OF THE CALIFORNIA DENTAL ASSOCIATION

Journal

AUGUST 2007

PIERCINGS & LOCALIZED PERIODONTITIS

YEHUDA ZADIK, DMD
& VADIM SANDLER, DMD

OF THE CALIFORNIA DENTAL ASSOCIATION
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DEPARTMENTS

FEATURES

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Sacramento Diaries: A Two-day Journey Into the Heart of CDA

STEVEN A. GOLD, DDS

Our volunteer dentist leaders and our staff have a tremendous amount of brainpower and passion for what they do.

SATURDAY 6:40 P.M.: I can't relax. This editorial is due next week and I've got absolutely nothing. On an airplane, quiet except for the engines, you would think the ideas would just flow in. To top it off, I spent the last two days in Sacramento at the CDA Board of Trustees meeting. I should have been home working on this editorial; researching, reading, calling up one of my colleagues to see what they're griping about, anything to get an idea. Instead I'm off lollygagging in Sacramento. Well, of course I wasn't lollygagging. The CDA Board of Trustees meeting is really an enjoyable experience for me. It is, after all, where most of the real business of our state dental association takes place. There's a lot of interesting and exciting stuff that our association is doing. And I have absolutely no responsibility during the meeting. I get to sit in the back of the room and observe the proceedings. I even get to have lunch and dinner with everyone, too! Yes, it was a long and busy two days and I'm feeling the effects of it. As my eyes get heavier, I'm reflecting on the events of the last 36 hours. Let's see …

FRIDAY 3:45 P.M.: Trustees have just flown in from everywhere. The meeting initiates them with a nearly two-hour finance report. If anyone would have told me previously that I would find a two-hour finance report interesting, I would have expected the next line to be a sales pitch for beachfront property in Temecula (or Chico for our Northern California readers). But Bob Spinelli did it. He is, in essence, the CFO for CDA and all of its entities. He leads us through a maze of graphs and numbers and looks all of about 28 years old while he does it. I thought I might ask Bob where he got his training and how he learned all this complex organizational financial stuff. Then I think this would be too embarrassing and tantamount to asking Tiger Woods how he learned to golf so well. They just know. Bob says our organization is doing financially well, but that we need to make some changes in the way we do business to make sure this is true 20 years from now. He knows the numbers too well. Believe him.

FRIDAY 6:05 P.M.: After a full 20-minute break following today's adjournment, we're on the bus to go to dinner. CDA Speaker of the House Matt Campbell has grabbed the bus's public address microphone and is broadcasting some instruction to us that is completely unintelligible. That is the job of the speaker, to sniff out the nearest microphone and start giving directions over it. This confirms my suspicion that we have selected a good one.

FRIDAY 7:30 P.M.: Ron Mead is our president. As such, he presides over the Board of Trustees meeting, which is no small task. He wears a suit, tie, and cowboy boots. At dinner, his traditional "thank you for attending the meeting" speech lasts all of 10 seconds. Like a true cowboy, he is a man of few words, at least for now. The trustees know they will get their fill of him tomorrow. This evening, they don't mind his reticence. In all fairness, Ron lets others do the talking at the meeting. He is very good at facilitating discussion and debate without juxtaposing his own view. He is the reason the meeting is effective, not just productive.

FRIDAY 10 P.M.: The lobby bar at the Sheraton Hotel is buzzing with too many of California's dental leaders to count. These people are still talking about dentistry. Well, I think Butte-Sierra Trustee Ernie Garcia is talking a little bit about fishing, but still … they're all nuts! I'm going to bed.

SATURDAY 7:30 A.M.: Santos Cortez, chairman of the Government Affairs Council, and Mark Kaufman, chairman of the Judicial Council, are sweating. So am I. We are in the gym at the Sheraton trying to work off last night's food and drink. We have been politely uninvited to the morning session of the BOT meeting. It is what they call "closed session." Some members might be suspicious of what the board is doing behind closed doors. What are they hiding from us? They

aren't hiding anything from us. There are simply matters that the association wants and needs to keep private from outside entities, like certain legal and financial matters. Trust them. They are, after all, trustees. Oh, and 7:30 is not an early start for the trustees. In fact, the member who was presenting at the closed session was up long before that in preparation. I could tell you what little else I know about closed sessions but, as past Trustee Rick Rounsavelle used to say, "then I'd have to kill you."

