capacity exists in the private dental sector to meet all of the accumulated need. Given the preponderance of pit and fissure caries in school-aged children, sealants represent one of the most effective weapons in the public health dental professional's armamentarium against caries. The U.S. Preventive Services Task Force — an independent, nonfederal group that conducts systematic reviews of the scientific evidence of effectiveness for selected community interventions — has identified fluoridation and school-based and school-linked sealant programs as the only community-based oral health interventions recommended for caries prevention.[22]

Differences in Sealant Use in Private Practice Versus Public Health Settings

Gooch et al. recently updated the guidelines for sealant use that were last revised in 1994.[6,22] The updated guidelines for school-based sealant programs (SBSPs) (TABLE 2) recommend sealing "sound and noncavitated pit and fissure surfaces of posterior teeth, with first and second permanent molars receiving highest priority." These recommendations complement recent ADA sealant recommendations and are consistent with them on virtually all topics addressed by both (e.g., sealing teeth that have noncavitated lesions and using a four-handed technique when possible).[1] While there are some differences in the delivery systems, there

TABLE 2

Recommendations for School-Based Sealant Programs

These recommendations update earlier guidelines and support policies and practices for school-based dental sealant programs that are appropriate, feasible, and consistent with current scientific information. This update focuses on indications for sealant placement on permanent posterior teeth that are based on caries status, and methods of assessing tooth surfaces. These recommendations also address methods of cleaning tooth surfaces, use of an assistant during sealant placement, and follow-up issues. These topics should be considered in the context of the essential steps in sealant placement, including cleaning pits and fissures, acid-etching surfaces and maintaining a dry field while the sealant is placed and cured. Practitioners should consult manufacturers' instructions for specific sealant products.

School-based sealant programs also can connect participating students with sources of dental care in the community and enroll eligible children in public insurance programs. Programs should prioritize referral of students with cavitated carious lesions and urgent treatment needs. For students with cavitated carious lesions who are unlikely to receive treatment promptly, dental practitioners in sealant programs may use interim management strategies. Strategies could include placement of sealants for small cavitations with no visual signs of dentinal caries and atraumatic restorative procedures.

Topic	Recommendation
Indications for sealant placement	Seal sound and noncavitated pit and fissure surfaces of posterior teeth, with first and second permanent molars receiving highest priority.
Tooth surface assessment	Differentiate cavitated and noncavitated lesions. ■ Unaided visual assessment is appropriate and adequate. ■ Dry teeth before assessment with cotton rolls, gauze or, when available, compressed air. ■ An explorer may be used to gently confirm cavitations (that is, breaks in the continuity of the surface); do not use a sharp explorer under force. ■ Radiographs are unnecessary solely for sealant placement. ■ Other diagnostic technologies are not required.
Sealant placement and evaluation	Clean the tooth surface. ■ Toothbrush prophylaxis is acceptable. ■ Additional surface preparation methods, such as air abrasion or enameloplasty, are not recommended. ■ Use a four-handed technique, when resources allow. ■ Seal teeth of children even if follow-up cannot be ensured. ■ Evaluate sealant retention within one year.

Source: Gooch BF, Griffin SO, et al, Preventing dental caries through school-based sealant programs. Updated recommendations and reviews of evidence. *J Am Dent Assoc* 140(11):1356-65, 2009.

are few differences in the indications for sealant application whether provided by an individual office-based practitioner or in a school-based sealant program.

The 1994 guidelines recommended that, unlike the model for tooth and tooth surface selection in individual care programs (both private practices and public clinics), risk assessment of individuals in community-based sealant programs should give considerable weight to the likelihood of the individual receiving future dental care. This raised the possibility that sealants might be applied to a greater proportion of sound teeth and teeth with questionable caries in community programs than in individual care programs because of the inability to monitor teeth over time in the former and a consequent need to "err on the safe side."[22]

The current ADA sealant recommendations encourage clinicians to use caries risk assessment strategies in their practices. Further, the recommendations are to place sealants when it is determined that the tooth, or the patient, is at risk of developing caries. Although the ADA guidelines did not specifically address SBSPs, the notion of at-risk patients is a critical risk factor to consider in these programs. However, the ADA recognized that there is not a single system of caries risk assessment that has been shown to be valid and reliable.[1] Nevertheless, many of these systems include socioeconomic status or eligibility for government programs as one of the patient-related risk factors.[23-26]

The updated guidelines point out that one notable difference between the recommendations for sealant use in clinical versus school settings is the approach used to assess caries risk. Clinicians assess caries risk at the level of the patient or the tooth to determine if sealant placement is indicated. In SBSPs, clinicians also must consider risk at the level of the school and community.

Local and state health departments commonly use the percentage of children participating in the National School Lunch Program ("Free and Reduced School Lunch Program [FSLP]") as a proxy for income to prioritize schools for sealant programs.[27-29] For example, the California Children's Dental Disease Prevention Program (which was recently suspended as a result of budget cuts) targeted programs to schools where the percentage of students participating in the FSLP was 50 percent or greater.[30]

Because children from low-income families are at higher risk of developing caries than are children from wealthier families, the updated guidelines recommend sealing all eligible permanent molars as the most cost-effective prevention strategy. In some schools and communities, however, providing sealants only to those children enrolled in a free or reduced-cost lunch program is viewed as stigmatizing and unacceptable, so all children participating in these SBSPs usually

receive sealants as a primary preventive measure without undergoing a routine assessment of their individual caries risk.

Another difference between the recommendations for sealant use in clinical versus school settings is related to the availability and use of diagnostic and treatment services. Clinical care in both the private and public sectors usually includes reasonably comprehensive diagnostic and treatment services for children, whereas SBSPs typically limit services to those necessary for successful sealant placement and retention. More recently, however, some school-based health services have evolved beyond just sealant programs to include comprehensive care or linkages to private or public practices for the remainder of the care.

In the 1994 guidelines, it was proposed that "interim sealants" be used in community programs for some teeth judged to have dentin caries. An interim sealant is one placed over suspected dentinal caries when definitive diagnostic and restorative care are not expected to occur in the near future. Interim sealants were recommended only when the examining dentist in a community sealant program believed that the patient was unlikely to receive restorative care in the near future and the size of the carious lesion(s) was not too large to preclude the procedure. Interim sealants are intended to arrest dentin caries until the tooth or teeth can be evaluated and more appropriately treated. The procedure was believed to be justified in community sealant programs in light of reports of children with significant dental caries being found, upon follow-up examination, who have not received care despite previous referral, and by studies in which frankly carious teeth were sealed successfully for many years.[3] The updated guidelines continue to suggest the application of sealants for small cavitations with no visually detectable signs of dentinal caries, and propose consideration of atraumatic restorative procedures for larger carious lesions.[31]

Effectiveness of School-Based Sealant Programs

Gooch and colleagues, in their recent update of guidelines for sealant use in school-based sealant programs, conducted an extensive review of the literature on several different aspects of sealant use, largely based on systematic reviews, and came to the following conclusions:[5]

SEVERAL REVIEWS HAVE found that sealants are effective in preventing the development of caries on sound pit and fissure surfaces.

- Several reviews have found that sealants are effective in preventing the development of caries on sound pit and fissure surfaces.[31-33]
- Sealants are effective in reducing the percentage of noncavitated carious lesions that progressed to cavitation in children, adolescents, and young adults.[34]
- Sealants are effective in reducing bacteria levels in cavitated carious lesions in children, adolescents, and young adults.[35]
- Use of the four-handed placement technique is associated with an increase in sealant retention.[36] The caries risk for sealed teeth that have lost some or all sealant does not exceed the caries risk for never-sealed teeth. Thus, the potential risk associated with loss to follow-up for children in school-based programs does not outweigh the potential benefit of dental sealants.[37]

Economic Aspects of Sealant Programs

While there is overwhelming evidence of the effectiveness of sealants in both private practice and school-based or school-linked programs, there have been few studies of the economic aspects of sealant use, so cost savings from sealant use has been questioned.[38-41] The U.S. Preventive Services Task Force reported that it had not used economic information to modify its recommendations with respect to school-based sealant programs, but that this information, when available, can help local policy makers in making decisions. Further, the task force noted that if local goals and resources permit, the use of these interventions should be initiated or increased.[22]

Some studies have tried to assess the costs versus benefits of sealants by comparing the costs of sealants to the cost of restorations saved.[42-44] For example, one early study found that after 10 years, the cost to fill a tooth was 1.6 times higher than the cost of providing a sealant.[45] However, Mitchell and Murray asserted that this method of comparison was deficient because it cannot be determined whether the monetary value of a healthy unfilled tooth is greater or less than the value of a healthy filled tooth. The cost of preventing a single carious lesion cannot be compared to the cost of a single sealant application because not every tooth is certain to become carious.[43]

Some researchers have noted that if fewer teeth are becoming carious, the cost of providing sealants to all teeth in all children far exceeds the cost of providing treatment. For example, Leverett and colleagues concluded that five sealants would have to be placed on sound surfaces and maintained for four years to prevent one carious lesion.[42] Heller et al. found that initially sound surfaces did not benefit greatly from sealants over a

period of five years compared with sealing initially incipient carious surfaces.[46] These results should be viewed with caution because populations having higher levels of caries attack will show more favorable results, which highlights the needs for placement in high-risk individuals or groups for maximum cost effectiveness.[47]

A number of authors recommend targeting resources to individuals at higher risk for decay and to the most caries-prone tooth surfaces to reduce overtreatment.[45,47-49] Such recommendations have included selection of teeth based on morphology and history of caries, and restricting the sealants to teeth with incipient lesions. One of the first economic analyses to compare the cost of universal provision of sealants with a risk-based strategy was conducted by Griffin et al.[50] They analyzed the relative cost-effectiveness of sealing no teeth, sealing first permanent molars if the child is determined to be at risk for future caries, and sealing all first permanent molars. They found that the higher the annual first molar caries increment and the higher the cost of a restoration relative to the cost of a sealant, the more costly it becomes to seal either all first molars or just those at risk, compared to sealing no teeth.

