OF THE CALIFORNIA DENTAL ASSOCIATION

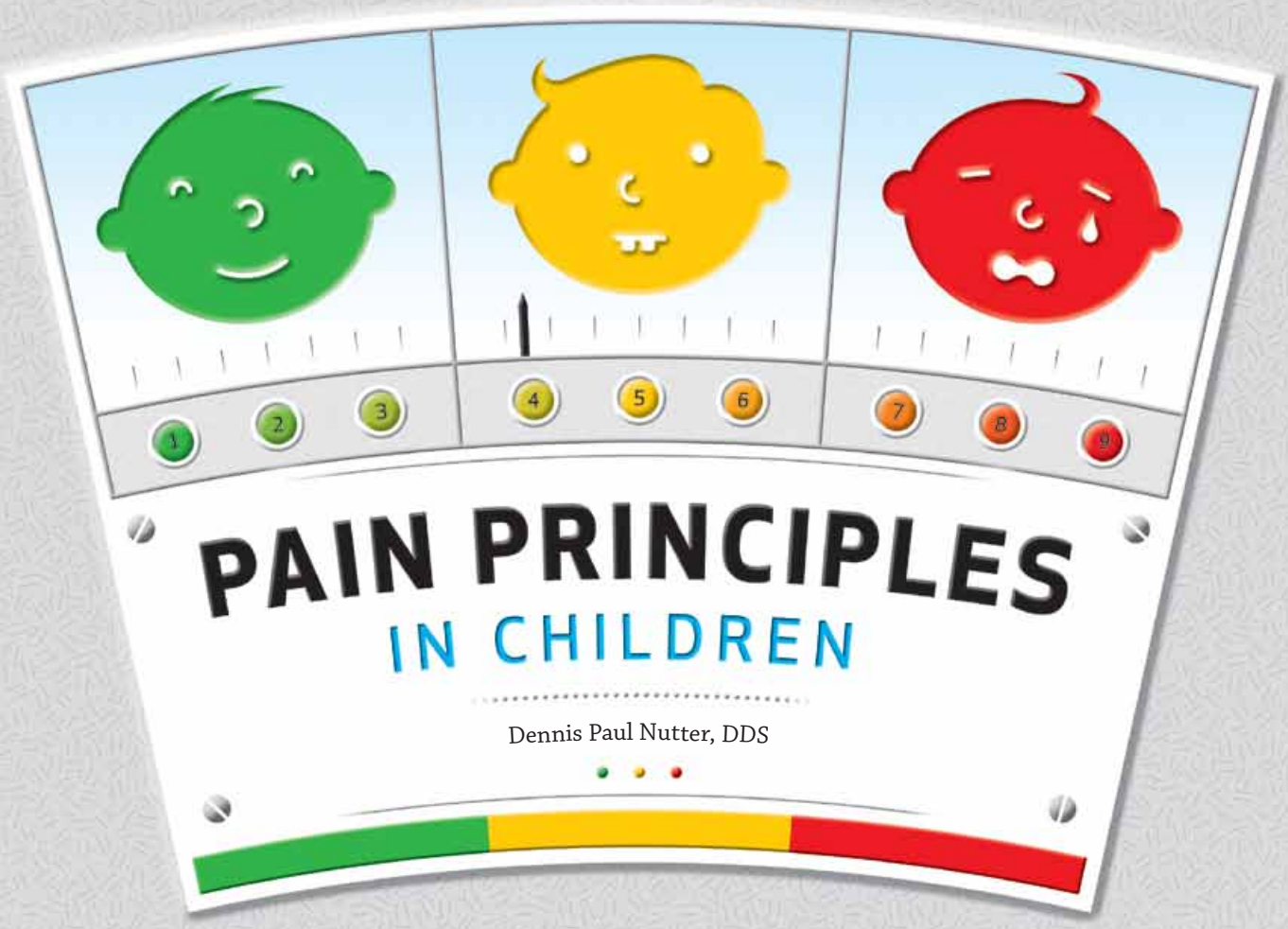
# Journal

OCTOBER 2009

Neurobiologic Considerations

Target Considerations

Pain Prevention Strategies




# PAIN PRINCIPLES IN CHILDREN

Dennis Paul Nutter, DDS

OF THE CALIFORNIA DENTAL ASSOCIATION
Journal
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## DEPARTMENTS



## FEATURES

CDA JOURNAL, VOL 37, Nº10

# Pipeline

KERRY K. CARNEY, DDS

For the past seven years whenever I heard mention of the "Pipeline" in dental circles, I was never quite clear on the concept. I knew it had something to do with access to care but I was fuzzy on the particulars. When the topic came up, I would listen and nod hoping to infer what the "Pipeline" was before my own ignorance could be revealed. Thanks to the recently published American Dental Education Association evaluation and the overview published in the *Journal of the American Dental Association*, I now understand the importance of the Pipeline program.[1,2]

**The Dental Pipeline program grew out of this call for action. It is an innovative and exciting effort to address these disparities.**

It has been nine years since the publication of the U.S. Surgeon General's report on "Oral Health in America." The 2000 report was groundbreaking. It described the status of our oral health as a nation. It emphasized that oral health is an essential part of overall health and provided a framework for action in addressing the oral health disparities and needs of the population of the United States.

One of the report's "frameworks for action" concerned the link between oral health and underrepresented minority dentists. There is a lack of racial and ethnic diversity in the oral health workforce. Efforts to recruit members of minority groups to positions in health education, research, and practice in numbers that at least match their representation in the general population not only would enrich the talent pool, but also might result in a more equitable geographic distribution of care providers. The effect of that change could well enhance access and utilization of oral health care by racial and ethnic minorities.[3]

The Dental Pipeline program grew out of this call for action. It is an innovative and exciting effort to address these disparities. In a nutshell, the first phase of the Pipeline program had three primary goals:

1. Increase the number of underrepresented minority students recruited, matriculated, and graduated from the participating schools.
2. Increase the number of hours dental students spend in extramural rotations in community sites providing care to the underserved. (The target was 60 hours).
3. Improve cultural competency of dental students through changes in the curriculum.

Of the 15 schools in the program, one-third were located in California. With funding from the Robert Wood Johnson Foundation and the California Endowment, all five of California's (then-existing) dental schools were part of the Pipeline program. The California schools formed a local collaborative to work together on the methods to be used to bring about the desired results. Many obstacles had to be addressed. There were time and curriculum issues. Dugoni had to work within its three-year program. USC had to incorporate cultural competency into its problem-based learning system.

Each of the schools had to deal with the fact that more student hours outside the school's clinic meant fewer hours producing revenue for the school. There was also the underlying question of whether access to care should be part of the schools' mission.

California's involvement in increasing underrepresented minority student enrollment began before the Pipeline program was established in 2002. In 1999, UCSF began a postbaccalaureate program to help underrepresented minority students who had applied but had not been accepted into dental school. The idea was to beef up the applicant's academic experience and prepare them for the rigors of dental school.

This postbaccalaureate program became a model for the California Collaborative. Each school initiated its own set of programs in an effort to achieve the goals of increased community clinic time, underrepresented minority student enrollment, and cultural competency. The Pipeline program successfully increased the number of underrepresented minority enrollees in the target schools and the number of hours spent in community clinic rotations.[2] The metrics used to analyze the success of the program are somewhat tortured. Each school had its own history, mission, and environment, and these elements interacted to complicate comparisons.

The number of underrepresented minority enrollments and clinic hours could be quantified but the achievements in cultural competency and changes in attitude were more subjective and relied on self-assessment. As part of the Pipeline evaluation states, "One cannot assume that providing dentistry in a community practice makes one culturally competent; nonetheless, having no exposure to vul-

nerable patients in the community setting may graduate dentists unaware of access to care issues."[1]

The big questions the Pipeline program tried to address are yet to be answered. Will the increased numbers of underrepresented minority dentists mean a more equitable geographic distribution of providers? Will these new underrepresented minority dentists practice in a manner that enhances access and utilization of oral health care by racial and ethnic minorities? Will cultural competency training and the increased experience in community clinics serving the underserved, translate into more mainstream dentists enhancing access and utilization of oral health care by minorities? Efforts are under way to measure some of these impacts by documenting practice locations of Pipeline graduates.[4]

The evaluations make clear that where the Pipeline program had a champion (a dean or faculty member), the program was highly successful and brought added value to the education of all the students in the school. As in other fields, accommodations made ostensibly for one group can end up eliminating obstacles and improving the experience for everyone.

The Pipeline program is not limited to dentistry. There exist versions of the program in both medicine and law. All the programs were designed to increase the recruitment of a diverse student population. The costs of initiating the program in dentistry were underwritten by the granting agencies. CDA also recognized the importance of the program for organized dentistry and contributed more than $60,000 to the California Collaborative to help with the postbaccalaureate piece of the program.

The number of underrepresented minority students doubled during the first five years of the program but since 2007, the number has remained unchanged. During this same period, the competition for admission to dental schools has increased to record levels. Once in place, the curriculum piece of the program should be able to continue without significant financial underwriting. Efforts are under way to share with the schools, the income generated by the students at the extramural locations. However, representatives of each of the California schools voiced their concerns about the sustainability of the recruitment portion of the Pipeline program given the current economic climate.

Parties unaccustomed to working together found common ground where they could creatively address ancillary issues.

The most exciting aspect of the Pipeline program springs from the coalitions it engendered. Parties unaccustomed to working together found common ground where they could creatively address ancillary issues. The second phase of the Pipeline has produced a number of creative programs as a result of these collaborations. There now exists a network of clinic directors that meets three times a year with representatives of the dental schools. This new association facilitates communication and adoption of successful practices and strategies. A training manual and program to aid clinic directors in incorporating dental students into their clinic operations have been developed, and clinic directors are formulating ways to encourage members of their communities to pursue careers in dentistry and oral health. Some clinic directors have reported it is now easier to hire dentists to work as regular staff members in community clinics.

Tackling complex social problems requires health care providers and community groups to work together in new ways. The Pipeline has fostered experiments with "remote dentistry" in an attempt to facilitate access to care in rural environments. With the help of the CDA Foundation, the Pipeline Policy Summit is held annually. The summit provides a forum for the proposal of policy that may effect change on a larger scale. The Pipeline has matured into a whole array of projects, associations, and collaborations.

Now, when I hear "Pipeline," a clear image comes to mind. I don't think of the controversial construction project that conducted oil over 800 miles of Alaskan permafrost. I don't think of an instrumental made popular by the Ventures. I think of an amazing program organized around increasing cultural diversity in our profession and encouraging cultural exploration in order to bring our professional skills to a diverse population. (Then I think of the Ventures). ■■■■

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*The editor also would like to thank the following individuals for their personal communication: Dr. Russell I. Webb, 13th District ADA trustee; Dr. Charles Alexander, associate vice provost for Student Diversity, University of California, Los Angeles; Dr. Howard Bailit, University of Connecticut Health Center; and Dr. Paul Glassman, professor, Department of Dental Practice, director of Community Oral Health, Arthur A. Dugoni School of Dentistry.*

*Address comments, letters, and questions to the editor to kerry.carney@cda.org.*


Matt Mullin

## Lemons in Dentistry

BY DAVID W. CHAMBERS, PHD

In the most recent Gallup poll where Americans were asked whether they trust dentists, the profession ranked fifth out of 25, with a 62 percent approval rating. That is the same ranking, but an 11 percent increase in approval over the past quarter century that the survey item has been used.

By contrast, the most recent Gallup data for used car salesmen gives them a 6 percent trust rating. The difference between dentists and used car salesmen is instructive. In 1970, G.A. Akerlof wrote a famous paper called "The Market for 'Lemons.'" His conclusion: "Bad products drive out good products and threaten the very existence of markets, all because current owners know more

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**gumEase by Olympic Dental and Medical Devices**

→

gumEase is the first FDA-approved cryoanesthetic device that provides the same effect as traditional anesthesia, without the patient risk, extra time and cost, and without the use of a single needle. gumEase is a stand-alone device and is effective for extractions, braces adjustments, scalings, fillings, cleanings, and other procedures. gumEase is easily placed in the mouth for fast pain relief that works. For more information, go to olympicdmd.net.

## Oral Bacteria Disease and Obesity: Is There a Link?

Researchers are looking into the possibility that oral bacteria may contribute to obesity.

In a study, published in the *Journal of Dental Research*, researchers J.M. Goodson, D. Groppo, S. Halem, and E. Carpino collected saliva from more than 300 women who each had a body mass index ranging between 27 and 32. A DNA probe analysis measured the bacterial populations and compared these levels with a group of 232 healthy women from studies of perio disease.

"The median percentage difference of seven of the 40 bacterial species measured was greater than 2 percent in the saliva of overweight women," according to a press release. Additionally, an analysis showed that 98.4 percent of the heavier women could be "identified by the presence of a single bacterial species (*Selenomonas noxia*) at levels greater than 1.05 percent of the total salivary bacteria."

Based on these findings, researchers said it is a possibility that bacterial species such as these could serve as biological indicators of a developing overweight condition. Additionally, and sure the subject of future research, is the possibility that oral bacteria may participate in the pathology that leads to obesity, according to a report.

To view the complete study, go to jdr.sagepub.com/cgi/content/full/88/6/519.

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## American Dental Association Statement: FDA Action on Amalgam

The American Dental Association has issued a statement that it concurs with the U.S. Food and Drug Administration's decision not to place limitations on dental amalgam use.

"The FDA has left the decision about dental treatment right where it needs to be — between the dentist and the patient," stated John Findley, DDS, ADA president. "This decision underscores what the ADA has long supported — a discussion between dentists and patients about the full range of treatment options to help patients make educated decisions regarding their dental care."

The FDA ruling recently issued categorizes encapsulated dental amalgam as a class II medical device, the same class as gold and tooth-colored composite fillings. In 2002, the FDA first proposed the class II designation for dental amalgam, an idea the ADA has long supported.