SATURDAY 10:30 A.M.: We hear a report on CDA's membership recruitment and retention plan. It's very ambitious; achieving 75 percent membership of licensed dentists in California by 2009. That is about a 12½ percent jump from where we are right now. Our volunteer dentist leaders and our staff have a tremendous amount of brainpower and passion for what they do, and I have no reason to believe they can't do it. Speaking of the staff, they get praised a lot by the leadership. It is unanimously held that they are all fantastic. Executive Director Peter DuBois sits at the president's left elbow during the entire meeting. As executive director he leads this staff. He listens to the praise they receive during the meeting and, upon hearing it, furrows his brow a bit deeper and gives a subtle, yet discernable, nod. Very subtle, mind you. He does not want to appear too proud of the group he leads. After all, our leaders did not hire him to sit and accept recognition for all the jobs well done by our association. Or did they?

SATURDAY 1:10 P.M.: ADA Trustee Russ Webb is not here for his verbal report to the board. We learn that he is actually in flight to Chicago for the ADA Board of Trustees meeting. As an ADA Trustee, he is also an ex officio member of the CDA Executive Committee, and thus a crucial link between ADA and CDA. He is lucky. He has the privilege of attending the leadership meetings of both organizations. The next time anyone, who is not an airline employee, sees him, be sure to thank him — twice.

SATURDAY 2:30 P.M.: Dave Famili and Dave Humerickhouse are having a rather animated discussion about peer review. Dave F. used to be chair of the Council on Peer Review and is now a trustee. Dave H. used to be a trustee and is now Peer Review chair. Isn't it funny how life works? Together these two guys know more about peer review than anyone in the state and probably the country. I don't know what the heck they were talking about. Come to this year's House of Delegates if you want to get in on the discussion.

SATURDAY 6:50 P.M.: The whirring and bumping of landing gear descending a few feet below my seat jars me from near sleep. The Board of Trustees meeting was a great experience and I wish all CDA members could get a glimpse of what's going on in the heart of our association. But I have more important things to do. What the hell am I going to write about? ■■■■

Address comments, letters, and questions to the editor at alan.felsenfeld@cda.org.

Mouthie Chatterteeth Goes Bilingual to Reach More Kids

The National Museum of Dentistry has launched a Spanish version of its educational MouthPower Web site. Aimed at elementary school-age children, the interactive and educational online program teaches youngsters about the power of a healthy smile. Online guide Mouthie the Chatterteeth takes visitors through his whimsical laboratory to teach valuable lessons about healthy eating, brushing, flossing, tooth anatomy, dental history, and tobacco use prevention.

Thanks to the California Dental Association Foundation, which awarded a grant to the National Museum of Dentistry to create the Spanish version http://www.mouthpower.org, visitors to the Web site now have the option of exploring Mouthie's lab in English or Spanish.

"We are pleased to partner with the National Museum of Dentistry on this

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Orthodontic Retainer Cleanser Readies for Large Market

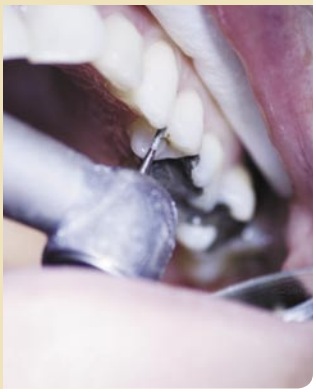
RTSP, LLC of Chattanooga, Tenn., announced the launch of Retainer Splash. Retainer Splash is an all-natural, patent-pending, trademarked, and trade secret-protected product. While the product is designed for use on retainers, local orthodontists and dentists have suggested potential efficacy on other removable appliances such as night guards. The product is sold exclusively through its Web site: http://www.retainersplash.com. For more information, contact Michael Pollock at 423-504-6573.

U.S. Court: FDA's Stance on Dental Amalgam Stays Intact

The U.S. Court of Appeals for the District of Columbia recently stated that the court cannot force the Food and Drug Administration to tighten restrictions on the use of dental amalgam fillings. The American Dental Association welcomed the ruling.

"Some activist groups, relying on faulty science, tried to use the court system to force the FDA to deprive the nation's dentists and the patients that they serve of a safe and inexpensive option for treating dental decay," said Kathleen Roth, DDS, ADA president. "The ADA and numerous other health and consumer organizations worldwide have said for many years that dental amalgam is a safe and effective filling material."

Made of silver, copper, tin, zinc, and mercury, dental amalgam form a stable alloy that has been used for generations to fill dental cavities. Dental amalgam has been extensively reviewed and studied, and has established a record of effectiveness and safety. Depending on treatment needs, it is one material available to dentists and patients when considering restorative options.



The ADA supports ongoing research in the development of new materials. However, the ADA, according to a press release, continues to believe that amalgam is a viable, valuable, and safe option for dental patients.

'Dental Dudettes' Gains Nationwide Appeal

A Sacramento women's study group is receiving interest from women dentists throughout the country. Although the Dental Dudettes only meet twice a year, the group provides a forum for women dentists to talk about the issues facing them. The biggest of which is balancing career and life, i.e., volunteer work, community activities, personal development, family, recreation, and leisure.