Over a nine-year period, they found the risk-based strategy to be less costly and more effective relative to the seal none and seal all strategies. Sealing none was always more costly than either of the other strategies. They concluded that individualized risk assessment of children enrolled in most school-based programs may be unnecessary because school-based programs generally target low-income children who are less likely than higher-income populations to receive preventive services and to have a regular source of care, and are thus more likely

to have higher caries increments than children from higher-income families.

Quiñonez et al. developed a theoretical model to determine the cost-effectiveness of three different sealant strategies.[51] One was to seal all children's first permanent molar occlusal surfaces regardless of their caries risk. The second was to seal only the first molars of children who are at high risk for caries. The third strategy was to seal no teeth but wait to provide a restoration when and if required. These strategies were compared by determining the costs to maintain a cavity-free state per month over a 10-year period. The study found that the risk-based strategy improved clinical outcomes in terms of cavity-free months, and also saved money compared to sealing no teeth. The strategy of sealing both high- and low-risk teeth further improved outcomes but at an additional cost, although the cost was relatively small at $.08 for each additional cavity-free month, or $.96 for each cavity-free year. The authors concluded that sealing children's first permanent molars can improve outcomes and save money by delaying or avoiding invasive treatment and the destructive cycle of caries.

A few studies have examined treatment outcomes and costs associated with sealants in Medicaid programs. Weintraub et al. compared the cost-effectiveness of dental treatment with and without the inclusion of sealants among 139 low-income children in Michigan.[52] They found the optimal time for cost savings attributable to sealants was not until the fourth to sixth year, with cost-effectiveness ratios becoming more favorable in the 10th and 11th year after application. In a larger study, Weintraub et al. analyzed the impact of sealants on the likelihood of restorative treatment and net expenditures for first permanent molars in a cohort of children enrolled in the North Carolina Medicaid program from 1985 to 1992.[48] They found that sealants provided their greatest benefit in preventing restorations when they were applied to children deemed to be at high risk on the basis of their restoration history up to the year they received the sealant. They also found that sealants significantly reduced both the likelihood and the level of expenditures among high-risk children. Although sealants were effective overall, the savings to the Medicaid program were not sufficient to offset the cost of placing sealants in the first permanent molars of all Medicaid-eligible children who received them.

SEALANTS ARE MORE cost-effective in both private practice and public health settings when they are provided to higher-risk individuals or populations.

Based on the premise that sealants are more effective if placed in children at high caries risk, and that low-income minorities are known to be at high risk, Dasanayake and colleagues undertook a study of black children on Medicaid in Alabama.[49] They found that only 10 percent of the children with at least one prior sealant claim obtained subsequent one-surface amalgam or resin restorations, while this proportion was 33 percent among children without a prior sealant claim. On average, total Medicaid reimbursement for sealants plus subsequent restorative care was $56 in the sealant group compared to $72 for subsequent care alone in the nonsealant group. The authors concluded that children who do not receive sealants are more likely to obtain subsequent restorative care and cost more money to the health care system.

In summary, sealants are more cost-effective in both private practice and public health settings when they are provided to higher-risk individuals or populations. Because most SBSPs are targeted to high-risk children, or at least to children in high-risk schools (i.e., those with a high proportion of low-income students), there is little to be gained from providing individually based risk assessment for each child.

Combined Topical Fluoride and Sealant Programs

It has been claimed that a combination of fluoride and sealants has the potential to virtually eliminate tooth decay in all children.[50] Given the complex and multifactorial nature of dental caries, that may be a bit of an overstatement, but the available evidence suggests there is an additive effect when these two preventive modalities are combined.

The Surgeon General's Report on Oral Health described a dramatic example of the impact of a combined fluoride and sealant program by a program in Guam, where the children traditionally had experienced caries rates more than double those of their U.S. mainland counterparts.[53] In 1984 a school-linked sealant program was added to an existing school-based fluoride mouthrinse program. More than 15,000 children participated annually in the sealant program. After eight years of fluoride mouthrinsing, mean decayed, missing, and filled surface (DMFS) scores declined by 1.79 surfaces per child. Only 7 percent of that decline was said to be due to prevention of caries on surfaces that can benefit from sealants. With the addition of the sealant program to mouthrinsing, overall DMFS scores decreased an

additional 2.34 surfaces per child in only two years. Most of this decline took place on pit and fissure surfaces. Over a 10-year period a reduction of 4.13 DMFS per child was seen — a decline from 7.06 DMFS per child at baseline to 2.93 DMFS in 1986. At the end of the 10 years, participating children on Guam had caries rates close to those of mainland schoolchildren.

The National Preventive Dentistry Demonstration Program, a large project conducted in 10 U.S. cities between 1976 and 1981 to compare the costs and effectiveness of combinations of caries prevention procedures, found that the inclusion of sealants was critical to the cost-effectiveness of prevention strategies.[40,54] In another combined program, Morgan et al. found that a three-year sealant program and a fluoride mouthrinse program for secondary schoolchildren incurred a low cost for each tooth surface saved from caries.[55]

Similarly, Selwitz et al. studied the caries preventive effect of a school-based sealant program when combined with an ongoing school fluoride mouthrinse program.[56] The magnitude of the reductions in caries experience, particularly among the younger children in the study, after up to four years of participation in the combined program, strongly suggested that dental sealants conferred additional caries-preventive benefits beyond those of the fluoride mouthrinsing alone.

While it is widely accepted that fluoride benefits primarily smooth tooth surfaces and sealants benefit primarily occlusal surfaces, studies of fluoride varnish have demonstrated that there is also a benefit to occlusal surfaces.[57] What is less well understood is that sealants may benefit smooth surfaces as well as occlusal surfaces. Bravo et al. conducted a study to determine the separate effects

of sealants and fluoride varnish on caries in fissured and nonfissured surfaces of first permanent molars of 6- to 8-year-old schoolchildren.[58] Compared to a control group that received neither sealants nor varnish, sealants resulted in a 68 percent reduction on fissured surfaces and a surprising 87 percent reduction on nonfissured surfaces after 24 months. For varnish, the corresponding figures were 38 percent and 68 percent.

The authors speculated that the observed sealant protection on nonfissured surfaces might be indirect, i.e., derived from the reduction in fissured caries. In other words, the sealants could prevent either the development of primary caries in nonfissured surfaces or caries progression from fissured to nonfissured surfaces. The results of this study indicate that sealants could provide an indirect protection on nonfissured surfaces. The authors concluded that while the use of sealants and fluoride together are still believed to be the best way to reduce caries in children, if the results of this study are confirmed by others, the amount of additional effect of topical fluorides over the use of sealants only should be investigated.

Conclusion

The oral health status of California children is considerably worse than that of their counterparts from most other states. In addition, their access to the proven caries-preventive benefits of pit and fissure sealants is well below that of children from most other states. For a variety of reasons, sealants are underutilized by private practitioners. In the face of low levels of access to dental care by underserved children, and in the absence of more widespread use of sealants by dentists, school-based sealant programs have been shown to offer a good way of reaching children who otherwise would not have access to this important preventive procedure. These programs have demonstrated that they are both effective and cost-effective, particularly when targeted to children at moderate to high caries risk. Moreover, they have been shown to be an effective way of reaching high-risk children who lack adequate access to traditional dental care, and to do it in a safe and familiar environment.

Despite the overwhelming evidence of the value of school-based sealant programs, funding for the publicly supported Children's Dental Disease Prevention program in California, which included a school-based sealant program, was recently suspended. The dental profession and policy-makers need to find the political will to assure that such programs are again made available to help reverse the neglected epidemic of oral disease among our children. ■■■■

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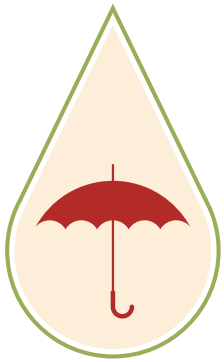

Pediatric Dental Care: Prevention and Management Protocols Based on Caries Risk Assessment

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ABSTRACT During pregnancy, numerous physiologic changes occur that allow the mother to accommodate the needs of the developing fetus. Oral health care professionals should be knowledgeable about these changes and the impact they have on the safe provision of prophylactic and therapeutic dental care to pregnant women. Herein, the authors describe maternal physiologic adaptations and discuss changes in drug processing and placental drug transfer in order to enhance the knowledge base of oral health care professionals.

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A 2007 publication by the Centers for Disease Control and Prevention reported that although dental caries prevalence had declined significantly among school-aged children since the early 1970s, caries rates in children aged 2-5 years had increased.[2] This confirmed early childhood caries (ECC) as the most prevalent chronic childhood disease in the United States; five times more common than asthma and seven times more common than hayfever.[3-5] ECC is more prevalent among young children in low socioeconomic populations and among racial/ethnic minorities who are also more likely to face barriers in accessing care.[6] Caries is a preventable infectious disease and it is well-documented that one of the

best predictors for future tooth decay is the presence of current caries or evidence of prior caries experience.[7,8]

Despite awareness of an increase in ECC prevalence, infant oral health care, as well as the establishment of a dental home by age 1, or when the first tooth erupts, has not yet become the standard of care in clinical practice. The Dental Health Foundation's report, *Mommy It Hurts to Chew* indicated that 28 percent of California third-graders had untreated tooth decay.[6,9] It also showed that only 35 percent of reporting families had private dental insurance, 42 percent had some type of government-funded coverage, and nearly a quarter (23 percent) had no dental coverage at all.[6]

In 2007, a half-million school-aged children missed at least one day of school in California due to dental problems.[10] This resulted in $29.7 million of lost revenue to school districts.[10] In the National Survey of Children's Health, California ranked near the bottom in children's oral health (only Arizona and Texas ranked lower).[11]

Several reports have shown that preventing the onset of ECC is more cost effective compared to treating advanced caries. Typical costs of comprehensive oral care visits for preschoolers are considerably less than the cost of emergency room treatment or extensive restorations requiring sedation or treatment under general anesthesia.[12,13] Early identification of risk indicators and implementation of oral health preventive practices at a young age can reduce or avoid caries progression.[14] The American Dental Association, the American Academy of Pediatric Dentistry (AAPD), the American Academy of Pediatrics (AAP),the American Association of Public Health Dentistry (AAPHD), and the Academy of General Dentistry (AGD), all recommend that a child see a dentist to establish a dental home by age 1 or within six months from eruption of the first primary tooth.[15-19] A dental home is defined as the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family centered way.[20] Establishment of a dental home should include referrals to dental specialists when appropriate.[21]

Despite widespread support for establishing a dental home by age 1, infant oral health visits have not yet been embraced universally by practicing clinicians. This situation persists even as dental and other health professionals recognize the growing prevalence of early childhood caries.