Over the years, many scientific studies have been completed on the subject. Among them, two trials published in the April 2006 *Journal of the American Medical Association* that showed dental amalgam as a valuable and safe cavity-filling material. In a review this year of scientific literature on the safety of amalgam, the ADA's Council on Scientific Affairs reaffirmed evidence that amalgam continues to be reliable and safe choice for dental patients.

"Dentists are doctors specializing in oral health care," said Findley. "We encourage people to talk with their dentists if they have any questions about their oral health."

For more information, go to ada.org.

## Banishing Bad Breath

Consuming garlic is great for warding off vampires, but if you're trying to get sentimental with your sweetie, then the byproduct of the pungent herb may put the kibosh on the mood.

Well, thank goodness for the developer of "OkayToKiss."

Similar to the theory of the portable device capable of estimating blood alcohol content, OkayToKiss, which is in development, gives the user definitive information on whether they're good to smooch.

The tester would stealthily put a little saliva on a window of the kit, which may be the size of a chewing gum package. If the resultant color is blue, that means halitosis. OkayToKiss inventor and developer Mel Rosenberg, a professor at Tel Aviv University, said his device tests for gram-positive and gram-negative bacteria, both conniving culprits in creating the offending odor.

Rosenberg, who is editor of the *Journal of Breath Research* and creator of a two-phase mouthwash, also wrote a book, *Save Your Breath,* an account of his research on halitosis for the past two decades.

## Comings and Goings at the National Museum of Dentistry

Thirteen is a lucky number for the National Museum of Dentistry. The museum — which now enters its teenage years — celebrated its birthday recently with the unveiling of new exhibits and a preview of new projects.

The exhibit, "Smile Experience," allows guests to take a digital photo of their smile and upload it to a monitor located in the gallery. Visitors also can test their celebrity intelligence by accurately pairing a smile to the corresponding star in the game, "Guess the Smile." A video presentation chronicles the Mayans who adorned their pearly whites with jade as well as other interesting oddities throughout history up to the introduction of tooth bonding.

The father of esthetic dentistry, Irwin Smigel, DDS, was honored during the festivities and also has an exhibit in which guests can explore his real-life smile transformations.

And while the museum celebrated its birthday by ushering in new exhibits and projects, it also said goodbye to a good friend. After a decade as the museum's executive director, Rosemary Fetter retired. At the event, Fetter was honored for her contributions and efforts.


## Marketing Effort Ended


Due to major operational and production snags, ADA Intelligent Dental Marketing is being phased out. Full refunds for paid undelivered goods and services will be issued to customers within 60 days. A special team was created to assist in resolving customer issues.

ADA Intelligent Dental Marketing, ADAidm, was formed in February 2007, a shared venture with ADA Business Enterprises, Inc., ADABEI, (a wholly owned subsidiary of the ADA) in an effort to help ADA members create and market their dental practices. Services and products, developed to help dentists attract and retain customers, included branding, marketing, Web site development, and direct mail.

Recognizing the difficulties with the program, the Board of Trustees recently took action, appointing an ADA trustee to chair ADABEI and to resolve the ADAidm issues, as well as to oversee the successful ongoing ADABEI programs, according to a press release. Additionally, the ADA board directed teams at ADABEI and ADAidm to resolve the ADAidm situation.

## Students Persuade Mississippi to Fluoridate the Water

A team of graduate students in the University of North Carolina at Chapel Hill, Gillings School of Global Public Health's Department of Health Policy And Management, has persuaded the Mississippi Legislature to require communities in the state to fluoridate their water.

Nick Mosca, DDS, Mississippi state dental director and a student in the school's distance education Doctor of Public Health program in health policy and management, along with students Lauren Brown, Kim Hammersmith, DDS, Ashley Kranz, Presha Patel, and Bhav Shukla were instrumental in convincing policy-makers to pass the statewide law.

To read the full article, go to fridayletter.asph.org/article_view.cfm?FLE_Index=10135&FL_Index=1575.

"Success is not the key to happiness. Happiness is the key to success. If you love what you are doing, you will be successful."

ALBERT SCHWEITZER


## Honors

**Robert Allan Handysides, DDS,** associate professor and an eight-year veteran of Loma Linda University School of Dentistry, Department of Endodontics faculty, has accepted the chairmanship of the department vacated by the semi-retirement of Leif K. Bakland, DDS, who occupied its chair for 28 years.

A graduate of Loma Linda, Handysides established a solo practice in Kingston, Canada, in 1994, and returned to Loma Linda in 1999 to study in the School's Advanced Education Program in endodontics, which he completed in 2001. He then joined the department faculty and took on the responsibility of teaching preclinical endodontics.

**Jane Weintraub, DDS, MPH,** the Lee Hysan professor and chair, Division of Oral Epidemiology and Dental Public Health at the University of California, San Francisco, School of Dentistry, has been named the 2009 Faculty Research Lecturer for her outstanding achievements in the field of science related to oral and craniofacial health.


Robert Allan Handysides, DDS


Jane Weintraub, DDS, MPH

Weintraub will be honored at the school's annual Research and Clinical Excellence Day on Oct. 8. Weintraub has advanced the science of dental public health through her efforts to establish and lead multifaceted research teams that study many aspects of caries and health disparities.

"I have worked with Jane for many years, and I am so pleased that she will be honored in this way this year," said UCSF School of Dentistry Dean John D.B. Featherstone, PhD. "Her work over several decades has been outstanding and has contributed strongly to improvements in oral health for our nation."

**LEMONS,** CONTINUED FROM 693

about the quality of the item to be exchanged than do potential buyers."

It is understood, even if we do not like thinking about it, that there are a few dentists who would count as lemons. Nationally, the rate of disciplined licenses is about 1.5 in 1000, well less than 1 percent. But there may be more whose occasional lapses matter. Most would assume that these lemons sour the public on the profession and hold down the Gallup trust numbers.

How does that come about? A critical part of the process comes from patients' inability to assess the quality of the care they receive. This applies equally to the patients of the most talented and honest dentists and the patients of those who are slipshod or disreputable. The likelihood of getting a dental lemon is determined almost entirely by the dentist and not the patient's skill at detecting lemons. This means that the public cannot be counted on to provide a reasonable check on the spread of lemons.

The next step in the argument is critical: Bad dentists drive out good ones. Thomas Gresham, a London financer, advised Queen Elizabeth I against minting new coins to stop the widespread practice of clipping (shaving off a bit of the edge and collecting these shavings to sell as precious metal while circulating the clipped coins at face value). His reasoning — which is absolutely correct — was that citizens would hoard the new coins and pay their taxes in clipped ones. This phenomenon is called Gresham's Law. Brighter smiles, misleading pricing, and procedures that quack circulate more quickly than fundamental, health-based dentistry.

Think of the reluctance of potential patients to commit to dental care they cannot accurately evaluate as requiring a tax paid to patients to compensate them for the possibility that they will have an unjustifiably negative dental experience. All dentists have to pay the tax.

The final step in the argument is that lemons damage both particular individual buyers and the buying public in general. The market becomes tainted. Patients demand more of all dentists now in order to protect themselves from the possibility of the few bad actors.

The nub:

1. Inform and educate patients so they can recognize good dentistry.
2. Challenge the lemons that will move the cost of bad dentistry from you to them.
3. Be a champion for the profession and comprehensive, continuous, competent, compassionate dentistry.

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

## Patients on Multiple Meds S sceptible to Xerostomia

An estimated 91 percent of dentists reported patients are grumbling about dry mouth because of multiple medications, according to a national survey of members by the Academy of General Dentistry. Xerostomia affects about 1 in 4 Americans, which means approximately 25 percent of the population is at risk for caries.

"The number of xerostomia cases has increased greatly over time because people are taking more and more medications," said Cindy Kleinman, RDH, BS, who presented a course during the AGD's 57th annual meeting. "General dentists are seeing this trend in their offices, which is why they are trying to learn all they can about this condition. The more they know, the better they will be at diagnosing and treating patients."

"Antidepressants, painkillers, diuretics, antihistamines, tranquilizers, and antihypersensitives can all contribute to dry mouth," said Raymond K. Martin, DDS, MAGD, of the more than 400 prescription and nonprescription drugs associated with xerostomia. "People who take several of these medications are more susceptible."

Medical problems such as Alzheimer's disease, rheumatoid arthritis, cystic fibrosis, Sjögren's syndrome, hypertension, anemia, diabetes, HIV/AIDS, Parkinson's disease, stroke, and mumps have been associated with dry mouth. Nerve damage, some types of cancer treatments, smoking, dehydration, and chewing tobacco also have been linked with xerostomia.

As indicated by the AGD survey, the most common symptoms reported by patients include constant thirst and difficulty eating, swallowing, or speaking, according to a press release. Additionally, tongue irritation, a burning feeling inside the oral cavity, stringy or foamy saliva, ulcerations that are painful, and dentin hypersensitivity are other dry mouth indicators. In time, the condition can lead to widespread decay, gum disease, and tooth loss.

Other interesting facts from the survey included:

- An estimated two-thirds consider dry mouth to be a very serious condition, as it relates to the promotion of tooth decay;
- Approximately 68 percent say constant thirst is the most common symptom communicated by patients; 44 percent say patients have difficulty eating, swallowing or speaking;
- More than 92 percent report that patients attempt to increase salivary production by drinking water; less than 58 percent say patients try taking over-the-counter saliva substitutes, chewing sugar-free gum, or sucking on hard candy; and
- More than 60 percent of those surveyed consider diagnosing a patient with xerostomia after he or she exhibits or reports symptoms of dry mouth.

So, what's there to do? Palliative efforts can range from using a moisturizer on the lips, flossing and brushing with a fluoride paste at least twice a day, choosing sugarless gum and candy (sour or noncitrus-flavored confections are better), staying adequately hydrated, and avoiding caffeine, alcohol, smoking, citrus juices, dry food, and overly salted food.

### UPCOMING MEETINGS

| | |
|---|---|
| **2009** | |
| Sept. 30–Oct.-4 | American Dental Association 150th Annual Session, Honolulu, Hawaii, ada.org. |
| Nov. 2–4 | National Network for Oral Health Access National Primary Oral Health Conference, Nashville, Tenn., Luana Harris-Scott (619) 279-5879 or nnoha.org. |
| Nov. 8–14 | United States Dental Tennis Association fall meeting, Scottsdale, Ariz., dentaltennis.org. |
| **2010** | |
| April 11–17 | United States Dental Tennis Association, Amelia Island Plantation, Fla., dentaltennis.org. |
| April 26–28 | National Oral Health Conference, St. Louis, Mo., nationaloralhealthconference.com. |
| May 13–16 | *CDA Presents The Art and Science of Dentistry*, Anaheim, 800-CDA-SMILE (232-7645), cda.org. |
| Sept. 9–11 | *CDA Presents The Art and Science of Dentistry*, San Francisco, 800-CDA-SMILE (232-7645), cda.org. |
| Nov. 7–13 | United States Dental Tennis Association, Grand Wailea, Hawaii, 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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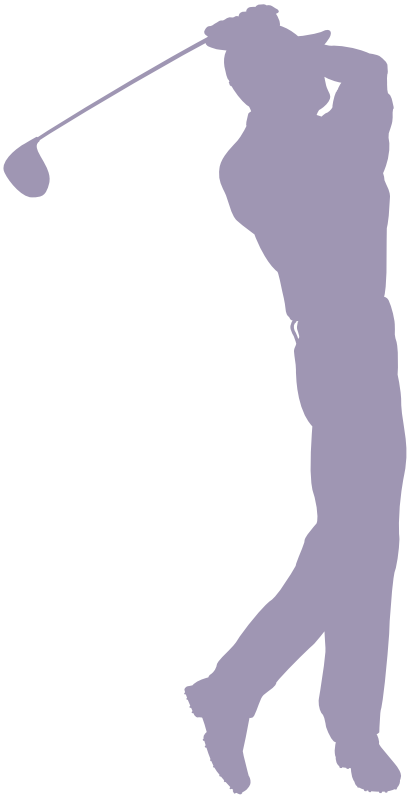

## 'Kids in the Klinic' Benefits from Golf Classic

Duffers united and the result was more than $80,000 that benefits children's dental services throughout the San Francisco Bay Area and Central Valley.

More than 175 linksters participating in the annual "Kids in the Klinic" 18-hole golf classic, which was held June 29 at the Olympic Club in Daly City, Calif., included donors, supporters, and alumni of the Arthur A. Dugoni School of Dentistry.

Once they were off the green, participants could bid on prizes in a silent auction. Dinner and a live auction ranging from travel packages, PGA Players Championship tickets, and wine tours, capped the day-long event.

"The Kids in the Klinic endowment helps make it possible for our school to provide the best possible treatment regardless of a family's ability to pay," said Patrick J. Ferrillo, Jr., DDS, dean of the Dugoni School of Dentistry. "This fundraising event is very important, especially in this period of economic uncertainty. These contributions help underwrite consultations, restorative dentistry, preventative dental education for children and parents, and many other vital services."

Funds from the Kids in the Klinic endowment cover preventive care, treatment for cleft lip and palate, dental restorations, orthodontics and dental education, according to a press release. The school's dental clinics annually deliver care at reduced rates to children who could not otherwise afford it. The recent event helps Kids in the Klinic endowment goal of raising $2 million.

## Some Children With Medicaid Face More Struggles Than Their Private Insurance Peers

Based on the type of insurance they have, children with cleft lip and/or palate may encounter dental care challenges as those with Medicaid are refused care more often, have fewer checkups, and state more frequently that they are dissatisfied with their dental care.

Caregivers and parents of the 171 cleft lip and/or palate-affected children were involved with the study, which was published recently in the *Cleft Palate – Craniofacial Journal*. While 84.8 percent of the youths received regular dental care, their counterparts who mostly had public insurance did not. The study did not find distance to a dental care facility to be a factor, according to a press release, but perhaps the small number of dentists treating this special needs group may be a component to the challenges in getting adequate care.