"People have called from states because they want to do something similar," said Herlin Dyal, DDS, a Sacramento prosthodontist who helped revitalize the group. "They find out about it through networking from friends and colleagues."

The group also provides mentoring, support and discussion of topics specific to professional women.

In the last two years, meetings have covered what might be considered fairly esoteric subjects. Among them:

Herlin Dyal, DDS

- A panel discussion on the choices local women dentists had made in their lives, why they made them, and the pros and cons of those choices in hindsight.
- A discussion of energy and how it is used, depleted, restored, or replenished.
- A "Wheel of Life" exercise that showed the participants how to value and prioritize time rather than spending it on activities that weren't actually important to them or helping them attain their goals.

The study group, founded in the late 1980s, had languished until 2005 when it was resurrected by Drs. Dyal, Nancy Archibald, Donna Galante, Kelly Gianetti, Nicky Hakimi, and Beverly Kodama, Sacramento-area dentists. The group currently has 75 active members. For more information, contact Dr. Herlin Dyal at hdyal@prosthogroup.com or 916-454-0855.

Life Optics Introduces New Advanced Head-mounted Dental Vision Device – The Varioscope M5^{dental}

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Chicago (Life Optics) has combined the excellent performance characteristics of high-end dental microscopes with the flexibility of loupes to create a compact, head-mounted dental vision device. The Varioscope M5^{dental} allows dentists to diagnose and operate at phenomenal magnification levels in their normal working positions while educating patients, staff, colleagues, and students with instant, real-time video monitoring of their procedures. For more information, visit www.lifeoptics.com or call Jeff Caplan at 608-236-4044.

UPCOMING MEETINGS

2007	
Aug. 4	31st Annual Scripps Symposium on Oral Medicine, San Diego, scripps.org/conferenceservices, 858-587-4404.
Aug. 22-24	International Society for Breath Odor Research Seventh International Conference, Chicago, Bill Bike, billbike@uic.edu or 312-996-8495.
Sept. 27-30	American Dental Association 148th Annual Session, San Francisco, ada.org.
Nov. 27-Dec. 1	American Academy of Oral and Maxillofacial Radiology 58th Annual Session, Chicago, aaomr.org.
2008	
May 1-4	CDA Spring Scientific Session, Anaheim, 800-CDA-SMILE (232-7645), cda.org.
Sept. 12-14	CDA Fall Scientific Session, San Francisco, 800-CDA-SMILE (232-7645), cda.org.
Oct. 16-19	American Dental Association 149th Annual Session, San Antonio, Texas, ada.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.

Melatonin May Help in Fight Against Periodontal Diseases

Melatonin, discovered in 1917, may be the latest supplement to join the fight against periodontal diseases.

In the June issue of *Journal of Periodontology*, melatonin may promote bone formation and stimulate the body's immune response, two factors that can affect a person's periodontal health. Melatonin has been found to be involved in many biological functions such as setting the body's sleep rhythms and fighting off free radicals that could lead to cancer and other autoimmune diseases.

The authors of the study conducted an extensive review of the literature (e.g., PubMed, Science Direct, Web of Knowledge, etc.) to evaluate the potential effects of melatonin on the oral cavity, including: melatonin as a host modulation agent; melatonin and periodontal disease; melatonin as a promoter of bone formation; and melatonin as an antioxidant and free radical scavenger. This review found strong evidence that it may play a crucial role in periodontal health by helping maintain bone levels in the oral cavity through suppressing the cells that work during bone resorption, and enhancing the body's host response to the periodontal bacteria. One of the most devastating effects of periodontal disease is bone loss in the jaw that frequently leads to tooth loss.

"Although the review did not directly look at melatonin as a treatment option for periodontal diseases, this is an area that might be worth investigating in the future," said Antonio Cutando, DDS, review author."

Musical/Singing Toothbrushes Designed to Get Kids to Brush

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World Trend, Inc. of Pomona, Calif., has introduced a line of musical/singing toothbrushes designed to get kids excited about brushing their teeth by using a combination of well-known characters, popular songs, and the latest technology. World Trend's new toothbrushes play popular songs from evergreen licenses.

The toothbrushes play the words and music of "Thomas Roll Call" and "Bob the Builder" theme songs, and the Care Bears' "You Are My Sunshine," for two minutes before turning off. For more information, contact Richard Hyken at 973-993-5805.

Careful How You Toss the Floss

The upswing in folks flossing their teeth is great news; but the fact many of them are flushing the floss is not.

In a recent issue of the *Journal of the Canadian Dental Association*, this bad habit is hard on wastewater treatment facilities as the shred-resistant variety of floss often jams the machinery. Discarded floss can create clumps the size of softballs.

Recently, the Toronto Water authority conducted a campaign to alert the public to the problems associated of discarding used floss into the toilet. So while oral health professionals are encouraged to educate their patients about the benefits of flossing, they also should mention the floss should not be flushed.