IN 2007,
a half-million school-aged children missed at least one day of school in California due to dental problems.

This article presents an updated pediatric dental caries management by risk assessment (CAMBRA) approach, along with practical tools to use in caring for young children, to stimulate greater adoption of infant oral health care programs by clinicians.[14] Age- and risk-specific "care paths" are included as a part of a "disease-prevention management model."

Perinatal Oral Health

Caries is a transmissible, infectious disease. When the disease is allowed to progress, surface cavitation and destruction of dental tissue occur over time. Due to their ability to stick to smooth tooth surfaces and produce copious amounts of acid, the mutans streptococci (MS) group of bacteria is considered one of the most important groups of pathogens in the cariogenic process.[20]

Primary caregivers can transmit these organisms to their children, which results in MS colonization of the child's oral cavity.[21] There is a direct relationship between adult caregiver MS levels and MS levels and dental caries prevalence in their children.[21] Factors influencing colonization include frequent sugar exposure in infants and habits that allow salivary transfer from mothers to infants. Maternal factors, such as high levels of MS, poor oral hygiene, low socioeconomic status, and frequent snacking increase the risk of bacterial transmission to their infants.[22] Infants have tested with high levels of MS even before the eruption of their first tooth.[22]

Therefore, it is critical to consider an infant oral care program in the context of a mother-child pair or dyad, which includes comprehensive maternal perinatal oral health care and treatment.

Dental professionals have begun to recognize the critical role a mother plays in ensuring her child's oral health. Improving expectant mothers' oral health by reducing pathogenic bacteria levels in their own mouths can delay the acquisition of oral bacteria in their children and may delay the development of early childhood caries.[23] Restoring carious lesions, by itself, is insufficient to reduce a mother's risk of transmitting cariogenic bacteria to her offspring. An effective perinatal program should institute a long-range, pre- and postpartum maternal strategy to reduce maternal MS and lactobacilli levels through therapeutic interventions and counseling on lifestyle modifications.[23]

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Unfortunately, pregnant women often do not receive oral health care and education in a timely manner. Many women do not know they should seek dental care during their pregnancy and for the many others who do, they often encounter dentists unwilling to provide dental care during pregnancy. New mothers are more likely to be receptive to ideas that would improve their offspring's oral health and both dental and obstetric providers have a prime opportunity to educate mothers on changes that could improve their children's oral health.[24] In 2010, the CDA Foundation published evidence-based guidelines for health profession on oral health for pregnant women and infants, which indicate that perinatal oral health care is not only safe but necessary to the oral and overall health of the pregnant mother but also that of her infant.[23]

In light of the importance of perinatal oral health in preventing early childhood caries, and the need to intervene early for mother and child in a "dual parallel track" of treatment and disease prevention management, collaborations and partnerships among all health professionals are encouraged to foster early and timely oral health care and referrals for expectant mothers.

The American Academy of Pediatrics has focused in improving children's oral health through its Oral Health Initiative and Section on Pediatric Dentistry and Oral Health (aap.org/oralhealth). Through these efforts, pediatricians are becoming more educated on oral health and their role in preventing disease and referring to a dental home. However, many continue to be unaware of the AAP's current oral health recommendations and more work needs to be done to disseminate this policy and raise awareness. Efforts to increase awareness of incorporating oral health evaluations into well-child visits are crucial since pediatricians often see children on an average of up to six times before age 2.

In addition to pediatricians, family practitioners, and other medical providers who see children frequently during infancy and early childhood are also ideally suited to assess young children for caries risk assessment and refer for dental care.[25] A partnership between medical and dental professionals is important to increase patient awareness of the importance of establishing a dental home by the child's first birthday, assessing caries risk, and coordinating care. As an important step in that direction, the AAP's "Bright Futures Guidelines for Health Supervision of Infants, Children, and Adolescents," which focuses on health promotion and prevention for children and their families, not only advocates for a dental home but also provides extensive information, education and training opportunities, and materials on pediatric oral health for a broad range of practitioners. The AAP is currently conducting a Bright Futures Implementation Project, Brightening Oral Health, to pilot test an oral health risk assessment tool for the primary care practitioner. See **TABLE 1**.[25]

PARTNERSHIPS AMONG all health professionals are encouraged to foster early and timely oral health care and referrals for expectant mothers.

Initial Infant Oral Care Visit

Infants and parents can benefit from early infant oral health visits and early establishment of a dental home. Infant oral health visits should include caries risk assessment, individualized preventive strategies and anticipatory guidance.[27] Periodic supervision of care intervals (periodicity) should be determined based on each patient's risk of disease and include age-and risk-appropriate "care paths" for management of the disease process.[14]

Infants and toddlers should not be expected to be cooperative during an oral examination. Crying and movement are developmentally age-appropriate behaviors for young children. Explaining expected behaviors to parents prior to, during and after infant care visits can help allay any fears and concerns they may have.

There is a simple six-step protocol for an infant oral care visit:

1. Caries risk assessment;
2. Proper positioning of the child (knee-to-knee exam);
3. Age-appropriate toothbrushing prophylaxis;
4. Clinical examination of the child's oral cavity and dentition;
5. Fluoride varnish treatment; and,
6. Assignment of risk, anticipatory guidance, self-management goals and counseling.

1. Caries Risk Assessment

An individualized risk assessment of an infant or toddler for developing caries serves as the foundation for health care providers and parents/caregivers to identify and understand the child's ECC risk factors. The specific information gained from a systematic assessment of caries risk guides the dentist in the decision-making process for treatment and preventive protocols for children already with disease and those deemed

TABLE 1

AAP-Recommended Sticker Version of Caries Risk Assessment Tools

Brightening Oral Health Project

Oral Health Risk Assessment Tool

This is a: 9-month visit ❑
12-month visit ❑

Risk Factors	Protective Factors	Disease Indicators (clinical examination)
Has mother or primary caregiver had active decay in the past 12 months? Yes ❑ No ❑	Yes No	❑ White spots or visible decalcifications
Does mother have a dentist? Yes ❑ No ❑	❑ ❑ Existing dental home	❑ Obvious decay
Other risk factors:	❑ ❑ Drinks fluoridated water or takes F supplements	❑ Restorations present
Yes No	❑ ❑ F varnish in the last 6 months	❑ Visible plaque accumulation
❑ ❑ Continual bottle/sippy cup use with fluid other than water	❑ ❑ Child has teeth brushed daily with fluoridated toothpaste*	❑ Gingivitis (swollen/bleeding gums)
❑ ❑ Frequent snacking		❑ None
❑ ❑ Special health care needs		❑ No Teeth Present
❑ ❑ Low SES/health literacy/ Medicaid eligible		

Caries Risk: ❑ Low ❑ High

Completed: ❑ Anticipatory guidance ❑ Fluoride varnish Referral to: _____

Goals:

*Current AAPD recommendation, not currently the recommendation of Bright Futures or the CDC.

Adapted from: Preventive Oral health Intervention for Pediatricians (2008), Oral Health Risk Assessment, Timing and Establishment of the Dental Home (2003), and Ramos-Gomez, FJ, Crall, et al, Featherstone J, Caries risk assessment appropriate for the age 1 visit (infants and toddlers). *J Calif Dent Assoc* 35(10) 697-702, October 2007. Distributed with funding from Crest and Oral-B Health Smiles, P&G Live, Learn and Thrive Initiative.

at risk. For optimal outcomes, caries risk assessment should be done as early as possible, and preferably, prior to the onset of the disease process. Since caries in the primary dentition is a strong predictor of caries in the permanent dentition, caries risk assessment and therapeutic management of the disease is crucial, as is the subsequent follow-up.[28,29]

Risk factors are determined from an interview with the parent and from a clinical assessment of the child. Further details, where evidence-based disease indicators, biological risk factors and preventive factors are described, have been previously published by Ramos-Gomez et al. and are accessible via the web at cdafoundation.org/journal.[14] The example provided in **TABLE 2** is a one-page, practical form for use in the dental office and has been modified from the original form published by Ramos-Gomez et al. based on the collective experience of pediatric dentists using the form and recommendations developed by the NIDCR-PRIME research at the SF NAHC and the CAMBRA coalition committee of West Coast Dental Schools. **TABLE 3** in the present article offers further modifications of the original published form that is an alternative currently suggested by the AAPD.