Although some dentists take public insurance, including Medicaid, the authors said that only 50 percent of dentists treat children with Medicaid coverage. In a Michigan study conducted earlier, there was a 32.3 percent bump in the number of children getting dental care after a particular program was implemented. The program had reimbursement rates for Medicaid that nearly rivaled the figures provided by private insurance.

More research is needed to figure out if raising the reimbursement rate will expand the number of dentists to accept these special needs patients with Medicaid coverage, said the authors in the *Cleft Palate – Craniofacial Journal* study, "A Survey of Cleft Team Patient Experience in Obtaining Dental Care."

The small number of dentists treating this special needs group may be a component to the challenges in getting adequate care.

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# Improve Your Clinical Pain Practice With Children

DENNIS PAUL NUTTER, DDS

GUEST EDITOR

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The following true-or-false questions will introduce you to the articles in this issue of *Journal of the California Dental Association*. They are designed to test your knowledge of clinical pain concepts. The answers are provided below.

1. If an infant or very young child does not consciously remember a brief but acute encounter with procedure pain, there is no lasting "sensitizing" harm to the child.

2. An acceptable way to clinically estimate the amount of pain a child is actually experiencing for a given stimulus intensity is to compare their reactions to the reactions of other children in similar circumstances.

3.The subjective, emotional dimension of pain expression is a false contribution to pain experience.

4. The child's mother is generally better than the dentist at determining the amount of pain a child is experiencing.

5. Under conditions of tissue trauma, a patient's behavioral or self-report of pain is superior to any clinician assessment of pain.

6. "Behavior management" confounds the operation of pain assessment-intervention dynamics and should be abandoned.

7. There is no reliable, objective measure of pediatric pain.

8. Caries prevention methods have the greatest chance of being effective when implemented prior to the age of 12 months.

9. Research reveals that between 1960 and 2000, total sugar consumption among American families increased by 33 percent.

10. At-risk children who do not receive fluoride varnish and caregiver education twice a year have a fourfold increased chance of developing decay.

This month's issue of *Journal of the California Dental Association* challenges conventional thought in the performance of clinical pain practice for children in dentistry. Although the pain principles advocated in these articles have been derived for pediatric procedure pain, they have relevance and applicability to adult pain as well.

Among the pain strategies suggested is one to preferentially reduce, defer, or prevent the procedural stimulation of very young children or children with an elevated "affective" dimension of pain so that they may develop more pain inhibitory controls. This will allow them to tolerate a more invasive procedure later. Among the advantages of this approach is that it will minimize the technical barriers to the early treatment of these children by nonspecialists.

Drs. Huston and Wood suggest we collaborate in this early treatment with our medical colleagues and thereby enable an important expansion in the access to dental care for underserved pediatric populations. Over time, early intervention

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and prevention should reduce the dental restorative procedures that contribute to the sensitizing pain inventory that children experience.

Answers:

1. *False.* The dorsal horn of the spinal cord "implicitly" remembers pain and amplifies future pain signaling.

2. *False.* There is no uniform pain response for a given stimulus intensity. It is the child's behavioral or self-report of pain that determines the intensity of their pain experience.

3. *False.* The emotional dimension of pain is integral to pain's subjective experience.

4. *True.* Dentists, physicians, and nurses all tend to underestimate pediatric pain.

5. *True.* In the case of procedure pain, unless it is clear that nociceptive input has not occurred, the patient's behavioral or self-report is the best evidence.

6. *True.* Assessment-intervention dynamics that target behavior make the assessment-intervention dynamic for pain susceptible to evaluator tendencies that deny the authenticity of children's pain reports and underestimate pain. Targeting pain, not behavior, will allow clinicians to develop and improve upon intervention strategies that are effective in controlling pain in all of its dimensions.

7. *True.* Objective measures of pain, such as heart rate or galvanic skin response, are not reliable.

8. *True.* This is one reason why physicians need to be counseled to lift the upper lip when doing their oral health exams to check for enamel integrity problems and assist in intercepting early white or brown spot lesions before cavitation occurs.

9. *True.* The increased risk of a prolonged sensitization injury from childhood dental procedure pain now places a higher value on dietary prevention messages.

10. *True.* Demonstrating that given the proper frequency, this noninvasive intervention will assist in stabilizing dental caries until children have developed increased pain inhibitory controls to better tolerate the invasiveness of dental procedures. ■■■■

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# Good, Clinical Pain Practice for Pediatric Procedure Pain: Neurobiologic Considerations

DENNIS PAUL NUTTER, DDS

**ABSTRACT** The objective of this review is to integrate current knowledge of pediatric procedure pain to develop a conceptual framework of good, clinical pediatric pain practice that can be used to improve the processes and outcomes of the clinical management of pediatric procedure pain in dentistry. This paper will present four characteristics of pain neurobiology that critically influence clinical decisions in pediatric procedure pain management.

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Procedure pain is a brief but frequent, problematic feature of clinical practice encountered by the dental surgeon treating children.[1,2] How this pain is assessed and managed is inevitably guided by each clinician's concept of good, clinical pediatric pain practice. Advancements in the understanding of the neurobiology of pain have led to pharmacological agents to obtund the nociceptive and central processing dimensions of pain experience.[3-24] Local anesthetics have historically served as the primary staple of intraoperative pain control in dentistry. However, the articles in this issue will argue that any description of good, clinical pain practice must take its derivation from both the neurobiology of pain as well as those clinician factors that influence judgments of pain assessment and pain intervention.

This paper discusses the neurobiological characteristics of pediatric procedure pain that critically influence clinical decisions in pediatric procedure pain management. These are pain's subjective nature that defies prediction; its "plastic" nature that facilitates central sensitization; its developmental nature that ensures that children, in the absence of sensitization, will experience more pain for the same medical procedure than they will as adults; and its multidimensional nature that compels an accommodating multidimensional pain technique.

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FIGURE 1.

FIGURE 2.

FIGURE 3.

**FIGURES 1-3.** All of the above children are displaying a type of pain behavior despite the absence of noxious nociceptive stimulation. In the context of a procedural setting, anxiety 1), anger 2), and what some may term "disobedience," 3) are all examples of pain affect. The child in Figure 3 is not clowning around. He has been asked by both his father and the dental assistant to take his hands away from his face.

## The Subjective Nature of Pain

Pediatric pain has a multidimensional ontogeny with contributions from nociceptive, affective (psychological) and stimulus dimensions that occur in a developmental context.[25-27,2] Through genotypic and phenotypic processes, procedure pain becomes differentiated in each of us so that the magnitude of our pain experience is only partially related to the amount of tissue trauma experienced. The subjective, emotional dimension of pain has been affirmed by the International Association for the Study of Pain, which has defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage."[28] Studies have confirmed that a child's sensitivity to pain varies from individual to individual.[29,30]

In a study by Walco and Dampier, et al., experimental pain was applied to a group of children with a history of clinical pain and a group of healthy controls without pain history.[31] The authors found that there was no uniform pain experience for a given stimulus intensity. They also found that previous pain experience lowers pain threshold levels, a process known as "central sensitization" discussed below. This phenotypic influence on nociceptive pathway development magnifies and further confounds genotypic differences in pain perception.

Given this, it is not possible for a clinician to reliably predict the intensity of pain experienced by a child based on the clinician's calculation of the extent of tissue damage or the clinician's previous experience with the reactions of other children in similar conditions. The clinical and neurobiological evidence supports the idea that only the child can know how much pain they are experiencing.[32,33] This is the first principle of good, clinical pain practice. It will be further supported by evidence, discussed in another article in this issue that clinicians tend to underestimate the magnitude of pain a child is experiencing as well as the clinical reality that there is no reliable, objective measure of pediatric pain.

The subjective expression of pain has two forms. In the case of procedure pain, the immediate form is the emotional response to the nociceptive-sensory perception of tissue trauma. It may manifest as an obvious, violent, evasive maneuver, or a barely discernable squinting of the eyes. The secondary form known as "pain affect" is the emotional response to its anticipated recurrence.[26,34-36] Pain affect may appear as an anticipatory response to a consciously recognized external threat (fear), or as a vague but persistent apprehension of danger (anxiety).[26,1,37-39] It may also be comprised of feelings such as "annoyance, anger, despair, boredom, or depression" if these moods assist in orienting the patient's attention toward a pain stimulus.[26,34,40] This delayed feature of pain is facilitated by ascending sensory afferents that are heavily interconnected with limbic, emotional centers of the brain that retain information about a pain event's time and place.[41,42] Affective pain behavior can be as subtle as an elevated heart rate, as overt as the refusal to sit in the dental chair, or as dramatic as combative hysteria (**FIGURES 1-3**).

Individuals with trait or state anxiety have a pain affect that is positive; it orients their attention toward a pain stimulus resulting in a general hyperalgesia.[40,43-45] Procedural anxiety's relationship to increased pain perception is well known.[46,39,47-50] Nakai and Milgrom et al. have concluded that unresolved preprocedural anxiety is the strongest predictor of poor pain control.[1] Therefore to target pain, a clinician must target for treatment both anticipated nociception and anticipated pain affect.

## Central Sensitization

Generally, central sensitization refers to any plastic change in the central nervous system that results in an amplification of pain experience. The most recognizable clinical form is pain affect. This is the secondary emotional response (e.g., anxiety) resulting from the "cognitive appraisal" of a memory of prior pain.[26] This clinical observation has led to a "conventional wisdom"; that if children do not consciously remember a painful experience, then there is no lasting harm to them. For many clini-

cians this has served to anchor a chain of logic to rationalize permitting a greater intensity of pain during procedures performed on infants and preschool children while they are completely restrained. Certainly, most circumcision before 1997 falls into this category but arguably much of the current practice of complete immobilization of preschoolers for dental treatment also qualifies.[51,52]

The idea that young children, even infants, do not remember painful events has been proven wrong by Clifford Woolf. In 1983, Woolf discovered the mechanism for a type of central sensitization that operates below the level of conscious memory by virtue of its location in the spinal cord.[52] When pain signals travel from a site of tissue trauma to the dorsal horn of the spinal cord, it causes receptive fields to enlarge, reduce conduction thresholds, and amplify their responsiveness.[53-57] As this "centrally located" altered sensory processing represents a form of subconscious memory, it is termed *implicit* memory to differentiate it from memory that is accessible to conscious thought, which is now being referenced as *explicit* memory.[58-66] In fact, the processes associated with producing an implicit memory of pain experience appears to be mediated by the same chemical factors that promote learning, memory, and conditioning in the brain.[67,68]

Much of what is known about the clinical effects of central sensitization in children can be gleaned from a single study of infant surgery by Taddio, Katz, and Ilerisich in 1997.[51] It is a definitive demonstration of the sustained neural sensitization induced by procedure pain that is consistent with other studies, both human and animal.[63,69-71] The study focused on the behavior of circumcised and uncircumcised infants at their first inoculation. An independent observer who was trained in rating infant pain behavior, and who was blinded to the infant's previous exposure to procedure pain, observed that circumcised infants consistently displayed greater distress than their noncircumcised peers.[51]

When better clinical pain practice was performed by placing an occlusive dressing of lidocaine-prilocaine cream (Emla) over the affected site for 60 to 80 minutes, these infants still displayed a distress level greater than the noncircumcised infants yet, less than the infants who were not given any pain medication.

**CIRCUMCISED** infants consistently displayed greater distress than their noncircumcised peers.

This study revealed three characteristics of the clinical sequela of procedure pain. First, it clearly demonstrated that a single episode of procedure pain in full-term infants can have a persistent disabling influence. Second, it showed that elevated sensitivity to tissue trauma is transferable to a site distant from the original injury, demonstrating that the sensitization in question is centrally mediated. Finally, it confirmed that pain intervention efforts can mitigate the degree to which a child may become sensitized.

The Hippocratic moral prescription to alleviate suffering has for centuries remained the traditional rationale for preventing pain.[72] However, evidence that children "remember" pain implicitly compels clinicians to recalibrate their pain justification scenarios to include the potential risk of a prolonged sensitization injury. The existence of implicit memory voids the idea that the absence of conscious memory for a painful event is proof that no latent harm is done. Procedure pain's cumulative effect is a repetitive stress injury to developing pain pathways. It leads to a sustained, magnification of pain perception that can debilitate a patient's compliance with future necessary, medical procedures.[60,63,74,75] Any attempt to justify permitting pediatric procedure pain is now more difficult due to this increased risk of sensitization injury. From this, it follows that it is better to prevent pain than to treat it after its occurrence.[32,33]

## The Developmental Dimension

Younger children generally experience more pain for the same medical procedure than do older children.[46,29,76-79] The mechanisms accounting for this observation in children have not been entirely elaborated but the immaturity of both their pain modulating mechanisms and their cognitions are contributors to the phenomenon.

Infants are not born with the endogenous pain control mechanisms that benefit adults.[80] This includes, but is not limited to, diffuse and descending pain inhibitory controls, voluntary control of attention, and arousal state.[81-91] These pain-limiting mechanisms are absent in the neonate and only gradually develop from nascent, endogenous utility in the preschool child to, putatively, full complement in late adolescence.[92-94,78] Clinical pain studies demonstrating that younger children experience more pain for the same medical procedure than do older children corroborates these basic science findings.[29,76] In adults, anxiety alone may be sufficient to produce endogenous opioid analgesia.[40] Yet, in children this

presumed advantage is lost through the rudimentary functioning of their pain modulating mechanisms that only blossom over time. This makes them more vulnerable to a debilitating, long-term potentiation of their nociceptive pathways as a result of exposure to procedure pain.

It would be important clinically to know the age at which a child's pain modulating mechanisms mature most rapidly. This would be an important milestone in a child's presumptive tolerance to pain. Noteworthy in this respect is the Jay, Ozolins, et al. study that found that children under the age of 7 exhibit five times more distress during bone marrow aspirations than do older children.[29] Evidently, 6-year-olds have a rapid maturation of pain inhibitory controls. However, not all children will conform to this developmental schedule. Before applying this rule to children clinically, it would be well to remember that brain imaging studies of children with attention deficit disorder have revealed that the areas of their brains that are responsible for control of attention are three years delayed in their development.[96] Voluntary control of attention is an endogenous pain control mechanism that will be delayed in these individuals.