Dan Hubig

ADA's Topical Fluoride Recommendations Accepted by U.S. Health Agency

Matt Mullin

The U.S. Department of Health and Human Services' Agency for Healthcare Research and Quality has accepted the American Dental Association's "Evidenced-based Clinical Recommendations for Professionally Applied Topical Fluoride."

This acceptance results in increased accessibility for the ADA clinical recommendations through AHRQ's National Guideline Clearinghouse Web site, http://www.guidelines.gov/summary/summary.aspx?doc_id=10199&nbr=005383&string=fluoride.

The mission, according to the NGC, is to provide a comprehensive database of evidence-based clinical practice guidelines and related documents to further their dissemination, implementation, and use.

The topical fluoride recommendations are the first clinical recommendations developed by the ADA Council on Scientific Affairs using a comprehensive evidence-based dentistry approach. EBD is "an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences," according to the ADA.

The ADA clinical recommendations for professionally applied topical fluoride serve as a chairside reference for patient care that are intended to make it much easier for dentists to use the most current scientific evidence in clinical decision-making. The recommendations are available at http://www.ada.org/prof/resources/pubs/jada/reports/report_fluoride_exec.pdf.

The ADA Council on Scientific Affairs expects to develop additional recommendations in key clinical areas using an evidence-based approach.

Introducing Crest Glide Shred Guard

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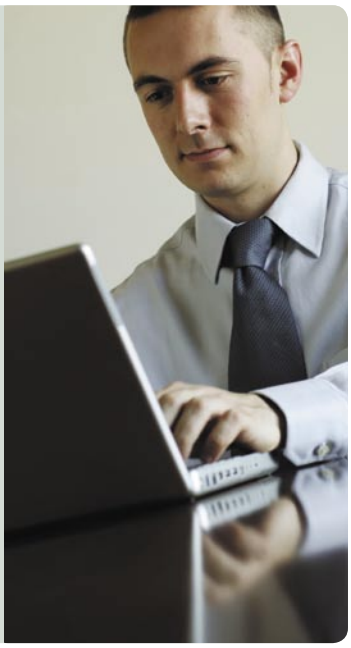
Glide Shred Guard is the strongest floss Crest has launched to date. Glide Shred Guard is up to 30 percent stronger than Glide Original Floss. Its wider floss design gives it improved strength. Glide Shred Guard is guaranteed shred-resistant. Glide Shred Guard is available in the 35-meter size.

For shred-resistant guarantee, call 800-645-4337 within 60 days of purchase with UPC and receipt. For more information, go to http://www.crest.com/glide/shredGuard.jsp.

HHS Launches New Web Site

The U.S. Department of Health and Human Services has launched a Web site that includes statistics on which type of complaints are most frequently filed as well as types of entities most often required to take corrective action as a result of consumer complaints.

Other information covers consumers' rights to access their health information. The Web site, www.hhs.gov/ocr/privacy/enforcement/, also includes the enforcement process, enforcement highlights, and case examples.




Brian Kenyon, DDS

Honors

Brian Kenyon, DDS, of Novato, Calif., has been honored with the Distinguished Faculty Member Award by the American College of Dentists Northern California Section. Kenyon is an assistant professor at University of the Pacific, Arthur A. Dugoni School of Dentistry in San Francisco.

DENTIST, CONTINUED FROM 541

important program to extend the cultural and linguistic opportunities to educate children and families on the importance of oral health," said Jon Roth, CAE, executive director of the California Dental Association Foundation. CDA aims to improve the oral health of Californians by supporting the dental health profession and its efforts to increase access to care for the state's most vulnerable people.

"Expanding our reach with preventive oral health messages is important to the CDA Foundation," added Bruce Toy, DDS, chair of the CDA Foundation Board of Directors. "We're glad to have the opportunity to partner with an established program like MouthPower to extend our reach."

Created by the National Museum of Dentistry, in partnership with the American Dental Association, MouthPower online has enjoyed significant success since being introduced three years ago. Educators, parents, dental practitioners, and Girl Scout troops throughout the globe use the program to reinforce oral health messages. Last year alone, the Web site had more than 4 million hits and received 70,000 individual visitors. Additional support for MouthPower online is provided by United HealthCare Dental.

The Dr. Samuel D. Harris National Museum of Dentistry, an affiliate of the Smithsonian Institution, has been designated by Congress as the official museum of the dental profession in the United States.

"The National Museum of Dentistry's mission is to educate the public about oral health in a healthy life, and translating MouthPower into Spanish significantly increases the reach of this vital and engaging program," said Rosemary Fetter, executive director of the National Museum of Dentistry. "We are grateful to the California Dental Association Foundation for their generous gift to translate (the Web site) into Spanish."