In practice, the caries risk assessment would begin in the dental office with an initial interview with the parent or caregiver. The assessment interview should explore biological or lifestyle predisposing risk factors that contribute to the development or progression of caries. Examples of these risk factors include recently placed dental restorations or active caries in the mother, low health literacy of caregiver, frequent intake of fermentable carbohy-

TABLE 2

CAMBRA — Caries Risk Assessment Form for Age 0 to 5 Years

Patient Name:_____ ID#_____ Age: _____ Date: _____

Assessment Date: _____ Please circle: BASELINE, three-month follow-up or six-month follow-up

	1	2	3	
NOTE: Any one Yes in Column 1 signifies likely "High Risk" and an indication for bacteria tests	Yes =CIRCLE	Yes =CIRCLE	Yes =CIRCLE	Comments:
1. Risk Factors (Biological Predisposing Factors)				
(a) Mother or primary caregiver has had active dental decay in the past 12 months*	Yes			
(b) Bottle with fluid other than water, plain milk and/or plain formula		Yes		Type of fluid:
(c) Continual bottle use		Yes		
(d) Child sleeps with a bottle, or nurses on demand		Yes		
(e) Frequent (>3 times/day) between-meal snacks of sugars/cooked starch/sugared beverages		Yes		#times/day:
(F) Saliva-reducing factors are present, including: 1. medications (e.g., some for asthma [albuterol] or hyperactivity) 2. medical (cancer treatment) or genetic factors		Yes		
(g) Child has developmental problems/CSHCN (child with special health care needs)		Yes		
(h) Caregiver has low health literacy, is a WIC participant and/or child participates in Free Lunch Program and/or Early HeadStart		Yes		
2. Protective Factors				
(a) Child lives in a fluoridated community or takes fluoride supplements by slowly dissolving or as chewable tablets (note resident ZIP code)			Yes	
(b) Child drinks fluoridated water (e.g., use of tap water)			Yes	
(c) Teeth brushed with fluoridated toothpaste (pea size) at least once daily			Yes	
(d) Teeth brushed with fluoride toothpaste (pea size) at least 2x daily			Yes	
(e) Fluoride varnish in last six months			Yes	
(f) Mother/caregiver chews/dissolves xylitol chewing gum/lozenges 2–4x daily			Yes	
3. Disease Indicators/Risk Factors – Clinical Examination of Child				
(a) Obvious white spots, decalcifications enamel defects or obvious decay present on the child's teeth*	Yes			
(b) Restorations present (past caries experience for the child)*	Yes			
(c) Plaque is obvious on the teeth and/or gums bleed easily		Yes		
(d) Visually inadequate saliva flow		Yes		

Child's Overall Caries Risk* (circle): High Moderate Low

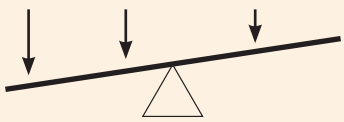
Child: Bacteria/Saliva Test Results: MS: LB: Flow Rate: Ml/min: Date:

Caregiver: Bacteria/Saliva Test Results: MS: LB: Flow Rate: ml/min: Date:

Self-management goals:

1)_____

2)_____



VISUALIZE CARIES BALANCE

*Assessment based on provider's judgment of balance between risk factors/disease indicators and protective factors.

TABLE 3

Example of a Caries Risk Assessment Form for 0–5 Year Olds as adopted in 2010 by the American Academy of Pediatric Dentistry (AAPD)**

Biological Factors	High-Risk Factors	Moderate-Risk Factors	Protective Factors
Mother/primary caregiver has active caries	Yes		
Parent/caregiver has low socioeconomic status	Yes		
Child has >3 between-meal sugar containing snacks or beverages per day	Yes		
Child is put to bed with a bottle containing natural or added sugar	Yes		
Child has special health care needs		Yes	
Child is a recent immigrant		Yes	
Protective Factors			
Child receives optimally fluoridated drinking water or fluoride supplements			Yes
Child has teeth brushed daily with fluoridated toothpaste			Yes
Child receives topical fluoride from health professional			Yes
Child has dental home/regular dental care			Yes
Clinical findings			
Child has more than one dmfs	Yes		
Child has active white spot lesions or enamel defects	Yes		
Child has elevated mutans streptococci	Yes		
Child has plaque on teeth		Yes	

** Modified from Ramos-Gomez et al., *J Calif Dent Assoc* 35(10):687-702, October 2007, and ADA Caries Risk Assessment forms.

Instructions:

1. Circle the "Yes" wherever there is a yes answer to the question or observation for the patient or caregiver.

2. Use the "Yes" answers in the risk factor columns (red and yellow) versus the "Yes" answers in the protective factor column (green) to caries risk level of low, moderate, or high. If there are clinical observations that indicate current and ongoing disease (frank cavities) then these will outweigh the protective factors. When the restorative work is done and preventive (protective) measures are in place, the green "yes" answers can outweigh the risk factors.

Overall assessment of the child's dental caries risk **High** **Moderate** **Low**

drates by the infant, sleeping with a bottle that contains liquids other than water, prolonged use of a sippy cup containing milk, juice, or a sweetened beverage. The practitioner can simply circle "Yes" beside the risk or protective factors that apply in order to make a judgment as to whether the risk factors outweigh the protective factors or vice versa, thereby determining a risk status of low, moderate, or high. The risk level will then dictate which care path to be used, as described below.

Protective factors are indicators of preventive activities that may reduce a child's risk for the onset extension of ECC and should be assessed during the parental interview. These factors include optimal exposure to fluoride, access to regular dental care (e.g., the presence of a dental home), and consistent daily brushing with fluoride toothpaste.

Disease indicators are indications of current and active caries and are obtained from the clinical examination of the child and include cavitated carious lesions, white spot lesions/decalcifications, and recent restorations. Biological risk factors are also observed at the clinical examination and include the presence of plaque, gingival bleeding (an indicator of inadequate oral hygiene), and dry mouth. In older children, the presence of dental or orthodontic appliances increases plaque retention and the risk for caries.

The caries balance concept (FIGURE 1) states that the progression or reversal of dental caries is determined by the balance between pathological factors and caries protective factors.[30-33] A risk assessment categorization of low, moderate, or high is based on a preponderance of

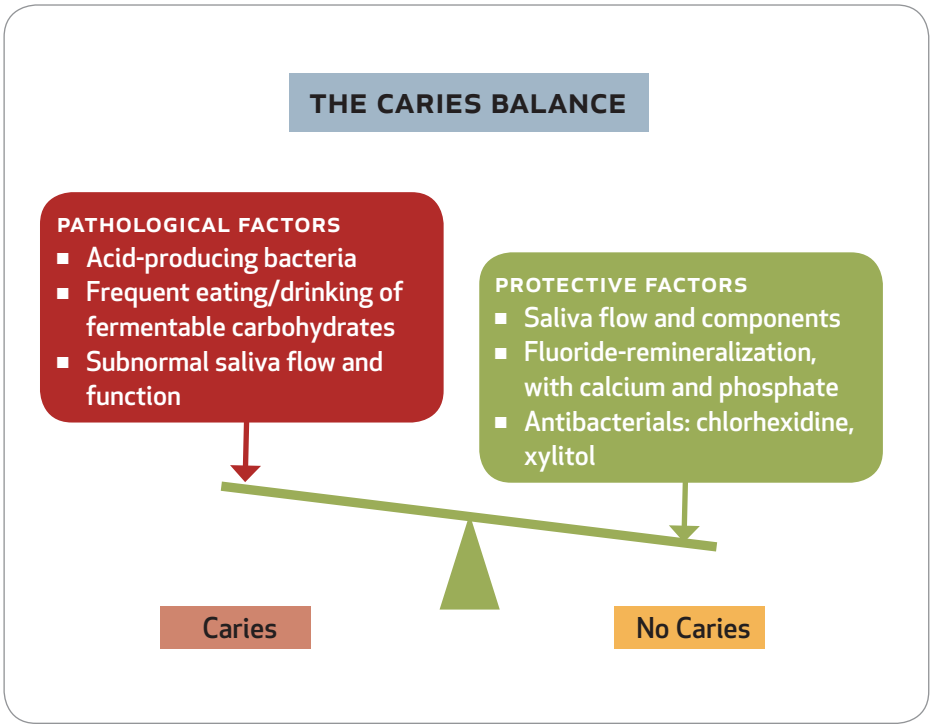


FIGURE 1. Caries balance.

the factors circled as "Yes" on the caries risk assessment form. When risk factors outweigh the protective factors, it indicates an increased likelihood for the development of caries, which would place the child in a high-risk category. When protective factors prevail and risk factors are controlled, the child can be considered low risk. The clinician's experience, expertise, and personal historical experience with his patient and the child's caregivers, is of vital importance in determining a child's risk, which serves as the basis for an individualized treatment plan for each infant/caregiver. These specific patient conditions and risks will help the practitioner and the parents understand the factors that contribute to or protect the patient from caries.

2. Proper Positioning

Proper positioning of the child is critical to conducting an effective and efficient clinical exam in a young child. In general, the knee-to-knee position should be used with children ages 6 months to 3 years, or up to age 5 with children who have special health care needs. Children older than 3 may be able to sit forward on their caregiver's lap or sit alone in a chair. Examiners and caregivers need to work together to transition the child smoothly from the interview to the exam. The clinician should explain what will happen ("Tell-Show-Do") prior to starting and anticipate that young children may cry since crying is developmentally appropriate for children at this age. If the child can perceive a friendly and comfortable interaction between the clinician and caretaker, a positive tone is frequently set for the visit. Knee-to-knee positioning allows the child to see the parent throughout the exam. It also allows the caregiver to observe clinical findings and hygiene demonstrations directly, while gently helping to stabilize the child safely for the clinical examination.

3. Toothbrush Prophylaxis

A toothbrush prophylaxis is efficient in removing plaque in most young children. It is also nonthreatening to young children and serves to demonstrate the proper technique of brushing to the caregiver. The examiner retracts the child's lips and cheeks and demonstrates brushing along the gingival margins (**FIGURE 2**).The spongy handle of an age-appropriate toothbrush can be used to prop open the child's mouth. The handle of a second toothbrush can be used as a mouth prop. During this "Tell-Show-Do" encounter, the caregiver should be encouraged to brush their child's teeth at least twice a day, especially before bedtime. The use of fluoride toothpaste should be emphasized since fluoride has been shown to be effective both systemically and topically to prevent caries. Parents and caregivers should be instructed to use a "pea-sized" amount of fluoride toothpaste for children age 2-6 and a "smear" for children under age 2.[34] (**FIGURE 3**) Children should be taught to spit out excess toothpaste during and after brushing.

FIGURE 2. Knee-to-knee positioning.