The younger the child, the more pain they experience for the same invasive procedure and the greater is their need for pain intervention. This strengthens the credibility of the behavioral pain reports of young children and provides a rational to modify procedures to lower their noxious stimulation or, when practicable, delay procedures until the child has developed increased pain modulating mechanisms.

## The Multidimensional Nature of Pain

Pain's multidimensional nature is facilitated by a convergence of peripheral sensory receptors and a centrally mediated psychological dimension.[56,83,97,98] Children's pain is differentiated from adult pain by its developmental dimension that is responsible for variations in an individual's pain experience over time.[93,99] Procedure pain, unlike chronic pain, has an easily recognizable and controlled stimulus dimension.

The stimulus dimension is comprised of those aspects of a procedure's invasiveness that encompasses the full spectrum of sensory receptors. This definition therefore includes not only nociceptive input but also those sensory aspects (touch, smell, sight, hearing, and taste) of a procedure that can be perceived aversively by the patient. The need to include all sensory components in this definition is compelled by the influence on pain affect that non-noxious procedural stimuli may exert. Cotton-roll isolation may not noxiously stimulate nociceptors but it is providing the child's integrated pain neuromatrix with a convergent pattern of somatosensory information that the limbic system may interpret as a threat. The resulting anxiety will orient attentional vigilance onto nociceptive stimuli and elevate pain perception.[36,43,46]

Reducing procedural invasiveness of all sensory modalities (proprioreceptive, mechanoreceptive, chemoreceptive, auditory, olfactory, visual, as well as nociceptive) is a reasonable clinical intervention that should be considered in order to counter the magnification of nociception that occurs with high pain-affect without resorting to a more risky, more expensive or more cumbersome elevated pharmacological option (**FIGURE 4**). The multiple dimensions of pain compel clinicians to use a multidimensional pain technique that attends to the nociceptive, affective, developmental, and stimulus dimensions of pain.[32, 33]

**FIGURE 4.** Patients with severe pathology and high pain affect are not usually candidates for a treatment strategy involving lowered operative stimulation. General anesthesia is unavoidable in many of these cases.

## Summary

Four characteristics of the neurobiology of pain have been identified and discussed in terms of their influence on clinical decisions in pediatric procedure pain management. The subjective nature of pain prevents clinicians from reliably predicting a child's pain intensity and supports the idea that the first principle of good, clinical pediatric pain practice is for clinicians to accept as credible the pain reports of children that issue from invasive procedures; that only the child knows how much pain they are experiencing.

From the neurobiologic phenomenon of central sensitization the second principle may be derived: It is better to prevent pain than to treat it after its occurrence. The developmental nature of a child's pain inhibitory controls provides further support for the notion that the pain reports of young children should be believed. It also suggests a reason for limiting the invasive, noxious stimulation of children until they have developed increased pain modulating mechanisms. Together, the diverse neurobiologic factors that contribute to pain's ontogeny compel clinician's to a third principle of good, clinical pain practice: Use a multidimensional pain technique that attends to the nociceptive, affective, developmental, and stimulus dimensions of pain. ■■■■

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# Good, Clinical Pain Practice for Pediatric Procedure Pain: Iatrogenic Considerations

DENNIS PAUL NUTTER, DDS

**ABSTRACT** The primary objective of this review is to integrate current knowledge on pediatric procedure pain to develop a conceptual framework of good, clinical pediatric pain practice that can be used to improve the processes and outcomes of the clinical management of pediatric procedure pain in dentistry. This paper will review the manner in which iatrogenic factors influence the management of pediatric procedure pain.

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How should we define good, clinical pain practice for pediatric procedure pain? Neurobiologic evidence supports the establishment of three principles of good, clinical pain practice.[1] The subjective nature of pain prevents clinicians from reliably predicting a child's pain experience and suggests that only the child can know how much pain they are experiencing. The phenomenon of central sensitization injury secondary to procedure pain demonstrates it is better to prevent pain than to treat it after its occurrence. Finally, the multidimensional nature of pain compels clinicians to use a multidimensional pain technique that attends to the nociceptive, subjective, developmental, and stimulus dimensions of pain.

Other principles of good, clinical pain practice may be derived from evidence that psychological and knowledge "deficits" unique to the clinician influence the dynamics of pediatric pain management. These clinician deficits can skew the pain assessment-intervention dynamic in a way that leads clinicians to permit more pain than necessary during the course of a procedure. The question of how much pain to permit is an analytic process known as "pain justification" and is undertaken by all clinicians each time invasive treatment is performed.

In this imperfect analgesic world, the method by which one derives the answer to this question lies at the heart of any concept of good, clinical pain practice.

## Pain Justification: Comparative and Pragmatic Methods

The limits of contemporary analgesic modalities compel clinicians to use an ethical method of pain justification as responsible administration of good, clinical pain practice. Despite advances in modern pain control techniques, it is not reasonable to expect safe or pragmatic elimination of all pain. Walco, Burns, and Cassidy astutely pointed out that "pain is not always an unqualified evil, and pain relief interventions are not always of unqualified benefit."[2]

Local anesthetic failures are an acknowledged facet of clinical pediatric dental practice, and needle procedures in dentistry have garnered an infamous reputation for acute pain, despite Malamed's qualified assertion that injections can be performed entirely "atraumatically."[3-7] For pediatric patients, Malamed's claim only holds true if they are preprocedurally screened by an imperfect, human process for those very young or highly sensitized, emotionally or cognitively impaired children whose pain perceptions are so acute they cannot tolerate even the best needle procedure technique.

For those remaining patients, their ability to tolerate a pain-free, good injection technique is merely a clinical hypothesis. It is through the operation of the pain assessment-intervention dynamic that clinicians ethically allow the potential for procedure pain while testing their clinical hypotheses during treatment. The pain assessment-intervention dynamic may be defined as the sum of all mental assignments of risk, calculations, and judgments that lead to clinical strategies of pain intervention or pain justification (nonintervention). Walco, Burns, and Cassidy described three rationales by which a clinician may justify permitting procedure pain.[2]

In the comparative justification for permitting pain, the clinician must resort to an estimation of the relative risk of procedure pain versus the risk of pain relief intervention and "choose the lesser evil."[2] Once the choice has been made, good, clinical pain practice will have been achieved if the child experiences no more pain than is necessary to remedy the pathology.

> "PAIN IS NOT always an unqualified evil, and pain relief interventions are not always of unqualified benefit."

Dentists exercise the comparative justification for pain when they permit the possibility, though not necessarily the expectation, of exceeding a patient's pain threshold. This is the minimum level of noxious stimulation needed to elicit pain sensation.[8] Pain is more ethically justified when it is not allowed to exceed the patient's pain tolerance threshold, which is the maximum level of noxious stimuli that a patient is willing to tolerate.[8]

The placement of "transitional" restorations is one example of invoking the comparative form of pain justification. Transitional restorations are a type of remedy that results from the performance of an accommodating procedural technique, APT, a procedure wherein the traditional level of invasiveness has been reduced to accommodate the unique pain response of the patient. Its goal is to stabilize the patient's pathology for a period of time that will allow the child to transition from a state of low pain inhibitory controls to a state of more elevated pain inhibitory controls.

With primary teeth, a transitional restoration can last until exfoliation and may thereby serve as the final restoration. More often, a more invasive procedure will need to be performed at a later date in order to provide a more durable remedy. An APT remedy is performed because it is better to prevent pain than to treat it after it occurs. This means that clinicians need to err on the side of caution when noxiously simulating pediatric patients.

When a dentist treating a 3-year-old elects to avoid a needle procedure by performing an APT remedy on a lower primary molar, the operation of the clinician's assessment-intervention dynamic has led to the hypothesis that the risk of exceeding the patient's pain tolerance threshold with a reduced invasive procedure (often decay excavation alone) is less than the risk of exceeding their pain tolerance threshold by adding a needle procedure as a part of the pain intervention technique.[9,10]

The typical factors that would lead the clinician to this hypothesis are: 1) accessible carious lesions (even in permanent teeth) do not always require an anesthetic.[11] Active decay is necrotic debris that is devoid of viable nerves and the stained but durable cavity floor that makes up the caries inhibition zone (sclerotic dentin) insulates the pain sensitive dentinal tubules from mechanical nociceptive stimulation.[12,13] Second, the assessment features inherent in an innocuous exposure trial (desensitization) process has demonstrated the patient's affective dimension of pain (anxiety, general

discomfort) to be low for slow-speed handpiece manipulation.[14] Third, psychological (desensitization, distraction) techniques have substantially lowered the patient's pain perception threshold. Fourth, the well-documented potential for sensitization injury by needle procedures makes avoiding them, in very young children, a prudent goal of good, clinical pain practice.[4,5,15-17] Procedure pain, should it occur in this case, is justifiable if this APT remedy results in the least amount of pain (or risk) experienced by the child relative to a more invasive form of pain intervention requiring a needle procedure.

Placement of an APT transitional restoration with reduced invasiveness will stabilize the child's pathology, giving them time to develop endogenous pain control mechanisms that will assist the child in tolerating a more invasive remedy later.[18-20]

A second rationale for permitting procedure pain is the pragmatic justification. It permits procedure pain in order to achieve a greater benefit. When a dentist taps on teeth with the end of a mouth mirror to elicit pain to identify and optimally diagnose an occult, mild, occasional pain complaint, the justification for allowing that pain is a pragmatic one. Likewise, when a dentist cautiously uses the sharp end of an explorer to "noxiously" stimulate soft tissue to assess the effectiveness of an analgesic nerve block, the pain elicited is pragmatically justified.

Pain may also be justified by appeal to revision of the pain report of the child. However, the ethical solution that this method of pain justification offers is critically limited by factors inherent to the clinician and not the patient.

## Clinician Deficits

Clinicians have been shown to have deficits, both psychological and educational, that adversely affect their pediatric pain assessment-intervention dynamic. The current definition of pain is not helpful in protecting the dynamic from these deficits. The International Association for the Study of Pain has defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage."[21] Price pointed out that a weakness in this definition is that it does not present a clear solution to the problem that arises when a clinician's assessment of a child's pain disagrees with the child's pain report.[22] To always acquiesce to a young patient's behavioral report of pain seems wrong since they will give behavioral reports of pain when there is clearly no nociceptive stimulation. So, who should decide how much pain the patient is really experiencing — the clinician or the patient?

**UNDER CONDITIONS** of tissue trauma, a patient's pain report is superior to any clinician assessment of pain.

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As discussed elsewhere in this issue, a child's sensitivity to pain varies from individual to individual.[1,20,23,24] There is no uniform pain experience for a given stimulus intensity. Previous pain experience will lower pain threshold levels and create unique phenotypic responses to pain that magnifies genetic differences. It is not possible for a clinician to reliably predict the intensity of pain that is experienced by a child based on the clinician's calculation of the extent of tissue damage or the clinician's previous experience with the reactions of other children in similar conditions.

Second, there does not yet exist a reliable, objective, measure of pediatric pain.[25] No physiological measurement of pain, such as heart rate or galvanic skin reaction, is more reliable than the child's subjective pain report. Clinicians must rely on the subjective reports (behavioral or self-report) of a patient's pain experience for the quantification of their pain intensity.

Third, psychological and knowledge deficits peculiar to caregivers can render clinicians biased in the operation of their pain assessment-intervention dynamics. This psychological deficit primarily affects the assessment side of the dynamic while knowledge deficits can affect both sides. Both deficit types can lead a clinician to justify more pain than is necessary.

If clinicians were not biased in their pain assessments and were simply inaccurate they would tend to overestimate pain as often as they underestimate pain but, consistent with physicians and nurses, dentists have shown a tendency to underestimate pediatric pain.[26-34] Versloot, Veerkamp et al., Nakai, Milgrom et al., and Bagheri, Perciaccante et al. have each confirmed that dentists are biased to underestimate a patient's pain.[35-37]

Versloot et al. found that the child's mother was more accurate at discerning the child's pain experience relative to the pediatric patient's self-report than the treating dentist who generally underestimated the patient's pain.[35] Walco, Burns, and Cassidy have hypothesized that one reason for this clinician tendency to downwardly revise a patient's behavioral pain report is a caregiver's intrinsic need to rationalize their failure at not ad-

equately preventing a child's suffering.[2]

Wanting to avoid hurting children is not a psychological deficit, needing to rationalize away their overt pain behavior is. Since the dentists in the Versloot et al. study had been given the same training in observational pain assessment to minimize knowledge deficits relative to pain assessment, it is likely that the bias uncovered was psychological, not knowledge in origin.

Supporting this conclusion is the finding that an independent observer was more accurate at assessing the pain of the pediatric patient than either the dentist or the patient's mother. This was a person who had been given the same preparatory training in behavioral pain assessment as the dentist but was not involved in causing the patient's pain.

Knowledge deficits can adversely affect a clinician's pain assessment-intervention dynamic and cause them to justify more pain than is necessary. Nurses have been found to have educational deficits with regard to their pharmacological management of pain.[32,34] Their ignorance of the low opiate addiction rate during pain treatment allows their fear of addiction to skew their assessment of intervention risk and withhold opiate pain dosing.

In dentistry, Houpt found that "82 percent of pediatric dentists use sedation for less than 11 percent of their patients."[38] Furthermore, "82 percent of the sedations reported in the survey were performed by only 27 percent of the dentists." While Houpt could find no specific reason to substantiate the wide variation in the use of sedation, one may speculate that an educational deficit may be a factor accounting for the discrepancy. Do a majority of pediatric dentists lack the proper training in this modality to feel comfortable in its use? Do they overestimate the risks of sedation, or do dentists not believe that children experience pain commensurable to their pain report?