The signature oral health education program of the National Museum of Dentistry, MouthPower motivates young people to discover the power of a healthy smile. MouthPower is offered as an interactive program on the Web; a hands-on exhibition on site; and across the country in a new traveling exhibition.

"We are excited that the important oral health messages found in MouthPower will now be able to reach into the Hispanic community," said Ernest L. Garcia Jr., DDS, Hispanic Dental Association board president. "This is an excellent program that will have a tremendous impact on the oral health of Hispanics with its translation into Spanish."

To learn more about CDA Foundation's grant programs, go to cdafoundation.org.

Dr. Fresh Firefly MouthSwoosh Anti-cavity Fluoride Rinse
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MouthSwoosh Anti-cavity Fluoride Rinse by Dr. Fresh is the latest form of daily cavity prevention for kids. It is a great tasting, sugar- and alcohol-free mouthrinse that boosts protection against cavities and helps strengthen tooth enamel. Firefly

MouthSwoosh is bright pink in color and bubble-gum-flavored. For more information, go to www.drfresh.com or contact Bliss Ellis or Megan Brown at 323-650-2201.

"This is an excellent program that will have a tremendous impact on the oral health of Hispanics with its translation into Spanish."

ERNEST L. GARCIA JR., DDS

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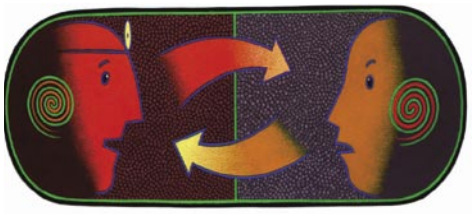

Medical Release Forms: Not a Replacement for a Conversation

Once a quarter, the *Journal* features a TDIC risk management case study, which provides analysis and practical advice on a variety of issues related to liability risks.

Authored by TDIC risk management analysts, each article presents a case overview and real-life outcome, and reviews learning points and tips which everyone can apply to their practice.

A 47-year-old male patient alleged his dentist practiced below the standard of care by prescribing ibuprofen even though he disclosed he had cirrhosis and hepatitis C, and was awaiting a liver transplant. The patient spent two days in the hospital due to gastrointestinal bleeding.

The patient presented to the dentist as a new patient. He explained to the appointment coordinator that he had not seen a dentist in at least seven years and his teeth were bothering him. He also explained he wanted to restore all of his teeth. The coordinator scheduled a new patient exam and allowed extra time to discuss potential treatment.

On the day of the appointment, the patient filled out the health history form and indicated he had viral hepatitis C and cirrhosis, and took Pegasys and Copegus to treat his liver damage. The dentist reviewed the form with him and noted in the chart the patient was on a waiting list for a liver transplant.

After taking a full-mouth set of radiographs and completing the exam, the dentist recommended extracting three teeth due to advanced periodontal disease, endodontic treatment and crowns on several teeth, as well as several simple restorations. She suggested starting with the extractions, since those teeth were bothering the patient most, then proceeding with deep-cleaning appointments before addressing the remaining restorative work.

The dentist told the patient she wanted to discuss the treatment plan with his physician to ensure it was safe to proceed with treatment. She was unable to reach the physician but sent a fax listing the treatment recommendations for the patient and requesting authorization to proceed with the extractions. Since the patient was complaining of pain, she prescribed 800 mg of ibuprofen, every four to six hours for discomfort from the teeth that were to be extracted. The dentist told the patient she would call him after hearing from the physician to schedule the extraction appointments.

The next morning, the fax transmission arrived from the physician authorizing the recommended dental treatment. The appointment coordinator left a message for the patient to contact the office to appoint for the extractions. The office never heard back from the patient.

Two months later the dentist received a letter from an attorney indicating the patient was suing her for negligence in prescribing ibuprofen, which resulted in the patient's hospitalization for gastrointestinal bleeding. He demanded $25,000 for loss of earnings as well as pain and suffering.

During Discovery

The patient's treatment record only contained four entries and the signed medical clearance from the physician. The first entry was the new patient exam, which included notes about the impending liver transplant, and a fax to his treating physician. The entry made the following day by the appointment coordinator, indicated she left a message at the patient's home to call and schedule an appointment for extractions. The next entry was three weeks later. It indicated another dental office was requesting copies of the patient's chart and radiographs. The final entry, which was four weeks later, read "letter from attorney."

The dentist's own attorney questioned her about the request for records. She stated she was not aware of the request until she received the letter from the patient's attorney, prompting her to review the chart. The dentist could not confirm whether the patient signed an authorization to release the records or whether the records had, in fact, been mailed or hand delivered. The dentist explained she had a complete staff turnover since seeing this patient, and the person who would have handled this request was no longer with the practice. She admitted to only learning the patient had been hospitalized after receiving the letter from his attorney.