4. Clinical Examination

Clinical examination can be accomplished while counting the child's teeth aloud, using the toothbrush handle as a mouth prop, if necessary. Many providers make a game of this task, singing songs, engaging the child's attention, and, if all else fails, distracting the child with a brightly colored toothbrush or toy. Praise the child at each step for their cooperation and good behavior. While counting the teeth, the examiner also inspects the soft tissues, hard tissues, and occlusion, if the child is able to cooperate. Data from the clinical exam results should be combined with data from the caregiver interview to determine the child's overall caries risk, establish an oral diagnosis, and formu-

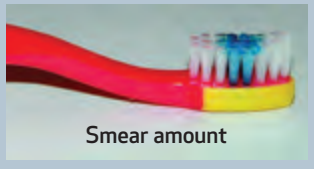
Topical Fluoride Recommendations for High-Risk Children Under Age 6

Decision Support Matrix

Population-based Risk Factors

- Low-income children (e.g., enrolled in Head Start, WIC, free/reduced lunch program Medicaid or SCHIP eligible, or other programs serving low-income children
- Children with special health care needs

Fluoride Modality

Age	Children Under 2 Years	Children 2-6 Years
		
Toothpaste	■ Encourage parents and caregivers to take an active role in brushing their children's teeth once the first tooth erupts ■ Educate parents and caregivers on proper fluoride toothpaste use ■ Brush children's teeth with fluoride toothpaste twice daily ■ Use a smear of fluoride toothpaste  Smear amount ■ Do not rinse after brushing	■ Encourage parents and caregivers to take an active role in brushing their children's teeth ■ Educate parents and caregivers on proper fluoride toothpaste use ■ Brush children's teeth with fluoride toothpaste, or assist children with toothbrushing, twice a day ■ Use no more than a pea-sized amount of fluoride toothpaste  Pea-sized amount ■ Children should spit out extra toothpaste ■ Do not rinse after brushing
Varnish	■ Apply every 3-6 months	■ Apply every 3-6 months
Mouthrinses, gel, or foam	■ Not recommended	■ Not recommended

Decision Support Matrix developed by MCHB Expert Panel on Topical Fluoride, October 2007.

FIGURE 3. Topical fluoride recommendations for high-risk children younger than age 6.

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The science of caries prevention continues to evolve. This table is an illustration on how to develop care paths for a practice's patients. There are many alternative approaches to the prevention and treatment of dental caries, with more emerging continuously. Care paths should remain dynamic and change over time as the effectiveness of new as well as current protocols is validated by scientific evidence.

TABLE 4

Example of a Caries Management Protocol for 0–2 Year Olds

Risk Category Ages 0 to 2	Diagnostic			Fluoride
	Periodic Oral Exams	Radiographs*	Saliva Test	
Low	Annual	Posterior bitewings at 12-24 month intervals if proximal surfaces cannot be examined visually or with a probe	Optional baseline	**In office:** No **Home:** Brush 2x day w/ smear of F toothpaste
Moderate	Every 6 months	Posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Recommended	**In office:** F Varnish initial visit & recalls **Home:** Brush 2x day w/smear of F toothpaste **Caregiver:** OTC sodium fluoride treatment rinses
Moderate; Noncompliant	Every 3-6 months	Posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/smear of F toothpaste combined w/smear of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses
High	Every 3 months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/smear of F toothpaste combined w/smear of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses
High; Noncompliant	Every 1-3 months	Anterior (#2 occlussal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/smear of F toothpaste combined w/smear of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses
Extreme	Every 1-3 months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/smear of F toothpaste combined w/smear of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses

*American Dental Association Council on Scientific Affairs. The use of dental radiographs: update and recommendations. *J Am Dent Assoc* 137:1304-12, 2006.

**American Academy of Pediatric Dentistry. Guideline on pediatric restorative dentistry. *Pediatr Dent* 30(suppl):163-9, 2008.

Preventive Intervention						Restoration**
Xylitol Products	Sealants	Antibacterials	Anticipatory Guidance/ Counseling	Self-Management Goals	White Spot / Precavitated Lesions	Existing Lesions
Not Required	No	No	Yes	No	n/a	n/a
Child: Xylitol wipes **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	No	Yes	No	Treat w/ fluoride products as indicated to promote remineralization	n/a
Child: Xylitol wipes **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/ fluoride products as indicated to promote remineralization	n/a
Child: Xylitol wipes **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/ fluoride products as indicated to promote remineralization	ITR (interim therapeutic restorations) or conventional restorative treatment as patient cooperation and family circumstances allow
Child: Xylitol wipes **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/ fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow
Child: Xylitol wipes **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/ fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow

The science of caries prevention continues to evolve. This table is an illustration on how to develop care paths for a practice's patients. There are many alternative approaches to the prevention and treatment of dental caries, with more emerging continuously. Care paths should remain dynamic and change over time as the effectiveness of new as well as current protocols is validated by scientific evidence.

TABLE 5

Example of a Caries Management Protocol for 3–6-Year-Olds

Risk Category —Ages 3 to 6	Diagnostic			Fluoride
	Periodic Oral Exams	Radiographs*	Saliva Test	
Low	Annual	Posterior bitewings at 12-24 month intervals if proximal surfaces cannot be examined visually or with a probe	Optional baseline	**In office:** No **Home:** Brush 2x day w/ pea-size of F toothpaste
Moderate	Every 6 months	Posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Recommended	**In office:** F Varnish initial visit & recalls **Home:** Brush 2x day w/pea-size of F toothpaste **Caregiver:** OTC sodium fluoride treatment rinses
Moderate; Noncompliant	Every 3-6 months	Posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/pea-size of F toothpaste combined w/pea-size of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses
High	Every 3 months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/pea-size of F toothpaste combined w/pea-size of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses
High; Noncompliant	Every 1-3 months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/pea-size of F toothpaste combined w/pea-size of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses
Extreme	Every 1-3 months	Anterior (#2 occlusal film) and posterior bitewings at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	**In office:** F varnish initial visit & recalls **Home:** Brush 2x day w/pea-size of F toothpaste combined w/pea-size of 900 ppm calcium-phosphate paste, leave on at bedtime **Caregiver:** OTC sodium fluoride treatment rinses

*American Dental Association Council on Scientific Affairs. The use of dental radiographs: update and recommendations. *J Am Dent Assoc* 137:1304-12, 2006.

**American Academy of Pediatric Dentistry. Guideline on pediatric restorative dentistry. *Pediatr Dent* 30(suppl):163-9, 2008.

Preventive Intervention						Restoration**
Xylitol Products	Sealants	Antibacterials	Anticipatory Guidance/ Counseling	Self-Management Goals	White Spot / Precavitated Lesions	Existing Lesions
Not Required	No	No	Yes	No	n/a	n/a
Child: Xylitol wipes/ products to substitute for sweet treats or when unable to brush. **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	No	Yes	No	Treat w/fluoride products as indicated to promote remineralization	n/a
Child: Xylitol wipes/ products to substitute for sweet treats or when unable to brush. **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/fluoride products as indicated to promote remineralization	n/a
Child: Xylitol wipes/ products to substitute for sweet treats or when unable to brush. **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/fluoride products as indicated to promote remineralization	ITR (interim therapeutic restorations) or conventional restorative treatment as patient cooperation and family circumstances allow
Child: Xylitol wipes/ products to substitute for sweet treats or when unable to brush. **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow
Child: Xylitol wipes/ products to substitute for sweet treats or when unable to brush. **Caregiver:** 2 sticks of gum or 2 mints 4x day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat w/fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow

late an individualized treatment plan.

The following information should be documented:

- Visible plaque and location;
- White spot lesions;
- Demineralized or remineralized enamel;
- Brown spots on the occlusal surfaces that may indicate caries;
- Tooth defects, deep pits/fissures, tooth anomalies;
- Missing and decayed teeth;
- Existing restorations;
- Defective restorations;
- Gingivitis or other soft tissue abnormalities;
- Occlusion; and
- Indications of trauma.

5. Fluoride Treatment

Fluoride is an important and cost-effective prevention method to strengthen tooth enamel and prevent decay. The ADA recommends that high caries risk children receive a full-mouth topical fluoride varnish application with reapplication consistently at three months intervals.[35] A minimum of every six months is recommended for children at moderate caries risk, even if the child lives in a community that already receives the benefits of water fluoridation[34] (**FIGURE 3**). Practitioners should also be aware that fluoridation of public water supplies can vary greatly by community and by the water source. Only 27.1 percent of Californians have access to optimally fluoridated community (tap) water.[9] Providers should reiterate the cumulative benefit of the fluoride varnish, even if it has been mentioned earlier in the visit.[40] Following the fluoride application, the caregiver should be reminded not to allow brushing of the child's teeth or eating crunchy/sticky foods for the rest of the day to maximize the effect of the fluoride varnish.

6. Risk-Classification, Anticipatory Guidance, Self-Management Goals and Counseling

An individualized treatment plan (**TABLES 4 AND 5**) for each infant/caregiver is determined by the risk determined from the parent interview and the clinical examination of the child. A dual treatment plan approach is essential for moderate and high caries risk children and their parent/caregivers. Strategies need to be employed to modify the maternal transmission of cariogenic bacteria to infants through the potential use of chlorhexidine rinse and xylitol products for caregivers, and fluoride varnish for both the caregiver and the child.[36] Additionally, the necessary changes in the child's diet, toothbrushing, and fluoride application can be identified from the risk analysis. Expected parental compliance to recommended treatment protocols is essential for moderate and high caries risk children.

A MINIMUM OF EVERY six months is recommended for children at moderate caries risk, even if the child lives in a community that already receives the benefits of water fluoridation.

Parents should be given additional information and anticipatory guidance on the prevention of dental disease that is specific to the their child's needs and caries risk factors, e.g., information on oral hygiene, growth and development, teething, digit or pacifier habits, oral habits, diet and nutrition, and injury prevention (**FIGURE 4**). The anticipatory guidance approach is designed to take advantage of time-critical opportunities to implement preventive health practices and reduce the child's risk of preventable oral disease.[37]

An important component of the visit is to counsel parents to change specific risk factors, which may contribute to caries activity or the child's caries risk. Traditionally, general recommendations to parents such as "brush your teeth twice a day and don't eat candy," have had very limited success. Research shows that family-centered approaches and individualized recommendations are more promising in engaging parents to change specific practices.

Motivational interviewing is a counseling technique that relies on two-way communication between the clinician and the patient or parent and establishes a therapeutic alliance (rapport and trust).[38] In this process the clinician asks questions to help parents identify problems; listens to their concerns; encourages self-motivational statements; prepares them for change (discussing the hurdles that interfere with action); sets attainable specific self-management goals; responds to resistance; schedules follow-up appointments; and prepares the parent for their family's specific and unique difficulties, which inevitably arise when instituting a consistent, lifetime dental care program for their child.[39]

Following the brief motivational interviewing (counseling), the parent/caregiver is asked to select two self-management goals or recommendations as their assignments before the next re-evaluation dental visit and to commit to the two goals selected, and is informed that the oral health care providers will follow-up on those goals with them at the next appointment (**FIGURE 4**).