The reason for the apparent aversion most pediatric dentists have for sedation may be a combination of all three possibilities. The presence of an educational deficit regarding sedation is one possible interpretation of the data reported by Vargas and Nathan who found that 36 percent of pediatric dentists "preferred to restrain a 3- or 4-year-old patient for limited treatment needs rather than use a sedative technique."[39] In 1994, Milgrom and Weinstein et al. reported evidence that dentists do not believe children's pain reports credible.[40] They found that 11 percent of the practicing Seattle-area dentists strongly agreed with denying the pain reports of children, and a large majority of the dentists in the study doubted the authenticity of children's behavioral pain reports issuing during invasive procedures.

**KNOWLEDGE DEFICITS** can adversely affect a clinician's pain assessment-intervention dynamic

While a dentist may mentally doubt the authenticity of a child's pain report yet still choose to act as if it is credible, there exists the possibility that this report has uncovered a type of knowledge deficit created by clinician ignorance or nonacceptance of the subjective nature of pain, the inability of clinicians to objectively measure it, and the tendency for clinicians to underestimate pain. Such an attitude is a barrier to good, clinical pain practice.

Given the subjective nature of pain, its resistance to objective measurement and the problems of clinician bias, one may conclude that only the child can know how much pain they are experiencing. A child's behavioral and/or self-report of pain is to be accepted as credible unless there is good evidence that procedural tissue trauma has not occurred. Otherwise, clinicians may commit errors in pain justification and allow more pain than necessary.

## Pain Justification: Revisionist Method

The tendency in clinicians to underestimate pediatric pain combines with other neurobiologic factors of pain experience to limit the ethical solutions available to the revisionist method of pain justification. This method permits a revision of the pain reports of the patient to a lower value when knowledge of the physiologic conditions for nociception makes it reasonable to do so.[2] There are two differing pain report contexts to consider here. In one context, revision of a patient's pain report is ethical, and, in the other context, revision is of questionable ethical practice.

A pain report that occurs without any context of procedural tissue trauma may be revised downward because the conditions for nociception are not present. When a dentist runs a slow-rotating round bur on sound enamel prior to commencing incipient cavity excavation and the child raises their hand in an anticipatory behavioral report of pain, that pain report is justifiably revised downward because a slow-rotating round bur will not penetrate intact enamel and because the enamel surface is devoid of nociceptors.

Under these conditions, the patient's anticipatory report of pain can be seen as a symptom of procedural anxiety. In this case, it would be acceptable to

cautiously revise downward a patient's pain report since the clinician has good evidence for believing the conditions for nociception were not present. However, that revision should result in a pain score that adequately encumbers the clinician's pain assessment-intervention dynamic to accommodate the nociceptive amplification that occurs with procedural anxiety.

In the instance of a pain report occurring coincident with procedural tissue trauma, downwardly revising the pain reports of a child is a questionable ethical practice. The problem arises because clinicians have long understood that much of the pain response they see is dominated by emotion. This observation can lead clinicians to mistakenly conclude that the emotional dimension of pain is a false contribution that can be dissected from the nociceptive pain experience as if it were a separate component. It gives clinicians the appearance of an assessment opportunity to discount a child's pain report that is not there when physiologic conditions make nociception possible. This is because 1) clinicians have an inherent tendency to underestimate pediatric pain; 2) clinicians cannot know that the physiological conditions for adequate hard tissue anesthesia actually exist; 3) pain is an emotional experience with nociceptive and subjective dimensions that cannot be separated; 4) in the event that the clinician's revision judgment errs, adding to the child's pain inventory may harm the child by increasing the possibility of a central sensitization injury.

Pediatric pain coincident with procedural nociceptive stimulation (e.g., restorative treatment) should not be justified by appeal to a method of revision. Rather, any pain justification in this instance should occur through appeal to a comparative or pragmatic method. Downwardly revising the pain reports of a child when coincident with invasive procedures teeters on the brink of unethical pain practice and should be avoided. Therefore, an integral aspect of good, clinical pediatric pain practice is to use an ethical method of pain justification. This principle is generally assumed to be in place during clinical pain practice but its importance, complexity, and ubiquitous application warrants being identified as a general principle itself.

**AN INTEGRAL ASPECT** of good, clinical pediatric pain practice is to use an ethical method of pain justification.

Bear in mind that children do not malinger with respect to procedure pain. Children who malinger have "bland, indifferent, or flat affective responses to unpleasant procedures" that are in contradistinction to the emotionally charged responses typical of procedure pain.[41] Malingering is a false pain report given for the purpose of obtaining an external gain such as money, avoiding school, or obtaining parental attention.[21]

Pediatric procedure pain is more conducive to symptom magnification. Symptom magnification is an "exaggeration of symptom severity to convince an observer (parent or clinician) that one is truly experiencing some level of pain."[21] The exaggerated responses of symptom magnification are more conducive to the affirmation of the child's pain report and altering one's multidimensional pain strategy to attend to the subjective, nociceptive developmental, and stimulus dimensions of pain.

## Summary

Three ethical methods of pain justification, the comparative, pragmatic, and revisionist, have been presented. The importance, complexity, and ubiquitous application of pain justification warrants that use of an ethical method of pain justification is identified as a general principle of good, clinical pain practice. The APT was introduced as a strategy to accommodate the unique pain responses of pediatric patients. The technique stabilizes a patient's pathology with a reduced invasive remedy (transitional restoration) while allowing the patient's pain inhibitory controls to mature.

Evidence for psychological and educational deficits peculiar to clinicians was discussed in the context of how these deficits or attitudes adversely affect the pain assessment-intervention dynamic. This frailty of the assessment-intervention dynamic to clinician bias further supports the idea that only the child can know how much pain they are experiencing be the first principle of good, clinical pediatric pain practice. ■■■■

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# Good Clinical Pain Practice for Pediatric Procedure Pain: Target Considerations

DENNIS PAUL NUTTER, DDS

**ABSTRACT** The objective of this review is to integrate current knowledge of pediatric procedure pain to develop a conceptual framework of good, clinical pediatric pain practice that can be used to improve the processes and outcomes of the clinical management of pediatric procedure pain in dentistry. This argues that targeting behavior confounds the assessment-intervention dynamic of pain management.

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Good, clinical pain practice is a concept in pediatric dentistry that has traditionally operated in association with assessment-intervention dynamics that target behavior. Previously, this was known as behavior management but is now being elaborated as behavior guidance.[1-3] The retooling of behavior management as behavior guidance has grown out of dissatisfaction that has taken root regarding the lack of adequate scientific justification for many of the intervention strategies associated with behavior management.[4,5]

Historically, authors and conference participants have had difficulty in confronting the task of defining what constitutes good, clinical pain practice and integrating that concept with behavior management and its successor, behavior guidance.[3,6-11] In a 2004 report of the proceedings of a conference especially convened by the American Academy of Pediatric Dentistry to discuss the rationale for behavior management techniques, pain is only mentioned once.[9] Yet, most clinically observed behavior in the procedural setting is pain behavior, either affective or nociceptive-sensory. Nearly all periprocedural patient behaviors may be distilled into one or the other of these two subcategories. In this paradigm, willful behavior is viewed as a manifestation of affective pain behavior.[12,13]

## Willful Disobedience or Pain Behavior?

When dentists treating children target behavior in order to derive their strategies to intervene in patient movement, two

problems arise. First, the intervention strategies that are derived from targeting behavior (e.g., restraints) are not necessarily strategies that are successful in intervening in pain. Second, an etiologically ambiguous assessment target, such as behavior, exposes the pain assessment-intervention dynamic to manipulation by evaluator bias. Patient movement that interferes with treatment can be seen ambiguously either as pain behavior (this includes its affective manifestation of anxiety/fear and its accompanying constellation of pain avoidance stratagems) or as willful disobedience. Behavior management authors, writing at a time when the contextual meaning of clinical pain behavior was not well understood, never displayed much interest in exploring pain as an etiological source of negative behavior.

That negative behavior was the focus of dental researchers 25 years ago, as they attempted to develop a metric that would reliably quantify it.[6,7,14] The specific type of behavior they sought to measure was termed "uncooperative," "disruptive," or "negative," and occurred coincident with tissue trauma, that is, during restorative treatment. To do this, they rated the child's cry, verbal protest, leg, hand, and torso movement.

Today, these same behaviors, occurring coincident with tissue trauma, are widely accepted as behavioral reports of pain. Most or all of these behaviors constitute the majority of the measurement for each of the nine different, behavioral scales of pain listed by McGrath.[15] In one of the above cited studies, the authors reported that some of the children exhibited "general protest with no compliance" during procedures involving tissue trauma. The authors were silent on the behavior's etiology and directed that an intervention of physical restraint would proceed from this observation.[6] Today, this same behavior would be interpreted as behavioral reports of pain. While restraints are a successful intervention in behavior, they are not an intervention in pain.

This example illustrates the great fault in the expositional elaboration of behavior management. That fault was its failure to meaningfully deliberate on the etiology of negative behavior and its tendency to adopt a default inclination to imply that patient movement during tissue trauma, or during a procedure with its potential, is an expression of willful disobedience — uncooperative behavior or misbehavior.[6,8,16] The word "pain" rarely occurs in any of the behavior management articles cited in this paper and in the American Academy of Pediatric Dentistry's final guideline on behavior management (2004-2005), the word "pain" is listed only three times.[17] In the current AAPD elaboration of behavior guidance, the reluctance to integrate pain assessment into the behavior paradigm seems to have been partially perpetuated. The word "pain" is not a key term used in any of the Medline searches for source material and is still limited to three occasions in the completed text.[18]

**WHILE RESTRAINTS** are a successful intervention in behavior, they are not an intervention in pain.

## Etiology of 'Negative Behavior'

Much of the deliberation on the etiology of negative behavior has focused on the cultural changes in American society that has led to permissive parenting styles. This trend has been blamed for an increase in the number of undisciplined, spoiled, or bratty children entering today's dental practices.[8,16,19,20] Casamassimo and Wilson in 2002 found that 85 percent of pediatric dentists surveyed believed that changing parenting styles had resulted in worse behavior for children in the dental operatory.[21] Recently, Law agreed that slack parenting has created an environment wherein "behavior management strategies that require the dentist to exercise authority (e.g., voice control) seem to be less effective than in previous eras."[22]

It is granted that the stressful context of modern parenting in the United States may be responsible for an increase in permissive parenting resulting in an undisciplined response to authority in today's children.[19] However, this undisciplined response manifesting in the dental operatory is etiologically nothing more than an altered expression of affective pain behavior in children who have not been culturally conditioned to fear adult disciplinarian consequence. Occurring in the dental operatory, this behavior typically has four solution sets. The clinician can increase their psychological interventions, their pharmacological interventions, or intervene strategically in the stimulus dimension by either reducing a procedures invasiveness or intervene entirely noninvasively. Restraints are not interventions in pain. Rather, they are interventions in movement. This may be the involuntary movement of palsy or tics or the voluntary (or reflexive) movement issuing from justified affective or nociceptive-sensory pain. The point here is that the road to the use of restraints goes through assessment-intervention dynamics that target pain not behavior.

## The Authoritarian-Disciplinarian Management Style

What behavior management has, historically, been managing is pain behavior, in both its affective and nociceptive-sensory dimensions. Yet, many dentists treating children still seem to prefer viewing affective pain behavior as a problem of discipline. In a 2007 survey by Vargas and Nathan et al., a majority of pediatric dentists identified themselves as having adopted an authoritative-disciplinarian management style.[23] It is not clear what characterizes a disciplinarian management style since disciplinarian strategies for any perceived misbehavior is necessarily limited by the fact that dentists do not legally stand in loco parentis (in the place of the parent) as does a teacher.[24] Without this legal standing, negative reinforcement is not a disciplinarian option.

More likely the disciplinarian mantle signifies that the clinician is philosophically aligned with the active use of the physical domain (restraints) or aversive domain (e.g., voice control, hand over mouth) of those management techniques that target a child's behavior.[8] Since a significant percentage of dentists treating children do not believe in the authenticity of children's pain reports during conditions of invasive treatment, it is easy to see how dentists who adopt a disciplinarian approach may choose to interpret uncooperative behavior as misbehavior.[2,5,8] This likely has some correlative contribution to the Vargas, Nathan, et al. finding that 47 percent of pediatric dentists considered sedation successful if treatment objectives were obtained despite the need to persistently restrain the patient.[23] This statistic may owe a percentage of its accrual to an educational deficit that either overestimates the risk of general anesthesia or postulates that the emotion of pain is a dissectible, false contribution. But it is also likely that a portion of its genesis is an attitudinal barrier, one that refuses to accept (or is unaware) that misbehavior manifesting in an invasive procedural setting is an expression of nociceptive-sensory pain. If a child grimaces, moves their legs or torso, cries, or is to some degree inconsolable during invasive procedures, then we must accept that behavior as an expression of pain behavior.[15,26,27]

By failing to specifically target pain and failing to unambiguously integrate pain assessment into its conceptual scheme, behavior-based assessment-intervention dynamics hobbles the operation of good, clinical pain practice. Good, clinical pediatric pain practice requires that the assessment-intervention dynamics of dentists treating children be oriented toward pain, not behavior. Therefore, when pain is a possibility, it should be measured. This will allow clinicians to develop and improve upon intervention strategies that are effective in controlling pain in all of its dimensions. Measuring pain and believing children's behavioral or self-reports of pain will neutralize the effect of clinician deficits on the assessment-intervention dynamic.