The expert witness for the plaintiff was a physician. When the plaintiff's attorney questioned him about prescribing ibuprofen to patients with liver damage, he explained any nonsteroidal anti-inflammatory medication is contraindicated for patients with advanced liver damage regardless of its origin, including the possibility of hepatitis C. The expert was also critical of the fax transmission form. He felt that by not including the prescription for nonsteroidal, anti-inflammatory medication, the physician was responding directly to the list of medications listed. For those medications listed, no contraindications existed for a patient with advanced liver disease. The expert did comment that in cases of severe liver damage, a physician should have a conversation with the dentist to discuss the recommended treatment, rather than merely signing a medical release form.

> Two months later the dentist received a letter from an attorney indicating the patient was suing her for negligence in prescribing ibuprofen.

The dentist was aware the patient's health necessitated a conversation with the treating physician prior to treatment. However, since she could not speak directly to the physician, she faxed a medical release form that indicated the need for extractions. The fax listed several types of anesthetics she typically used, as well as antibiotics and pain medications she may prescribe. She did not feel it was necessary to include the ibuprofen and expected the physician to indicate any other contraindicated medications that were not on her list.

The defense attorney questioned the plaintiff's expert witness about the role a pharmacist plays when dispensing medication. He asked whether the pharmacist should have filled the prescription for ibuprofen knowing the patient was taking Pegasys and Copegus to treat his liver disease. The expert stated that without the patient's health history, the pharmacist would have little reason to contact the prescribing doctor to verify the prescriptions.

The defense attorney was unable to find an expert to support prescribing ibuprofen to a patient with liver disease and recommended offering a settlement. After negotiations, both parties agreed to settle for an amount lower than originally demanded.

WHAT CAN BE LEARNED FROM THIS CASE?

Medical Release

When requesting a medical clearance for a patient from another practitioner, it is vital for the dentist to include all information necessary. The dentist knew the patient's advanced liver disease necessitated a conversation with his treating physician. However, her impatience led her to fax a medical release form rather than waiting to speak to the physician. Furthermore, the medical clearance form contained medications (anesthetics, pain medications, and antibiotics) she typically administered or prescribed when performing extractions. Not only did she not customize the clearance form for the patient, she did not list the ibuprofen, which was a critical oversight. Be sure to include all prescription and over-the-counter medications you anticipate using during treatment, whether you believe they are contraindicated or not.

Additionally, providing treatment to patients anticipating an organ transplant requires antibiotic prophylaxis because they are usually provided less than 24 hours' notice prior to surgery. In fact, one of the protocols for pending organ transplant patients is to have all dental treatment performed prior to the transplant surgery. It is best to discuss the patient's needed dental treatment with the treating physician and agree on a course of treatment and timeline. Do not substitute a form for this conversation.

There were two checkboxes at the bottom of the form, "proceed with treatment" and "do not proceed with treatment." Medical release forms should have an area that allows physicians to

comment on the patient's overall health and alert dentists to potential issues. In cases where the patient's health is severely compromised, a conversation with the treating physician must occur before initiating treatment of any kind, including prescribing medication.

Staff Training

Dentists are responsible for everything that occurs in the office. For this reason, it is imperative staff is properly trained to bring patient issues to the dentist's attention right away. These issues include patient complaints, letters from patients or their representatives, and any requests for records. Staff turnover is not a defense for failing to provide proper training for each staff member.

Staff should also understand copies of patient records can be mailed or given to the patient, a new treating dentist, or anyone the patient designates as long as the patient is making the request. The chart should reflect the date the records were requested, when they were mailed or delivered, and to whom they were sent or delivered. It is preferable to have the patient's written authorization but not mandatory when requested directly by the patient. When patients do request their records, it is typically the first sign of discontent. Had the staff informed the dentist of the patient's request, a call to the patient would have enlightened the dentist to the situation and possibly headed off a lawsuit.

When dentists accept patients into their practices, it subjects dentists to liability, even before rendering physical treatment. Any miscommunication on the dentist's or staff's part can create a chain of events that may lead to serious consequences. ■■■■

— ROBYN THOMASON
TDIC RISK MANAGEMENT ANALYST

CDA JOURNAL, VOL 35, Nº8

Periodontal Attachment Loss Due to Applying Force by Tongue Piercing

YEHUDA ZADIK, DMD, AND VADIM SANDLER, DMD

ABSTRACT This report describes lingual cortical plate loss of the two lower central incisors with second degree mobility in an 18.5-year-old patient. Seven millimeters of clinical attachment losses were detected. For the last 4.5 years, the patient has worn a tongue ornament. The spheres were pressed directly against the periodontal lesion. The metal bar was bent as empirical evidence of the excessive force. Dental practitioners should educate their patients about the risk of oral piercing.