Recall Visits and Recall Periodicity

The clinician must consider each child's individual needs to determine the appropriate interval and frequency for oral ex-

Self-Management Goals for Parent/Caregiver

Patient name _____ DOB _____

Regular dental visits for child

Family receives dental treatment

Healthy snacks

Brush with fluouride toothpaste at least 2 times daily

No soda

Less or no juice

Wean off bottle (no bottles for sleeping)

Only water or milk in sippy cups

Drink tap water

Less or no junk food and candy

Chew xylitol gum

IMPORTANT: The last thing that touches your child's teeth before bedtime is the toothbrush with fluouride toothpaste.

Self-management goals 1) _____

2) _____

Practitioner signature _____ Date _____

FIGURE 4. Self-management goals.

amination; some infants and toddlers with high caries risk should be re-evaluated on a monthly basis.[37] Most children at high risk need to be seen on a three-month interval for re-evaluation, additional counseling and clinical preventive services (e.g., fluoride varnish). Children in the moderate-risk category usually are placed on a six-month interval, while low-risk children can be re-evaluated at six- to 12-month intervals.

Parents who have demonstrated compliance with recommendations for three to six months should be scheduled back for a follow-up visit with their child for reassessment of risk. Parents need encouragement early on when new behavioral change is required and should be questioned regarding any difficulties with following recommendations. Reassessment of risk factors and monitoring the progress of improvements in established self-management goals are essential elements of infant oral care visits. Modifications of recommendations or positive reinforcement for successful changes are necessary to achieve and sustain successful risk modification. Parents should be reminded that changing risk factors and lifestyles do not happen overnight and require persistence.

Summary

Pediatric dentists and general dentists have a critical role in preventing and reducing the severity of early childhood caries. Embracing the concepts of caries risk assessment, early establishment of a dental home, medical home with their recommendations integrated within the family home practices are essential. Perinatal and infant oral health and implementation of the techniques, protocols, and care paths highlighted in this paper in a clinical practice can help break the cycle of dental disease in high-risk families and reduce burden of disease. Caries risk assessment, individualized counseling, clinical preventive services such as fluoride varnish applications, xylitol use, and referral of high-risk infants and children to dental homes are increasingly being recognized as important elements of efforts to engage other pediatric health care providers in reducing the prevalence and severity of early childhood caries.

Many providers adapt caries risk assessment tools to meet their individual practice needs. For example, the Western CAMBRA group uses and recommends the forms presented in **TABLE 2**. AAPD has endorsed and adapted as their 2010 Risk Assessment the guideline presented in **TABLE 3**. Also, some pediatricians have been using an AAP-recommended sticker version of caries risk assessment tools on their charts (**TABLE 1**). Whatever form is chosen, what remains critical is the process of assessing caries risk on a routine basis in an individualized and age-specific manner that can empower practitioners and parents/caregivers in identifying each child's risk and protective behaviors for a targeted "age- and risk-specific" approach to lower their risk for ECC. ■■■■

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- **EL DORADO HILLS:** *For Sale*-General Dentistry Practice. 2009 GR $790,758 adjusted net income of $312K. Intra-Oral camera, Pano, Softdent software, 4-equipped ops. 6-hygiene days. Practice has been in its present location for past 18 years. Owner retiring. #14324 SOLD
- **FOLSOM:** *For Sale* - General Dentistry Practice 2009 Collections $513K. Adjusted net income $181K. 4 ops (plumbed for 5), Intra oral camera, fiber optics, 4 ops. Patient base software. Owner retiring. SALE PENDING
- **FOLSOM/CITRUS HEIGHTS/ORANGEVALE AREA:** *For Sale* - General Dentistry Practice. Approximately 4 miles from Lake Natomas.This 5 op, 1,700 sq ft office has 8 days of hygiene. Receipts were one million one thirty four last year with $480K adjusted net income. The practice has shown increases every year the past five years. Practice has Panoramic machine and Practice Works software. Practice has been in its present location for 18 yrs of its 29 years. Owner is retiring. #14325 SALE PENDING
- **GRASS VALLEY:** *For Sale*-This Periodontal Practice is located in a very desirable growing community. Practice has been in its present location for the past 28 years. Office consists of 1,500 sq. ft. 3 ops, Intral-oral camera. Practice has 5 days of hygiene. #14272 SALE PENDING
- **LAKE FORREST:** *For Sale* - General Dentistry Practice. This 4 operatory, 1,200 sq. ft. office had gross receipts of 1.2 million in 2009. There are 5 days of hygiene and approx. 2,000 collective patients. Approx. 10% of receipts are from two HMO plans. Seller has practiced in the same location for approx. 30 years. Owner is retiring. SOLD
- **LIVERMORE:** *For Sale* - General Dentistry Practice. 2009 Collections were $688K with an adjusted net income of $287K. There are 4 ops in this nicely updated 1,082 sq ft office space. Dentrix software, 6-days/wk hygiene. Owner has been in same location for 36 years with long-term employees. Owner is retiring. #14326 SALE PENDING
- **LOS ANGELES:** *For Sale* - General Dentistry Practice: This practice 80% Dentical and has approximately 2000 active patients. Owner has operated in same location for 31 years. 2009 receipts were $709,000. 4 equipped tx rms, laser, Intra-Oral camera Pano and Ceph. Call for details. SALE PENDING
- **MODESTO:** *For Sale* - General Dentistry Practice. 5 operatories, 32-years in practice. Gross Receipts $884K w/adjusted net income of $346. Dentrix, Cerec, and Intra-Oral camera. Owner to retire. #14308 SOLD
- **MURRIETA/TEMECULA:** *For Sale* - 2009 receipts were $648,000. This 4 op, 1,500 sq ft office space with 4.5 days of hygiene. Average age of Dental Equip is 7 years. #14313 SOLD
- **NORTH HOLLYWOOD:** *For Sale* - General Dentistry Practice. 2009 GR $642K with adjusted net income of $251K. Office has 3 operatories 1 Addt. plumbed op, 1,350 sq. ft. in a small shopping center, very busy intersection-corner. Intra-Oral camera, laser, Easy Dental software. Owner relocating. #14328
- **NORTHERN CALIFORNIA:** For Sale - Pediatric practice. Owner has operated in same location for 32 years. Approx. 1,760 active patients, 1,160 sq. ft., Panoramic X-ray, Dexis Digital and Dentrix software in this 5-chair office. 2009 Gross Receipts $713K with 48% overhead. Owner retiring. Call for details.
- **OROVILLE:** *For Sale* - General Dentistry Practice. Owner dentist recently deceased. 2009 collections $770K. Very nice stand alone dental building with basement. 7 ops. digital x-ray 5 days of hygiene. Bldg 3,000 sq. ft. basement 540 sq. ft. Temporary Dentist in place. #14310 SOLD
- **PALM SPRINGS:** *For Immediate Sale* - General Dentistry Practice. 2008 Gross Receipts $900K with adj. net income of $346K. Highly desireable location with 4 ops. Laser, and Intra-Oral camera. 5 days of hygiene. Owner recently deceased. SOLD
- **PALM SPRINGS:** *For Sale* - General Dentistry Practice. Fee for Service. 2009 Gross Receipts $282K with adjusted net income of $157K. 1,280 sq. ft., 3 equipped operatories. Intra-Oral camera, Pano, Practice-NEB software. Doctor willing to transition by working 1-2 days a week.
- **PLUMAS COUNTY:** *For Sale*-3 equipped ops. Space available for 4th op. 1,245 sf office in good location. 2009 gross receipts $475K. Practice in present location over 50 years. Owner is retiring. #14318
- **REDDING:** *For Sale*-Owner looking for Assoc. trans. into Partnership w/Buy-Out. GR $1 Million dollars income $436K. 5.5 days hygiene, 2,200 sq. ft. #14293
- **RENO:** *For Sale* - General Dentistry Practice and Dental Building: 2009 Gross Receipts $517K with adjusted net income of $165K. 4 ½ hygiene days/week. 1, 800 sq. ft. with 6 equipped ops. (7 Avail). Dentrix software, Pano. Practice has been in its present location for 40 years. Owner retiring. SALE PENDING
- **ROSEVILLE:** *For Sale* - General Dentistry Practice. Great Location. 2009 GR $900K with adjusted net income of $300K. 1,975 sq. ft. with 4 ops, 8 days hygiene/wk. Digital, Intraoral camera, Dentrix, Trojan, fiber optics, P & C chairs - all less than 5 years old. Owner is retiring.
- **SACRAMENTO/ROSEVILLE:** *For Sale* - One of many partners is retiring in this highly successful General Dentistry Group Practice. Intra-Oral camera, Digital Pano-Dexis, electronic charts, owner Financing. Call for further information.
- **SAN FRANCISCO:** *For Sale-Patient Base for Sale*-Owner passed away last June and the practice has continued to 4 days a week with an associate. Lease can't be renewed. There are approx. 1,000 acive patients in the practice. The patient base can be purchased at no risk to buyer since the purchase price is paid according to the receipts collected on the patients that transfer. #14312 SALE PENDING
- **SAN DIEGO:** *For Sale*-General Dentistry Practice. This office is plumbed for 4 ops. 3 ops. are equipped with Promo Equipment. Lease is $2,200 per month. 2009 receipts were $185,645. PPO and Fee for service practice. #14315
- **SAN DIEGO:** *For Sale*-General Dentistry Practice. 6 ops, Intra-Oral camera, Eagle Soft Software. Office square feet 2,300 with 3 years remaining on lease. 2009 Gross Receipts $1,448,520, with an adjusted net income of $545K. Doctor would like to phase out then retire. #14331
- **SAN DIEGO/CITY HEIGHTS:** For Sale-General Dentistry practice. Owner has operated in same location for 12 years. Approx. 1,000 active patients, Panoramic X-ray, Intra-Oral camera, in this 3-chair office. #14321
- **SAN JOSE:** *For Sale* - 3 op office space & equipment only in south valley area of San Jose. Fully equipped including hand instruments. If you are going to start up a practice or add a satellite practice you can save hundreds of thousands of dollars. New lease available from landlord with the option to purchase suite. #14330
- **SANTA BARBARA:** *For Sale* - General Dentistry Practice. This excellent practice's 2009 gross Receipts $891K with steady increase every year. Practice has 6 days of hygiene. 1,690 sq. ft., 5 ops, Laser, Intra-Oral camera, Schick Digital X-Ray, Datacon software. Doctor has been practice in same location for the past eleven years of his 31 years in Santa Barbara. Doctor is retiring.
- **SOUTH LAKE TAHOE:** *For Sale*-General Dentistry Practice. Office is 647 sq. ft. w/3 ops. Practice has been in its present location for the past 26 years. Owner to retire. #14277 SOLD
- **TORRANCE:** For Sale- General Dentistry Practice: Owner has operated in same location for 20 years. Approx. 1,000 active patients, 1,080 sq. ft., Brican System, and Camsight software in this 2 equipped, 3 available-chair office. 2009 Gross receipts $434K with 38% overhead. Owner relocating. #14320

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FEATURED LISTINGS

LOS ANGELES COASTAL COMMUNITY
Profitable, 6 op GP located in a highly desirable Los Angeles coastal community. This practice is well established with over 28 years of goodwill. Collections in 2009 exceeded $650,000. The seller is retiring.