**WHEN PAIN** is a possibility, it should be measured.

## Summary

Behavior is an ambiguous assessment target that confounds the operation of assessment-intervention dynamics that target pain. The etiological ambiguity of children's uncooperative behavior exposes the pain assessment-intervention dynamic to evaluator tendencies that deny the authenticity of children's pain reports and underestimate pain. Most behaviors occurring in the procedural setting are actually forms of pain behavior. Therefore, when pain is a possibility, it should be measured. Establishing this as a principle of good, clinical pain practice will assist in displacing the confounding tradition of targeting children's behavior in dentistry. ■■■■


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# Sharing Early Preventive Oral Health With Medical Colleagues: A Dental Pain Prevention Strategy

JEFF HUSTON, DDS, MS, AND A. JEFFREY WOOD, DDS

**ABSTRACT** An alarming number of children suffer from preventable dental pain and infections. Untreated caries may cause severe discomfort and grave systemic problems. Using this article as a curriculum of fundamentals, all dental professionals are encouraged to share current best practice oral health prevention strategies with their local community medical providers. Subject matter includes rudimentary pathophysiology, very early oral health risk assessment, anticipatory guidance, fluoride varnish, and establishing a dental home by age 1.

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Common sense tells us the best dental pain management strategy would be to steer clear of the cause. In countries with no prevention protocol, pain often precipitates the first dental visit.[1] This can establish a pain-fear cycle that remains throughout life.[2] Outdated paradigms on the appropriate age of the first dental visit vary from age 3 to 5, to when there's a problem, to "don't worry about it, they're just baby teeth." These archaic and ill-informed approaches may explain why caries remains the most common chronic disease of children throughout the world.[3]

Nine years ago the surgeon general of the United States reported, "The social impact of oral diseases in children is substantial. More than 51 million school hours are lost each year to dental-related illness. Poor children suffer nearly 12 times more restricted-activity days than children from higher-income families. Pain and suffering due to untreated diseases can lead to problems in eating, speaking, and attending to learning."[4] Significant improvement in what he referred to as "the silent epidemic" of oral disease has not occurred.

In fact, the problem continues to get worse. National Health and Nutrition Examination surveys showed the number of children age 2 to 4 years who have caries in their primary teeth recently increased by 6 percent. The rate rose from 18 percent during 1988-1994 to 24 percent during 1999-2004.[5]

**FIGURE 1.** Dental infection.

**FIGURE 2.** Healthy 7-month-old baby.

**FIGURE 3.** Biofilm or plaque.

It has been estimated that half a million California children miss school each year due to dental problems.[6] The 2006 California Smile Survey indicated that 28 percent of children in the state have untreated decay and 19 percent have extensive decay. By kindergarten, more than half of California children have experienced tooth decay. In this study of more than 21,000 California kindergartners and third graders, many adverse manifestations of caries were found, including 4 to 8 percent of the students suffering from dental pain and infections[7] (**FIGURE 1**).

The new millennium brought a new paradigm of treating caries as a nonclassical infectious bacterial disease.[8] It is now recognized that caries can be addressed most successfully with nonsurgical, preventive modalities. However, due to the timing of inoculation, high-risk individuals must be identified and interventions begun within the first year of life. The American Academy of Pediatric Dentistry, AAPD, and the American Academy of Pediatrics, AAP, recognize this fact. Policy statements of both organizations advocate establishment of a dental home no later than 12 months of age.[9,10]

Evidence-based science shows that early preventive strategies decrease the need for invasive surgical procedures, increase access to all, and cost less.[11] Numerous programs aspiring to control the growing caries problem have been developed. Between 2004 and 2008, more than 16,000 California dental and medical professionals and members of local community service organizations participated in the California Dental Association Foundation and Dental Health Foundation's joint effort, First Smiles — Dental Health Begins at Birth.[12] This program trained California health providers to perform early oral evaluations, anticipatory guidance, and fluoride varnish applications on toddlers and infants. Other states have programs that build partnerships between dental and medical providers.[13,14] Recently, the American Dental Association Foundation awarded an educational grant to the AAP to train pediatricians who will become oral health advocates and lead oral health prevention movements for each of the academy's 66 chapters in the United States, Canada, and Puerto Rico.[15]

Many California dentists embrace early preventive efforts and understand the importance of establishing a dental home prior to age 1. They have taken the opportunity to reach families already in their practices. However, individuals in their community who do not regularly seek nonemergent dental care but maintain well-child visits with their physician may be left out. A first-time mother may not realize how her oral care profoundly impacts the health of her baby.[16]

Furthermore, pediatric medical providers are well-versed in general prevention, but may not be as familiar with the specifics of oral disease prevention. Results of the 2006 Annual Survey of (Pediatric Medical) Graduating Residents revealed that 35 percent had no oral health training in their residency programs. Seventy-five percent of those who had training received less than three hours.[17]

Nondental health providers, including physicians and nurses, are far more likely to see new mothers and infants than dentists. Pediatricians see healthy children up to eight times by age 1 and 13 times by age 3[18] (**FIGURE 2**). Based on the essential nature of early preventive approaches, our medical colleagues are advantageously positioned to exert a positive influence on oral health education and early childhood caries prevention. This may be especially true among members of communities who have little or no access to dental care providers.

Recently, the oral health policy statement of the AAP was updated and reflects new recommendations pursuant to primary care pediatric practitioners integrating oral health into their practices[10] (**TABLE 1**).

Consequently, nondental health professionals are more interested in early childhood caries than ever before and have many questions. Regardless of dental practice type, all California dentists can make inroads in dental pain prevention by serving as resources of information and by providing fundamental education of the critical components of preventive oral health visits. A rudimentary summary of the caries as a transmissible, communicable disease is a good starting point.

## Basic Cariology

Health providers "traditionally define diseases on the basis of clinical presentations rather than on pathogenesis. This practice thwarts attempts at effective prevention."[19] Controlling caries begins with a foundational understanding of etiology.

Caries is defined as a nonclassical infectious disease. Like other multifactorial diseases (diabetes, cancer, heart disease,

**FIGURE 4.** Various stages of visible caries.

and certain psychological illnesses), it has no simple causation pathway.[8] A familial resemblance of caries experience was documented many years ago.[20] Studies now demonstrate a high degree of concordance between a mother's oral flora and that of her child.[21] Saliva transmits cariogenic bacteria from generation to generation.[22]

The timing of inoculation and acquisition of cariogenic bacteria occurs very early in life. The previous assumption that the presence of tooth enamel in an infant's mouth is required for cariogenic bacteria to be present is no longer considered to be true. These microorganisms have been detected in 2-month-old babies.[23]

Once in the mouth, bacteria adhere to erupting teeth and form a biofilm, commonly referred to as plaque (**FIGURE 3**). A complicated bacterial ecosystem interacting with the host comes into existence and preferably homeostasis prevails. Dental disease involves a multifactorial relationship between the etiological factor (bacteria), microbial deposits and tooth surfaces interacting with social factors and biological determinants[24] (**TABLE 2**).

Describing the complexities of the myriad of interactions of the numerous variables that produce caries goes far beyond the scope and intent of this paper. Basically, if pathological factors predominate, the unseen initial stages of the caries process begin. When an abundance of unhealthy bacteria overrun the biofilm, components of ingested food and drink become more readily metabolized into acid. This causes a consequential drop in pH and the subsurface enamel crystals of teeth start to dissolve.

**TABLE 1**

### AAP Policy Recommendations For Primary Care Pediatric Practitioners[10]

1. An oral health risk assessment should be administered periodically to all children.
2. Oral health risk assessment training should be recommended for medical practitioners who are in training programs and those who currently administer care to children.
3. Dietary counseling for optimal oral health should be an intrinsic component of general health counseling.
4. Anticipatory guidance for oral health should be an integral part of comprehensive patient counseling.
5. Administration of all fluoride modalities should be based on an individual's caries risk. Patients who have a high risk of caries are candidates for consideration of more intensive fluoride exposure after dietary counseling and oral hygiene instruction as compared with patients with a lower risk of caries.
6. Supervised use of fluoride toothpaste is recommended for all children with teeth.
7. The application of fluoride varnish by the medical practitioner is appropriate for patients with significant risk of dental caries who are unable to establish a dental home.
8. Every child should have a dental home established by age 1.
9. Collaborative relationships with local dentists should be established to optimize the availability of a dental home.

On the other hand, when protective factors outweigh deleterious components, caries is halted and sometimes even reversed. Fluoride, inherent enamel restorative properties of free-flowing saliva, and other beneficial variables help maintain homeostasis. Teeter-tottering back and forth between remineralization and demineralization (healthy and disease processes) occurring in the mouth has been called the caries balance.[25]

Frequently unnoticed, the first visible clinical sign of ongoing caries is the tell-tale white spot enamel lesion. These decalcified enamel areas often appear in the form of dull or chalky white lines located in cervical (gumline) areas of the maxillary primary incisors. Prudent practitioners register these findings as warning signals that a once invisible disease process is now progressing to detrimental stages (**FIGURE 4**).

The American Academy of Pediatric Dentistry defines early childhood caries, ECC, as the presence of one or more decayed (noncavitated or cavitated lesions) in a child less than 6 years old. In children younger than age 3, any sign of smooth-surface caries, even a single white spot lesion, is indicative of severe early childhood caries.[26] This definition acknowledges that ECC can be detected long before a frank cavity (aka, hole, decay) is seen or felt. Getting this point, the true definition of caries, across and into the minds of all health providers and the public, is critical to the success of any preventive intervention. It is important to distinguish the bacterial disease, caries, from the resulting cavities. Health professionals should emphasize that tooth restoration (filling a cavity) does little or nothing to stop the bacterially caused and behaviorally driven caries process.

Explaining this complicated multifactorial disease process in plain language helps improve caregivers' and patients' understanding. This can increase chances that they will take personal responsibility for their children's oral health as well as their own. The importance of caregiver compliance cannot be underestimated. Appropriate simple scripts for nonprofessionals may be of help (**TABLE 3**). Inconsistent or

TABLE 2

**Tooth, Bacteria, and Host Interactions (adapted from Dental Caries, 2008[24])**

| Individual and population social factors | Biological determinants acting at tooth surface |
|---|---|
| Social class | Saliva flow rate and composition |
| Income | Diet composition and frequency |
| Knowledge | Fluoride |
| Attitudes | Microbial species |
| Behaviors | Buffer capacity |
| Education | Sugar clearance rate |
| | Time |

absent home oral hygiene, unhealthy daily dietary intake choices, inadequate fluoride exposure, and early colonization of cariogenic organisms accelerate and exacerbate dental disease. These, along with many other variables, including those previously mentioned, are referred to as risk factors.

## Risk Factors

Reviewing the literature on risk factors can be overwhelming.[27] The origin, rate of progress, and destructive potential depend on an abundant number of determinants. "Big picture" views depicting causative factor interrelationships have been published.[28] The disease process is very complex and everyone has some degree of susceptibility. Primary behavioral influences are social and lifestyle variables.

Familiarity with and early identification of individuals falling into a social high-risk category is essential in targeting preventive efforts. Research indicates that in the United States, 70 percent of childhood caries can be found in approximately 20 percent of children.[29] Significant social risk factors include infants of low socioeconomic status whose mothers have a low educational level and whose diet includes sugar-rich foods. Lifestyle variables such as poor oral hygiene result in a failure to disrupt plaque, which promotes tooth decay. This obvious infant risk factor generally relates to parenting skills and practices.

Risk factors unique to infants and young children, which are listed in the AAP policy, include perinatal considerations, establishment of oral flora, host-defense systems, susceptibility of newly erupted teeth, dietary transitioning from breast and bottle feedings to cups and solid foods, and the establishment of childhood food preferences.[10] Other factors that may be of particular interest to medical colleagues include middle ear and respiratory infections, asthma, and antibiotic use prior to 18 months of age.[30,31]

Children with special health care needs have the greatest risk of caries having an impact on systemic disease.[32,33] Many take medications that have a high sugar content and side effects that include decreased salivary flow. Oral hygiene challenges and compromised immune systems are common. Often oral health takes low priority until other problems are stable. This can lead to life-threatening acute infections and pain.

Certain people groups such as Native American Indian and Latino children have extremely high rates of caries. The *ADA News* quoted a researcher, "Native Americans have one of the worst cavity rates in the world. It is not uncommon to see a less-than-2-year-old Native American child with completely decayed teeth."[34] In California, Latino children have the highest risk for dental health problems.[7] Learning about these and other facets of caries help health providers identify individuals most vulnerable to experiencing dental pain in their lives. Understanding the disease and its determinants can aid in reducing population disparities.[35]

TABLE 3

**Simple Talking Points on Understanding the Cause of Cavities**

- Dental disease process starts whenever food or drink enters mouth. Known as "acid attacks."
- About one in four or five people have bad germs or bacteria that can change the foods we eat and drink into powerful tooth-dissolving acids.
- Cavities are the result of bacterial acids that literally burn holes into teeth.
- A cavity is a hole. Caries is the bacterial disease that causes cavities.

### *Key Early Prevention Strategies*

Persuading caregivers to perform consistent home care for themselves and their children is of paramount importance. Thoroughly brushing for two minutes with a soft-bristled brush and a "smear" of an ADA-approved fluoridated toothpaste the size of the child's pinky fingernail (FIGURE 5) at least twice daily (after breakfast and just before bed) is all that is required.[10] This may be the best and most practical dental pain prevention approach an individual can utilize.

Nondental professionals benefit greatly from hearing hallmarks of preventive dentistry such as brushing with fluoride toothpaste. However, fundamental knowledge can become second nature and easily forgotten to be mentioned. Sharing key early oral health prevention strategies may be likened to teaching others how to ride a bike. It helps trainees when the nuts and bolts of procedures are taught. Try to keep this in mind when sharing the well-known and effective preventive strategies highlighted below with medical colleagues.