AUTHORS

Yehuda Zadik, DMD, is head of The Zrifin Central Dental Clinic, The Health and Prevention Medicine Institute, The Centre for Medical Services, Medical Corps, Israel Defense Forces, and Department of Anatomy and Cell Biology, Hebrew University-Hadassah School of Medicine, Jerusalem.

Vadim Sandler, DMD, is with The Zrifin Central Dental Clinic, The Health and Prevention Medicine Institute, The Centre for Medical Services, Medical Corps, Israel Defense Forces, Israel.

Among other local and systemic complications, some of them life-threatening, the mucogingival defect is a well-documented late complication due to oral piercing.[1-4] Since an increasing number of youngsters and young adults are wearing jewelry inserted into oral tissues, the likelihood that dentists will face piercing-induced pathologies is increasing as well.[5]

Tongue piercing is a risk factor for gingival recession, especially when the bar is longer than 1.6 cm and the ornament is in place for at least two years.[6] Between 16 percent and 53 percent of the patients with oral piercing exhibit some degree of gingival inflammation and/or gingival recession related to the ornament.[4,7-9] Most of the reported piercing-induced gingival damages are related to lip ornaments, probably because the usual metal flattened disk jewelry in the lip induces more traumatic damage to the tissue, compared with the usual ball ornament in the tongue.[10-13] The most common tongue ornament-induced gingival injury site is at the lingual aspect of the anterior lower teeth.[6,7,14] However, reports of alveolar bone loss related to tongue ornaments are scattered.[15-17]

The authors describe a case of alveolar bone loss due to 4.5 years of tongue piercing, with unique consequences.

Case Report

An 18.5-year-old female presented to the dental emergency service at the authors' institute for "mobility of her lower front teeth." She was a healthy young adult, but had smoked a pack (20) of cigarettes a day for the last five years. She had not undergone a dental examination in the last three years. Intraoral examination revealed a combined 3.5-cm metal/plastic ornament placed through the mid-dorsum of the tongue. The metal bar was bent, and calculus coated the plastic sphere that was located near the floor of the mouth

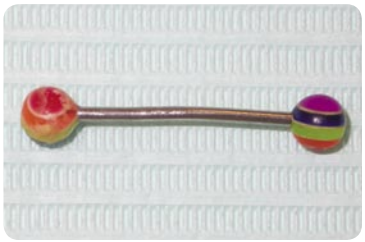

FIGURE 1. The tongue ornament. The metal bar is bent due to force applied by the patient on the hard oral tissues. The plastic sphere that is located near the floor of the mouth is coated by calculus.

FIGURE 2. Probing of the lingual aspect of the right lower central incisor. Clinical attachment loss of 7 mm was detected.

FIGURE 3. A periapical radiograph of the anterior lower region shows the loss of cortical bone.

(**FIGURE 1**). According to the patient, she pierced her tongue at her 14th birthday, 4.5 years ago. The current jewelry had been in place since then. She admitted she has never cleaned the ornament.

A periodontal examination revealed gingival recessions on the lingual aspects of the two central lower incisors, directly opposite of the location of the ornament's sphere. For the right and left incisors, the free gingival margin was 3 mm and 2 mm, respectively, from the CEJ. The depth probed was an additional 4 mm in these teeth (**FIGURE 2**). Thus, the clinical attachment loss was 7 mm in the right incisor and 6 mm in the left incisor. The mobility of the two teeth was of the second degree (2 mm horizontally). Periapical radiography revealed evidence of loss of the lingual cortical plate in that area (**FIGURE 3**).

In other sites in the dentition, attachment loss was not noticed by probing and with radiographs. Except for the tongue ornaments, the patient denied any harmful traumatic habit. Moreover, there was no evidence of tooth wear and/or tooth mobility.

The patient was well-informed of her condition, and the treatment options and prognosis were explained in detail to her. However, she refused to have the tongue jewelry permanently removed, which was a preliminary condition for surgical periodontal treatment. She opted to replace the ornament with a shorter flexible acrylic bar. Scaling and root planing were performed.

Comments

Differential diagnosis of localized alveolar bone loss in a young patient includes localized aggressive periodontitis, LAP, periodontal manifestation of systemic disease and incidental bone loss. LAP is characterized by circumpubertal onset and involvement of at least two permanent teeth, one of which has to be a first molar.[18] Since the presented patient did not have any bone loss in other sites and was systemically healthy, LAP and periodontal manifestation of systemic disease can be ruled out, respectively. Incidental bone loss can be caused by local trauma, tooth position or third molar adjacency.[18] The patient suffered from the bone loss in the lower central dentition. The ornament's spheres were pressed directly against the periodontal lesion. Because there were no other local factors such malposition of teeth, the lesion was probably caused by the long-term ornament-induced local irritation.