KERN COUNTY
Well established, 6 op GP with a great location for the dentist desiring a rural lifestyle in a friendly community. This practice collected over $523,000 in 2009 with amazing growth potential

LANCASTER
Long established, 4 op GP with an excellent location in a professional complex. Strong patient base developed over 34 years. 2009 collections exceeded $670,000. The seller is retiring.

LOS ANGELES (Endo)
Price Reduction!
4 op, long established endodontic practice. Located in an easily accessible professional building next to a major intersection.

SACRAMENTO COUNTY (Ortho)
Spacious 6 op, well established orthodontic practice in a full service easily accessible office building. 2009 collections $440,000+.

Pending

SOLANO COUNTY
Price Reduction!
4 op (3 equipped) GP with strong patient base. Efficient facility and proven systems.

SAN DIEGO AREA
Multi office opportunity. Contact us for more details.

ORANGE COUNTY COASTAL COMMUNITY - (Perio)
Busy periodontal practice with a highly desirable location. 5 op, very profitable business with long term goodwill and a great staff. 2009 collections $900,000+. The seller is retiring.

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CENTRAL OREGON PRACTICE FOR SALE — Come live/work in Sunny Central Oregon. Best G/P in Central Oregon. Spectacular high-end practice in fabulous location with great visibility. Equipment and building only 5 years old. Collecting over $1.2 million annually. Doctor and wife (office manager) will stay to help in transition and tenured staff will stay with practice to assist new owner. Contact buckinvest@comcast.net or call 503-680-4366.

GENERAL PRACTICE IN EL CAJON/SAN DIEGO FOR SALE — Maily cosmetics, C&B, implants. No pedo, no HMOs. All PPOs and cash. Collected over $650K in the last 3 consecutive years. Reduced price from $525K to $395K. Buy directly from owner. Options of long term-lease or buy the building as well. Call 619-401-0444.

MONTEREY PRACTICE FOR SALE — This is a four operatory, high-quality practice that has consistently grossed approximately $1.1 million for the past few years. The owner is retiring and will help with the transition. Leave name and phone number by e-mail at sellingdoc@gmail.com.

PRACTICE FOR SALE — 40 year old established general practice in Fresno. Good location in professional building. Four equipped ops, panorex and intra-oral camera. Plumbed for nitrous. 1,426 sq. ft. Priced right! Send inquiries to: California Dental Association, Attn: CDA Box 0809, 1201 K St., Sacramento, CA 95814.

PRACTICE FOR SALE IN BEAUTIFUL NORTHEASTERN CALIFORNIA — Good patient base in nice facility. Collection over $550K on three days per week. Sell for $225K or best offer. Building for sale or lease. Contact 530-233-2900 or 530-233-8274.

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3028 NAPA-SOLANO COUNTY GP

Owner retiring from well-est. practice in 1,400 sq. ft. facility with 5 ops. All fee-for-service pts. with great word-of-mouth reputation. 2009 GR $731K+, June 2010 FY on schedule for $771K + with just 4/doctor-days. Asking $518K.

3030 NORTH BAY AREA PERIO

Owner retiring from well established periodontal practice with excellent referral sources in a 2,411 square foot state-of-the-art office facility with 4 fully equipped operatories and a dedicated staff. Looking for buyer with high ethical standards and great clinical skills. Great location and owner willing to help for a smooth transition. Asking $600K.

3006 MONTEREY COUNTY ORTHO

Est. Ortho practice in 2,668 sq. ft. office with 5 open bay chairs in a professional dental complex. Panorex and Cephlometric X-ray machines. Stable and loyal referral base. Annualized GR as of Oct 2009 are $335K+. Owner retiring and willing to help for a smooth transition. Asking 227K.

2986 SAN JOSE FACILITY

A 1 1/2 year-old stunning facility with small patient base that has all the bells and whistles. 2,000 sq. ft., state-of-the-art dream office. Located in desirable commercial/residential neighborhood close to O'Connor Hospital & Valley Fair Mall. 6 ops and new GP equipment. For the established GP who is looking to move into a larger facility or for the associate GP who is ready to start out on their own. Asking $475K.

3036 SF SOLO-GROUP

High quality small GP in San Francisco with dedicated and professional patent base. Established since 1985, located in Pacific Heights neighborhood. Asking $100K.

3031 - ALMADEN VALLEY GP

Owner retiring from well-est. practice in great location. 3 fu" SOLD ops. in 1,000 sq. ft. facility. Avg. GR $50(Dr. days & 4 hygiene days/ week. All fee-for-service, great upside potential. Owner willing to help for smooth transition Asking $349K.

3037 PLACER COUNTY GP

Well est. Placer County General & Cosmetic Practice. 6 fully-equipped state-of-the-art ops., in single story 2,700 sq. ft. stand alone professional building. Avg. GR for past 4 years $1.4M+ with 61% overhead and just 4 doctor-days/week. PENDING d staff and modern office system ctive patients, all fee-for-service. S relocating out-of-state but will help for smooth transition. Seller owns the building and will provide buyer with a fair market lease or sell the building to buyer. Asking $1,134,000.

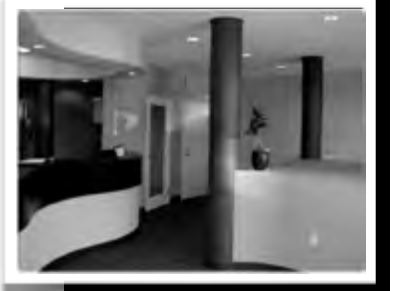
3035 CONTRA COSTA COUNTY

General & Cosmetic high-end private practice in one of the most beautiful shopping malls in northern California. Architecturally stunning 1,070 sq. ft office with four fully equipped Adec operatories and networked Dentrix computers. Ideal for young dentist w ng to accept some PPOs to add i practice. Owner PENDING willing to l nsition. Currently a 2-3 day/week semi-retirement practice, which can be expanded by adding specialties not performed by seller. Asking $296K.

3016 CONTRA COSTA COUNTY PERIO

Est. 1990 in desirable bedroom community 20 miles from SF. 1,068 sq. ft. beautifully remodeled office w/4 fully-equipped ops., & excellent staff. Assign ble 5 year lease w/5 year option. Sell help in the transition of SOLD the practice GR $441K+, 2009 GR projected to $460K+ as of Oct. Terrific upside potential. Asking $275K.

UPCOMING
Peninsula Endo
Mid-Peninsula GP



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BAY AREA

A-817 BELMONT- Surrounded by dental specialties in 2-story Prof. Bldg. 860sf w/2 ops +1 **$210k**

A-829 SAN FRANCISCO *Facility* – Attractive Office w/traditional décor. 1600sf & 2 ops. **$69k**

A-8911 SAN FRANCISCO— Don't hesitate! One of the areas most prestigious addresses! 2,073 sf, 4 ops + plumbed for 1 add'l op. **$585k**

A-8941 SAN FRANCISCO– Ready to Move In. Fully Equipped. 2 ops. Plumbed for 1 add'l **$85k**

B-846 OAKLAND- Long-established, fee-for-service practice. 2,100sf w/ 3 fully equipped ops **$325k**

B-902 HAYWARD-Easy Freeway access. Near Busy Shopping Mall. 2400sf, 5 ops office. Gross Receipts over $977k in 2009! **$795k**

B-906 PLEASANT HILL – Most Desirable Community in Contra Costa Co. 2,501 sf & 6 fully equipped ops **$550k**

C-7811 SOLANO CO - 2,997 sf w/6 ops + 2 Hyg ops + 1 add'l op! Buy the whole practice for $1.3m or only 50% for $650k. **Call for Info!**

C-869 NAPA VALLEY AREA - Quality, fee-for-service practice. Dental Prof Bldg w/ ~ 800 sq. ft. & 2 ops. Option for 3rd op. **$450k**

C-8901 SANTA ROSA– Residential area. 40+ new pats/mo. Highly Visible! 1291sf & 3 + 1 op. **$475k**

D-842 PLEASANTON –General Dentistry. 1,488sf w/ 2 ops **$295k**

D-779 SUNNYVALE - Well established GP in heart of Silicon Valley! 4 ops, 1050sf. **$225k**

D-824 SANTA CLARA- GP - 35+ new pats/mo by word-of-mouth referrals. Just 6 years old w/ 1,500 sf & 3 fully equipped ops. **$485k**

D-845 SAN JOSE - *Facility* -Attractive office. Traditional décor. Retail Plaza. 2,240 sf & 5 ops. **$150k**

D-877 LOS ALTOS -Pristine Professional plaza. Office is ~ 2,400sf - 6 ops **2009 Collections - $819k!! Asking only $425K**

D-9091 ATHERTON -Turnkey operation – no construction hassles, equipment purchase. Would cost nearly twice our asking price to duplicate. 969 sf & 3 ops ***Call for Details!***

BAY AREA CONTINUED

D-908 SAN JOSE -Well-established, fee-for-service/ PPO. Paperless, fully computerized office. 1,550 sf & 4 ops. **$450k**