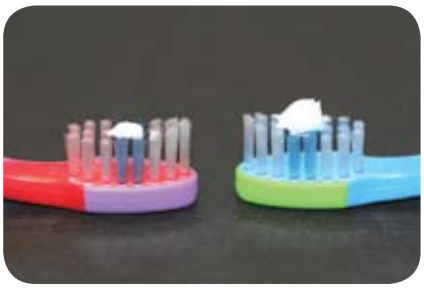

**FIGURE 5.** Pinky nail-size (left) and pea-size (right) smear of toothpaste.

**FIGURE 6.** Fluoride varnish application.

## Fluoride

Nondental health providers and the public in general often have questions about how fluoride prevents cavities. Promoting remineralization of decalcified enamel, inhibiting cariogenic microbial activity in dental plaque, and increasing tooth resistance to acid dissolution comprise three explanations of its beneficial effects.[36] Commonly used words to describe the prophylactic and/or therapeutic utilization of fluoride refer to topical (directly on the enamel of a tooth present in the mouth) and systemic (ingested and absorbed into the blood stream leading to higher levels of fluoride in the plasma, which theoretically results in fluoride incorporation into developing permanent teeth making them more resistant to decay). Note that systemic fluoride has a topical effect as it passes through the mouth and over enamel surfaces. It also becomes topical again in saliva.

In the past decade, fluoride varnishes have emerged as an effective way to provide topical fluoride for at-risk pediatric patients. By integrating them into their practices, medical providers and dentists can reduce caries incidence and noninvasively repair incipient carious lesions. Essentially, this product consists of an organic or synthetic resin material with incorporated fluoride.

After being applied to the enamel with a brush (**FIGURE 6**), the resin sets and forms a coating on the teeth. This serves as a matrix that slowly releases fluoride over time. The material remains on the enamel surface for a period of days to weeks and then must be reapplied if additional fluoride exposure is desired. Professional application of varnish and other topical fluoride modalities, together with oral health education, is supported by the scientific literature for the prevention and therapeutic/nonsurgical treatment of caries.[37]

Furthermore, research finds children who do not receive fluoride varnish and caregiver education are four times more likely to develop tooth decay than those receiving two yearly treatments and twice as likely than those receiving annual applications.[38] Apparent in a recent survey, use of topical fluoride varnish treatment has increased dramatically in pediatric dental offices across the United States.[39]

A systematic review of fluoride varnish concluded that it is safe, an unlikely contributor to fluorosis, and that related allergic reactions are rare.[40] Providers need to assure the safety of their patients, as well as their own safety when using fluoride varnish products. Care must be taken to avoid ingestion and contact with eyes or skin. As with all dental and medical materials, adherence to the manufacturer's instructions and precautions is important for successful outcomes. There are a number of different fluoride varnish products on the market and some variation in the instructions for use.

A bare minimum supply list for fluoride varnish applications may include gloves, eye protection, tongue blade, disposable mouth mirror, light source (otoscope or small flashlight), and 2x2 gauze. The fluoride varnish often comes in individual packets with an applicator brush. The tip of the brush can be bent at a 90-degree angle, which facilitates reaching areas of difficult access. A 2x2 gauze can be used to remove superfluous saliva from the teeth before applying. Simply paint a thin coating over the enamel. It is important that excess fluoride varnish not pool in the mouth or migrate beyond the intended tooth surfaces. The varnish hardens with moisture contact. The material must be reasonably well-set (most varnishes require one to two minutes to harden) before the patient is dismissed. Considerations and general instructions (**TABLE 4**) for patients include the avoidance of brushing or flossing for four to six hours to allow for the complete setting of the material.[41]

The timing of application is critical. Obviously, most benefits can be obtained before the enamel surface loses its integrity. Success also depends on applying the topical fluoride where lesions most likely occur. Targets for varnish (and oral hygiene) are enamel surfaces upon which caregivers/patients often allow biofilms (plaque) to mature and remain for prolonged periods of time, such as along marginal gingival enamel, interproximal areas below contact points, and occlusal surfaces (especially during the prolonged eruption into functional occlusion).[8] Furthermore, focusing fluoride varnish application on teeth comprising the typical pattern of ECC, upper incisors and upper first molars of babies and toddlers, is ideal. These teeth are highly susceptible to early decay that consequently can cause infections and pain.

Systemic fluoride and judicious supplementation generate the interests of health providers and the public. A child's daily total fluoride intake can be difficult to determine, especially in consideration of contemporary family lifestyles in which children receive food and drink from a number of different locations and a wide variety of sources. An individual's exposure to fluoride (fluoride

TABLE 4

**Considerations and Instructions for Fluoride Varnish Application[41]**

| | |
|---|---|
| **Preapplication** | Review medical history<br>Do not use if:<br>Ulcerative gingivitis, stomatitis<br>Apthous ulcers, other open lesions<br>Allergic to colophony/rosin<br>Allergic to pine or possibly nuts<br>Multiple allergic sensitivities<br>Explain risk, benefits, and alternatives<br>Disclose alcohol content (vaporizes upon application)<br>Receive written permission prior to application<br>Remove obvious calculus or plaque (optional) |
| **Apply** | Mix varnish until appears homogeneous<br>Eliminate excess moisture on teeth with gauze<br>Paint very thin layer on enamel, only 0.1 ml (1 drop) per arch<br>Varnish begins to harden upon contact with saliva or water<br>Floss to get varnish between teeth (optional) |
| **Postapplication caregiver instructions /messages** | Leave on 4 to 6 hours for maximum effect<br>Eat only soft foods day of treatment<br>No brushing for 4 to 6 hours<br>Avoid hot beverages<br>Some brands leave a light yellow tint and/or feel sticky<br>Stop supplemental fluoride, including fluoride tabs for 2 or 3 days<br>Patients can be told teeth may feel "furry" for a short time |
| **Anticipatory guidance and oral health education** | |
| **Periodicity of next application** | |

halo) from ingestion of multiple varied sources of drinking water and diverse food sources depends on many variables.[42]

New guidelines for prescribing fluoride have been proposed but not released. A recent *Journal of the American Dental Association* article concluded that the use of supplemental fluorides during the first six years of life should be re-examined.[43] Authors Ismail and Hasson found evidence of dental caries being prevented in permanent teeth but the efficacy of using supplements to prevent caries in primary teeth was described as weak and inconsistent. It is clear that current discussions about fluoride supplementation recommendations will lead to revision of the current supplementation guidelines.

Conjecture of new guidance on the horizon, which will decrease current dosage, might be garnered from the fact that, at the time of writing, it is becoming more and more difficult to obtain the 1.0 mg dose. Perhaps methods for tracking dental, medical, and school varnish applications will be mentioned. Future recommendations for prescribing fluoride will be predicated on caries risk assessment.[44]

## Oral Health Risk Assessment and Evaluation

Medical providers can initiate and maintain oral homeostasis or balance with early oral health risk assessments, OHRA, and oral evaluations. The term OHRA may not be familiar to dentists or physicians. Dentists normally think in terms of a caries risk assessment and complete oral examination. These are the comprehensive procedures and definitive diagnoses that take place when children visit or are referred to a dental home. The OHRA and oral evaluation occur in a medical practice setting. "History and physical" is a common term in the medical vernacular. For all intents and purposes, an OHRA and oral evaluation are a brief history and physical for the mouth. They can easily be integrated into routine well-child medical visits.

Basically, the "history" or OHRA starts with auxiliary staff collecting data. Next, a short dental and oral evaluation by the physician or other health provider comprises the "physical" component. Risk level (low, moderate, or high caries risk) is determined based on information gathered and observations made. A categorization of risk allows clinicians to formulate individually customized plans of action. Personalized preventive strategies and interventions targeted specifically to a child's particular risks are more likely to control caries.

A risk assessment instrument is a fundamental preventive strategy. The AAPD has developed a caries risk assessment tool, CAT, which is straightforward and helps dentists categorize patient risk factors.[45,46] Health providers can access free comprehensive descriptions and forms online that focus on integrating oral health in practice settings. For example, New Hampshire's program includes forms of parent dental questionnaires and even scripts of appropriate provider responses and actions.[47] *The Journal of the California Dental Association* has dedicated four entire publications to caries prevention and risk assessment.[48-50] Recently, the American Dental Association Councils on Scientific Affairs and Dental Practice posted user-friendly caries risk assessment forms online.[51]

TABLE 5

**Oral Health Assessment Rapid Checklist — Birth to Age 3[52]**

**Parent factors**

- ☐ Mother/caregiver's oral health
- ☐ Does mother/caregiver have a dental home?
- ☐ Does patient have a dental home?

**Action**

- ☐ Education
- ☐ Referral to dental home

**Child factors**

- ☐ Caries
- ☐ White spot lesions
- ☐ Plaque
- ☐ Swollen gums
- ☐ Night feedings
- ☐ Frequent snacking/juice intake from bottle or sippy cup
- ☐ Medicaid eligible
- ☐ Special health care need

Although the tools mentioned above are excellent, they may not meet the needs of the medical providers whose goal is a cursory oral evaluation, quick assessment, and fast documentation. Physicians may be more amenable to using rapid check lists (TABLE 5) that can be added to routine patient encounter forms.[52]

Traditionally, physicians have looked past the teeth as they depress patients' tongues with a wooden blade to view the pharynx. It only takes another minute to perform an oral health evaluation. Lifting the child's upper lip allows the provider to assess the hard and soft tissues. A small disposable mirror can be used to visualize various surfaces of the teeth and to check for any discoloration. These include white or brown spots, and other early warning signs of high risk or apparent loss of enamel integrity. The mirror surface can be moistened on the cheek mucosa to prevent fogging.

FIGURE 7. Knee-to-knee position.

Clinicians can "teach while they treat" by showing caregivers how to lift the child's lip and regularly check the teeth at home. While performing the evaluation, providers can point out plaque, enamel defects, white spots, and erupting teeth. If the child has been detected to be at high or moderate risk and does not have access to a dental home, a fluoride varnish application (previously described) is indicated. These activities should be repeated with appropriate periodicity being determined by risk level. The frequency of recommended appointments increases along with increasing risk level. Although third-party carriers have been slow to acknowledge this, it is still the best practice approach.[53]

Untoward child movements during the evaluation and varnish application can be minimized with the popular knee-to-knee position (FIGURE 7). The child's legs can be placed under the caregiver's arms and their hands or arms can be held and stabilized. Operators can hold the child's head with the palms of their hands while manipulating a toothbrush or instruments with the thumbs and forefingers. Be sure to warn inexperienced providers to take care not to get bitten. Newly erupting baby teeth are extremely sharp and pointy. A child-sized brush can be used for parental tooth brushing instruction and the handle utilized as an effective mouth prop. Demonstration videos may be accessed online.[54,55]

## Anticipatory Guidance

Anticipatory guidance encompasses basic and age-appropriate oral health education topics such as transmission, oral hygiene, nutrition, fluoride, and the use of xylitol products. Letting caregivers know about what to expect next and what to be on guard for as their child grows helps guide home care preventive efforts. An ideal time to educate intimate child caregivers is during well-child visits. Specific learning objectives aspire to promote healthy infant oral flora inoculation and maintenance of oral homeostasis in the child's and adult caregiver's mouths.[56] Education about how to avoid transmitting acid-producing bacteria indirectly or directly by behaviors such as sharing utensils, licking pacifiers, or prechewing the baby's food is essential. If not already accomplished prenatally, having a mother's active caries lesions removed tops the priority list.

Medical providers typically focus on total health with all of the attendant assessments and interventions. Incorporating comprehensive anticipatory guidance into already full schedules may not be possible. However, a few inspirational words from a physician about oral health could positively influence caregivers to make healthy choices. This may be especially true in regard to impressionable first-time mothers. Intimate caregivers who heed the simple advice and carryout home care instructions can minimize the probability of their child experiencing dental pain and/or the need of costly dental-surgical interventions later in life.

The ready availability of practical and concise information facilitates the integration of oral health education. Messages can be presented in the form of motivational questions or menus. A Baltimore program used just three motivational questions: "Does the child go to sleep with a bottle containing something other than water?" "Does the child drink undiluted juice or soda during the day?" "Have you started brushing your child's teeth in the

TABLE 6

### Rainbow Smiles Motivational Interviewing Menu[58]

Do not add anything sweet or sugary to the baby's bottle.

Wean your child from bottle at night-time first.

Clean your baby's teeth as soon as they appear.

Use a smear of fluoride toothpaste.

Hold your baby when feeding.

If your baby wakens at night, give them water.

Limit sipping and snacking.

Bring your baby to the dentist twice a year for fluoride varnish.

morning and at night?"[57] Giving caregivers a menu of healthy choices demonstrates another way to educate in a succinct fashion[58] (TABLE 6). Providers ask caregivers to choose just one or two items they might feel comfortable trying at home. Follow-up calls in between visits have been shown to help with compliance.[59]

A small, soft-bristled toothbrush can be introduced to a baby even before teeth erupt. This helps the child become desensitized to a caregiver cleaning his or her mouth. Making oral hygiene efforts fun can enhance acceptance by an infant or toddler. Singing while brushing and consistently doing something positive immediately after may encourage the child to look forward to cleanings. Directing the toothbrush bristles at a 45-degree angle, with half on the gum and half on the tooth, is the most effective technique for caregivers to use. Moving the brush in four or five little "jiggles" or circles before moving to the next area helps ensure that all of the teeth are thoroughly cleaned. As mentioned previously, just a smear of fluoride toothpaste is necessary (FIGURE 5). Young children swallow whatever is introduced into the mouth and excessive toothpaste should be avoided (FIGURE 8). Flavored toothpastes may promote excessive ingestion.

Typically, personal hygiene activities like toothbrushing are performed in the bathroom, but this is the most likely room for dental trauma to occur. Children's teeth can be brushed and flossed in any location where lighting is adequate. The child can be held in the caregiver's lap. If behavior challenges arise, caregivers do well to focus on areas prone to decay such as the previously mentioned highly susceptible cervical areas of incisors and the occlusal surfaces of primary molars. The best times to brush are immediately after breakfast and just before bed. Morning brushing is important to disrupt the biofilm that has formed in the mouth overnight. Cleaning the teeth before nighttime sleep, when the mouth's self-cleansing activity (salivary flow and oral movement) is at the lowest point of the day, helps prevent tooth damage during this susceptible time. If brushing is not possible, at least caregivers can be sure that a few sips of water are swallowed immediately following any drinks, snacks, or meals. Ideally, mouths are always kept clear of any fermentable carbohydrates, including milk or formula residue, as well as any naturally or artificially sweetened foods.

A high carbohydrate diet actually promotes the growth of acid-tolerant bacteria and inhibits the growth of alkali-generating, healthy bacteria. In addition, it fuels acid and polysaccharides/glucan production that is known to promote plaque formation and can result in enhanced carious destruction of the teeth.[60] Proper diet is key to maintaining a healthy oral environment.[7] Caregivers should be advised to focus especially on limiting exposure to sugars in all forms and never leaving the bottle or breast in the baby's mouth past a limited feeding time. Because of the difficulty that

FIGURE 8. A baby eating flavored toothpaste.

many families experience minimizing sugar intake, it is a message providers need to repeat frequently. Data revealed that between 1960 and 2000, total sugar consumption among American families increased by 33 percent. The ingestion of high fructose corn syrup increased 10.6 fold between 1970 and 2000.[61]

The frequency of sugar intake could be just as important as the amount of sugar.[61] Ingestion of fermentable carbohydrates ultimately leads to a decrease of oral pH or "acid attack," which harms enamel surfaces. Caregivers benefit from being taught how to minimize the number of daily acid attacks that occur in their child's mouth. For instance, drinking a cup of juice during a meal would be better than taking small sips throughout the morning. For toddlers, eating a box of raisins in one sitting is much healthier than nibbling on one raisin every 10 or 15 minutes during an afternoon of play.

Long-term regular doses of medications containing glucose, fructose, or sucrose for palatability may also contribute to caries risk.[62] Lists of the sucrose content of liquid pediatric preparations are available.[63] Consumption of juice and sugar-sweetened beverages has been linked to childhood obesity as well as caries development. Promoting healthy eating behaviors can decrease both.[10]

Xylitol is the only sugar substitute with antibacterial properties. It has 40 percent fewer calories and a sweetness rivaling sugar. Currently, xylitol is available in many forms, such as gum, mints, chewable tablets, lozenges,

TABLE 7

**Dental Home Provisions[10]**

1. Accurate risk assessment for oral diseases and conditions
2. Individualized preventive dental health program based on risk assessment
3. Anticipatory guidance about growth and development issues
4. A plan for emergency dental trauma management
5. Information regarding care of teeth and oral soft tissues
6. Nutrition and dietary counseling
7. Comprehensive oral health care in accordance with accepted guidelines and periodicity schedules for pediatric oral health
8. Referrals to dental specialists, such as endodontists, oral surgeons, orthodontists, and periodontists when care cannot be provided directly within the dental home

**FIGURE 9.** Newly erupted teeth.

toothpastes, mouthwashes, cough mixtures, and other products. However, only chewing gum has been proven to be an effective preventive agent.[64] Using xylitol gum in expectant and new mothers has been attributed to the prevention of transmission of *Streptococcus mutans* from mother to child.[27]

With childhood obesity on the rise, many health providers are understandably concerned about promoting sweet-tasting xylitol products that may inadvertently promote the use of nonxylitol gum, mints, etc. In addition, excessive jaw movement may be detrimental to the temporal mandibular joints and something to consider when discussing gum. The best selection for caregivers who allow their children to chew gum would be products labeling xylitol as the first ingredient. For children, gum and mints may not be a good choice. They are definitely not recommended for children under the age of 4.

## Dental Home

The first steps in oral disease prevention are early OHRA, oral evaluation, and anticipatory guidance. Establishment and maintenance of a dental home is equally important for long-term success. The "home" concept has long been applied to pediatric medicine but until recently overlooked in relation to children's oral health. Modeled after the medical concept, a dental home is defined by the AAPD as "the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivery in a comprehensive, continuously accessible, coordinated, and family-centered way."[65] The AAP states several provisions that a dental home should offer[10] (**TABLE 7**).

A timely establishment of a dental home is critical. Ideally, it should be arranged before the child's first birthday. As previously mentioned, this places a child into care while still in the early stages of the erupting dentition (**FIGURE 9**) and prior to carious involvement that requires dental surgery. Preventive methods have the greatest chance of being effective and minimize the chance of experiencing dental pain when implemented prior to 12 months of age. Early preventive visits increase the probability of the continuation of preventive visits and decrease costs.[11] Early timing also establishes a child in a dental practice prior to any unfortunate oral/dental trauma.

### *Where to Refer?*

Having dental homes readily available facilitates the referral process and helps physicians comply with the AAP recommendations[10] (**TABLE 1**). In 2002, the executive directors of the California Dental Association's local dental societies compiled a list of dental clinics in California.[66] In addition to listing clinics, it might be prudent to generate a statewide database of potential dental homes that would include private dental offices, dental clinics, hospitals, community health centers, mobile vans, dental schools, and other possible sources whose doors are open for infants. Specific data collection details might include willingness to see patients under the age of 1, how many patients the facilities are capable of seeing per month, and what third-party reimbursements are accepted.

Setting up local community referral network infrastructures modeled after Michigan's Point of Light program might increase early dental home access. Physician and dentist contact letters, referral policy, infant oral health care handouts, and PowerPoint presentations can be found free online.[67] The dentists' willingness to collaborate with primary care providers to establish referral bases for at-risk infants and toddlers is an important key to success.[68] Because of a paucity of pediatric dentists, general dentists involvement is particularly crucial.[69]

## Sharing with Medical Providers

As evidenced by AAP's 2008 policy statement, pediatric medical providers are interested and many desire additional training in providing oral health for their patients. Physicians have questions about the new AAP recommendations (**TABLE 1**) and are looking for answers. Every California dentist is a natural resource for this information.[10]

Obstetricians also can play a significant role in oral health counseling. They have contact with first-time mothers at a time

**FIGURE 10.** Prenatal is the best time to start education on oral health.

when these women are very receptive to infant care information. The prenatal period is the ideal time to begin the conversation (**FIGURE 10**). Prenatal discussions of infant oral health can be effective in preventing oral disease and resultant pain.[70]

Dentists who have become familiar with early preventive interventions may wish to help educate physicians and other nondental health providers on how to integrate oral health into primary medical care. It is not necessary to use an elaborate presentation to share this information. Often, a simple discussion is less intimidating and helps establish a rapport for future questions and guidance. All that may be required is a basic outline to serve as a reminder of key points (**TABLE 8**). Physicians interested in learning more about infant and toddler oral health can be directed to online resources.[71,72]

Formally or informally, all dentists can promote early oral health care by recruiting our medical colleagues. Simply asking a physician out to lunch and inquiring about their thoughts on infant oral care might initiate an important conversation. Personal contacts may open doors to presenting at medical study clubs and other small health care groups. Typically, hospitals have a one-hour continuing medical education, CME, presented monthly for staff physicians. An opportunity to speak to such a group can quickly disseminate the important early prevention message throughout an entire health care facility. Contacting a hospital's CME coordinator and offering to present usually will be met with an appreciative invitation. With a larger cadre of health providers trained to intervene in early childhood oral disease, ultimately, the need for dental pain management can be substantially diminished.

**TABLE 8**

### Outline of Key Early Oral Health Prevention Discussion Topics

Objective: Facilitate integration of AAP's Policy Statement on Preventive Oral Health Intervention into pediatric, family, and OB/GYN medical practices

A. Introduction (current crisis condition, consequences of caries, before first birthday model)

B. Basic cariology

C. Risk factors

D. Five key early prevention strategies
1. Fluoride (systemic and topical)
   - How it works
   - Fluoride varnish
2. Oral health risk assessment = caries risk assessment
   - Identify risk factors early
   - Oral evaluation – lift the lip
3. Anticipatory guidance/oral health education
   - Motivational dental care counseling
   - Oral hygiene instructions
   - Caregiver compliance
   - Dietary intake and feeding habits
   - Xylitol
4. Establishing a dental home before age 1
   - Where to refer?
5. Sharing with medical providers

F. Conclusion (Call to action and questions)

## Conclusion

Optimal dental pain management protocol eliminates etiological factors early in life. Controlling caries with education and medicinal therapy may be as close to rendering true atraumatic dentistry as possible. Evidence-based strategies that prevent or decrease the likelihood of gross dental decay and ensuing pain and infections are available. These timely preventive strategies decrease the chance of California children requiring operative/dental surgery, local anesthesia, sedation, and/or general anesthesia in a hospital setting. Conceptually, the minimally invasive methods presented can be applied to patients of all ages, including those with special health care needs and geriatric issues.

On average, it takes 17 years before new, proven medical guidelines become integrated into mainstream practice.[73] The pitiful state of oral health in California children can be addressed much more quickly if early prevention is disseminated widely. Dental pain and suffering can be avoided now. Not only do dental health care providers need to take an active role in early prevention, but our medical colleagues, who have earlier opportunities with patients and patient families, must be actively involved in helping patients steer clear of

caries. Working together, we can promote and provide prevention strategies for children before their first birthday.

Early prevention is the key to helping all of California's children enjoy a lifetime of pain-free oral health. Promoting the new paradigm of very early prevention in nontraditional settings promises to be worthy of our efforts. Every dentist can invite a pediatrician, family practitioner, or obstetrician out to discuss the AAP's new policy and recommendations.[10] Better yet, please consider picking up the phone today and arranging to speak to a group of physicians at a local hospital, clinic, or medical school to share early preventive oral health strategies. ■■■■

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# Cell-ebrate Life, Language, and Lawyers

An individual seeking his raison d'être in the dizzying mysticism of science must sign an ineluctable agreement to forego English as his first language.

Robert E. Horseman, DDS

ILLUSTRATION BY CHARLIE O. HAYWARD

Nobody stands more in awe of science than I. In fact, my support of science attains an almost lyrical pitch. Knuckling my forelock in obeisance, I bow to the superior intellects who have brought us pop-up toasters, automatic transmissions and wrinkle-erasing versions of botulism.

The problem with science is scientists. An individual seeking his raison d'être in the dizzying mysticism of science must sign an ineluctable agreement to forego English as his first language. This is only fair. Ordinary people without a scientific education involving the use of polysyllabic words might accidently discover the process of vulcanization or exploit some green mold on old mozzarella as a cure for intractable diseases. Like kids concocting a new adult-proof language to supplant the Igpay Atinlay of their elders, scientists are obliged to invent an incomprehensible argot of their own.

That is why stem cell research has been glacial since 1906. Russian histologist Alexander Maksimov (1874-1928) coined the term and postulated (guessed) the existence of haematopoietic stem cells. It is probably a good idea to confirm the reality of such a thing before setting out to become an expert on it. Once Wikipedia explained to researchers that a stem cell is "a special type of 'source' or 'starter' cell that has the ability to grow into adult tissue," the rush for research grants was on.

Stem cells may be able to repair or replace damaged tissue, reversing diseases and injuries, such as cancer, diabetes, premature hair loss and the indignities of gravitational droop. The requisite obfuscation involved in such matters glosses over that stem cells have no stems at all. Equipped like a Bing cherry, they would be easier to harvest.

California voters approved Proposition 71 in November of 2004. It would provide $3 billion in state funds to research human embryonic stem cells. The proposition was couched in the usual opaque language of such documents, so we decided to go out

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**DR. BOB,** CONTINUED FROM 750

on the street like Jay Leno to ascertain the average person's understanding of stem cells.

Us: Excuse me, sir, we're doing a survey on the use of stem cells. Are you familiar with the term?

Street person: Are you kidding me? Is this for the Letterman show? He's OK, but I think that band leader guy is overpaid.

Us: No, I'm sorry. We would just like to know if you have heard about stem cells?

Street person: I'm glad you asked. I just happen to work for a company that makes 'em. We can make anything you want up to 4-feet-long in any style. Got a big contract with the city right now for all the crosswalks. You can spray or brush, no problem.

Us: Uh … I think what you mean is "stencils."

Street person: That's what I said. Is this *Candid Camera*?

California has no lock on vacuity. We are almost certain the $3 billion will not be spent in vain, although teaching English as a first language would be a good second choice.

The proposed use of human embryos has resulted in ethically slow progress. Alien embryos were deemed acceptable provided they had humanoid characteristics and not those of inked and pierced rock star heritage. None have surfaced, possibly because pregnant aliens are not qualified for interplanetary travel or an embryo would be of high-school age before arriving.

The Chinese were able to avoid the controversy by fielding a pair of identical divers in the 2008 Olympic synchronized diving event. Judges, anticipating an appeal based on possible manipulation of human embryos, determined there was actually only one diver. Innovative video photography was credited for creating the illusion of two. Lin Yue and Huo Liang agreed, exchanged mutual high-fives and departed as one.

Recently, the human embryo stumbling block was bypassed by Japanese researchers at the NIAIST, or National Institute of Advanced Industrial Science and Technology for short. Scientists there claim to have created stem cells similar to those of human embryos using the removed wisdom teeth of a 10-year-old girl! Team leader Hajime Ogushi told reporters the results of his work were significant in two ways: avoidance of ethical issues of stem cells and "because wisdom teeth are destined to be thrown away anyway."

Third molars until now had joined tonsils, deviated septums, useless hide from tummy tucks and angry gall bladders as nature's detritus. Think of it! Exodontists, oral surgeons and GPs with forceps are sitting on a gold mine of material destined to be thrown away. That's like discovering a way to scrape the diamond chips from used burs and reprocessing them into flawless eight-carat jewelry for trophy girlfriends.

Ogushi stated, "Because extractions of wisdom teeth are commonly operated in dental clinics, we can expect a lot of donors of stem cells." Theoretically, people who give up their third molars in their youth could sock them away in the back of the freezer, retrieving them later in life when deterioration sets in.

Unfortunately, you, me, the man on the street and everybody else who isn't either a Japanese- or English-speaking scientist won't have a clue what's going on. The demystifying of stem cells is best not left to scientists. The explanation should be granted to professionals in expository simplification of language, terms and solutions, e.g., lawyers. ■■■■

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