NORTHERN CALIFORNIA

E-729 AUBURN - Busy retail shp ctr w/excellent signage & good traffic flow. 1750sf, 4ops. Plumbed for 2 add'l ops **REDUCED! NOW ONLY $250k**

E-7121 SACRAMENTO AREA – Largely FFS. 1800sf, 4ops (+2 add'l plumbed). . **$695k**

E-818 SACRAMENTO-Increase the part-time, relaxed workweek & watch the practice grow! Collections $350k+ in '07. 1,200sf & 4 ops. **$315k**

E-881 SACRAMENTO-State-of-the-art Practice with growing patient base. 2,400 sf & 3 ops. Plumbed for 3 add'l. Seller flexible w/ transition plans**$250k**

E-888 AUBURN - Highly esteemed FFS practice. Well respected. Doesn't get any better than this! Very desirable free standing building. Practice offers unparalleled dental care! 1,480sf w/3 ops. **This IS your dream practice! Call for Details!**

E-914 ELK GROVE—Doctor averages 4 patients w/ approx 5-6 new patients monthly. Located in an attractive professional building. 1,200sf / 4 ops. **$650k**

G-751 RED BLUFF/CHICO- Complete remodel ~5 yrs ago. FFS GP. 2350sf /4 ops. Plumbed for 2 add'l. **Practice Offered at $175k / Real Estate $250k**

G-875 YUBA CITY–Estab. 30 + years, GP, FFS, 3575sf /9 ops, great location. **$1.5m**

G-882 YUBA CITY - 3 ops, ~ 850 sf. Thriving Practice! Call for Details! **$190k**

H-634 WEST OF RENO - 1500 sf/ 4 ops, Lease below market value. **$250k**

G-883 CHICO VICINITY – Quality FFS GP. Attractive Professional plaza. 1,990 sf w/ 5 ops **$535k**

H-668 NORTHEASTERN CA–4 ops 1600sf office. 2007 gr rcpts exceed $650k! **$395k**

H-856 SOUTH LAKE TAHOE Over 50 new patients/ mo Respected & Growing! 1568 sf & 4 ops **$425k**

CENTRAL VALLEY

I-685 TURLOCK - 1700sf, 7 ops. Rrecently remodeled. Free standing bldg. Mostly Adec Eqpmt. **REDUCED! NOW ONLY $305k**

I-772 *Facility* STOCKTON-Desirable, affluent health care area. 2,140sf/4 ops **REDUCED! $150k**

I-889 MERCED- Heart of town, bustling with activity & foot traffic. 3 ops **$265k**

I-8961 SAN JOAQUIN CO– 1000sf/ 2 ops. ~ 400 charts. FFS. 24+ yrs. Seller Retiring. **ONLY $60k**

J-9031 SLO Co– Nestled between Pacific Ocean and beautiful foothills! 1218sf, w/ 4 ops. **$350k Real Estate also available**

SOUTHERN CALIFORNIA

K-762 INDIAN WELLS– Well Respected practice w/loyal patient base. Newly remodeled, 1400+ sf, 5 ops **REDUCED!! $425k**

K-887 ESCONDIDO-Beautifully landscaped dental prof bldg 1,705 sf w/5 ops **REDUCED! Now $175k**

K-900 LA HABRA– 1700sf w/4 ops. Plumbed for 2 add'l. Newer EQ and Improvements **$250k**

K-916 SANTA MARIA—Location and reputation are only two of the winning attributes of this stunning practice! 1,545 sf, w/ 4 fully equipped ops, **$300k Real Estate also available!**

SPECIALTY PRACTICES

C-6821 SOLANO CO. PROSTHO- Personalized treatment in caring environment. 1040sf, 3ops **$225k**

I-7861 CTRL VLY ORTHO- 2,000sf, open bay w/8 chairs. Garden View. Antique Exam Room. 45 years Goodwill. FFS. 60-70 patients/day. Prof Plaza. **$370k**

E-811 SIERRA FOOTHILLS ORTHO-Fast growing area. Patient Oriented, Well respected Ortho practice. Avg 30 pats/day. 1200 sf & 3 chairs in open bay. **PRICE REDUCED! $125k**

D-892 MORGAN HILL ORTHO- Remarkable Oppty! Floor to Ceiling windows—wooded courtyard. 1900sf & 6 chairs in open bay. **$275k**

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ADVERTISER INDEX

DR. BOB, CONTINUED FROM 774

over their waking hours (20) to acquiring even more.

My adolescent peer group all agreed on one fundamental maxim: If you drank a bottle of Coke into which had been placed an aspirin tablet, the consequences were guaranteed to be so horrendous, you would not survive to see the dawn. Our most daring drink was a glass of whole milk enhanced with a Horlick's Malted Milk tablet, or a glass of Ovaltine, the latter having been recommended by Little Orphan Annie whose father, billionaire Daddy Warbucks was said to have fronted a pyramid scheme involving Moxie and Grape Nehi.

Take a stroll down the aisles of any supermarket, pharmacy, service station or upscale 7-Eleven to come face-to-shelf with America's latest mania since designer water: Energy drinks! Obviously we need more energy and we need it now! Forget saving it. Saving it for what? Just look at your 401(k) plan. All my life I conscientiously saved energy. I didn't play tennis or basketball, I didn't scale every peak in the Grand Tetons. I reclined in my chair, careful not to expend any more valuable energy than necessary to lift my glass and occasional fistful of Cheez Doodles. I built up an impressive account of energy by avoiding gyms and dance floors and chasing wild women. When it came time to withdraw my savings during my eighth decade, it was to discover that, like so many others of my vintage, my account had been cancelled.

Thanks to a benevolent, energy-conscious new industry, everyone (except children, pregnant women and certain species of small dogs with bladder problems) is entitled to experience new horizons of energy. The euphoria of being "wired" has been described as similar to rapidly downing 15 cups of coffee, or acquiring a case of tinnitus exacerbated by a swarm of Africanized bees taking up residence in your inner ear.

I reclined in my chair, careful not to expend any more valuable energy than necessary to lift my glass and occasional fistful of Cheez Doodles.

Quick to respond to America's demand for more energy are products with onomatopoetic names like Red Bull, Jolt, Surge, Amp, Monster, Full Throttle, Rock Star, Sockittome, et al. Basically, the source of the energy is caffeine in high-octane amounts. Because the public is already familiar with the pros and cons of caffeine, producers of energy drinks have added as a guilt-lowering concession, vitamin B1 and traces of B6 and B12. Pending its discovery and clearance by trademark owner Boeing, look for B52 and the descriptive term "bomb" to appear on the product cans.

So that the active ingredient caffeine is not overstressed to the detriment of sales, a substance named guaranine found in a South American shrub chemically like caffeine is added. But wait—you say you want more action? How about 2,000 mg of taurine per 16-ounce can? This potent amino acid was first discovered in bulls scoping out heifers in adjoining pastures. It is the drink choice of tireless Thai rickshaw drivers schlepping obese Occidentals around Bangkok.

With all these chemicals attractively blended in your drink, plus enough sugar to induce a high in the entire student body of an average middle school, there is no more chance of you becoming de-energized than the annoying drum-beating bunny.

No energy product has been marketed with more brio and effectiveness than Red Bull GmbH, founded by Dietrich Mateschitz, an Austrian entrepreneur. He wisely zeroed in on colleges throughout the nation, whose history of goldfish swallowing, panty raids, keg parties and other adolescent excesses indicated a prime consumer base. The Red Bull-sponsored "Undie Run" was embraced with unbridled enthusiasm as energized students stripped to their unmentionables and waving complimentary cans of the company's product, raced exuberantly around a one-mile course in the middle of the night.

At UCLA, where the Undie Run has been joyfully observed three times a year since 2002, festivities were reluctantly cancelled this year by authorities, citing "problems" and increased policing costs. Pity, but racing around the dorms in dishabille is still within budget.

Hating to rain on anybody's parade, but professionally required to point out the inevitable downside of energy drinks, is Dr. Clark Stanford, associate dean for research at the University of Iowa. He explains that the drinks usually contain enough sugar to horrify the dental profession and are highly acidic with carbonation and citric acid as additives. A few products are sugar-free to placate the health-conscious consumers, but who are more than happy with the rest of the chemicals.

When the fun of running around in your underwear is offset by your teeth eroding and dissolving, or you get an untoward result because of innocently adding a drop or two of Smirnoff to your energy drink, you might want to rethink the whole energy thing and let your erg move your dyne as nature intended. ■■■■

CDA JOURNAL, VOL 38, Nº10

Oomph in a Can: Beat the Blahs

Citizens of my age (Pleistocene) regret not saving any energy while they still had some, having squandered it recklessly on making a living.

→ Robert E. Horseman, DDS

ILLUSTRATION BY DAN HUBIG

It is no secret there is an energy crisis in this country today. Fossil fuels are being depleted faster than the contents of the U.S. Treasury. The president says so, the speaker of the house agrees, and environmentalists and conservationists on full lobbying alert concur. A vast bureaucracy of highly skilled government workers anxiously awaiting their retirement pensions, believe the energy spent in struggling against the inevitable could very well prevent it from becoming inevitable. Opposition to saving energy is un-American — probably discriminatory and partisan as well.

Unfortunately, the saving of energy frequently involves some sacrifices other than not showering on a regular basis, not the least of which is admitting the exact definition of energy escapes you.

Write This Down

Energy is simply defined in terms of ergs, or the cgs unit of work equal to the work done by the force of one dyne acting through a distance of one centimeter. Obviously, putting all your ergs in one basket contravenes federal recommendations. The last successful government energy-saving edict was the highly popular national 55 mph speed limit of yesteryear.

Compliance is largely a generational problem, sharply dividing the nation. It is the fine line between saving and acquiring. Citizens of my age (Pleistocene) regret not saving any energy while they still had some, having squandered it recklessly on making a living. Those under 30, who already have way too much of it to use in an intelligent manner, have given

CONTINUES ON 773

Dr. Bette Robin's level-headed, knowledgeable, and pleasant demeanor covers a bulldog tenacity and endless energy in getting superior results. She really understands the dental and business side of practices.

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