Two recent reports suggested, though did not prove, that plastic jewelry is less damaging to oral tissues than metal jewelry.[19,20] Nevertheless, in the present case, the periodontal damage was done despite that the sphere was plastic. Probably, the most significant factors in the damaging process were the relatively long (3.5 cm) metal bar and the time period the jewelry was worn.

Because of the bent metal bar, there was no doubt the patient had forced the jewelry against hard oral tissues; teeth, alveolar bone, or both. Thus, the localized periodontitis was probably caused by the local trauma induced by the tongue ornament.

In a previous study, the authors reported inadequate knowledge of the possible complications of oral piercing among young adults.[4] In the present case, the patient was unaware of the risks of oral piercing and thus, she had tongue jewelry from a relatively young age without periodic professional examinations and maintenance. The patient has full health insurance coverage, including periodontal, as an Israel Defense Forces soldier. Nevertheless, even after the complication was diagnosed and a free-of-charge surgical periodontal treatment was offered, she refused to remove the jewelry as the first step in the therapy. However, it is not unusual for patients to refuse to remove oral jewelry even after a complication has occurred.[19]

In conclusion, dentists should carefully exam the oral tissue of patients with oral piercing for early diagnosis of these complications. This case adds to the growing number of cases about oral piercing complications found in the literature. Dental surgeons have the responsibility to educate their patients about these conditions and to recommend appropriate treatment to them. ■■■■

REFERENCES

1. Ram D, Peretz B, Tongue piercing and insertion of metal studs: three cases of dental and oral consequences. *ASDC J Dent Child* 67:326-9, 2000.

2. Shacham R, Zaguri A, et al, Tongue piercing and its adverse effects. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 95:274-6, 2003.

3. Levin L, Zadik Y, Oral piercing: complications and side effects. *Am J Dent*, in press.
4. Levin L, Zadik Y, et al, Oral and dental complications of intraoral piercing. *Dent Traumatol* 21:341-3, 2005.
5. Venta I, Lakoma A, et al, Oral piercings among first-year university students. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 99:546-9, 2005.
6. Campbell A, Moore A, et al, Tongue piercing: impact of time and barbell stem length on lingual gingival recession and tooth chipping. *J Periodontol* 73:289-97, 2002.
7. De Moor RJ, De Witte AM, et al, Tongue piercing and associated oral and dental complications. *Endod Dent Traumatol* 16:232-7, 2000.
8. De Moor RJ, De Witte AM, et al, Dental and oral complications of lip and tongue piercings. *Br Dent J* 199:506-9, 2005.
9. Kieser JA, Thomson WM, et al, Oral piercing and oral trauma in a New Zealand sample. *Dent Traumatol* 21:254-7, 2005.
10. Sardella A, Pedrinazzi M, et al, Labial piercing resulting in gingival recession: a case series. *J Clin Periodontol* 29:961-3, 2002.
11. Leichter JW, Lovegrove J, et al, Elective lip piercing and gingival recession: case report. *N Z Dent J* 99:42-5, 2003.
12. O'Dwyer JJ, Holmes A, Gingival recession due to trauma caused by a lower lip stud. *Br Dent J* 192:615-6, 2002.
13. Chambrone L, Chambrone LA, Gingival recessions caused by lip piercing: case report. *J Can Dent Assoc* 69:505-8, 2003.
14. Brooks JK, Hooper KA, et al, Formation of mucogingival defects associated with intraoral and perioral piercing: case reports. *J Am Dent Assoc* 134:837-43, 2003.
15. Choe J, Almas K, et al, Tongue piercing as risk factor to periodontal health. *N Y State Dent J* 71:40-3, 2005.
16. Kretchmer MC, Moriarty JD, Metal piercing through the tongue and localized loss of attachment: a case report. *J Periodontol* 72:831-3, 2001.
17. Panagakos FS, Linfante J, et al, Attachment loss associated with the presence of a tongue bar: a case report. *Gen Dent* 48:454-6, 2000.
18. Tonetti MS, Mombelli A, Aggressive periodontitis. In: Lindhe J, Karring T, et al (eds.), Clinical periodontology and implant dentistry, fourth edition, Blackwell Munksgaard, UK 233-5, 2003.
19. Stringer B, Intraoral and perioral piercings: what can I say and what can I do? *J Can Dent Assoc* 72:901-2, 2006.
20. Zadik Y, Becker T, et al, Intraoral and perioral piercing. *J Isr Dent Assoc* 24:29-34, 2007.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Yehuda Zadik, DMD, 16 Shlomo Zemach St., 96190 Jerusalem, Israel.

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Challenging Dentistry to Recognize and Respond to Family Violence

BARBARA M. AVED, RN, PHD, MBA; LARRY MEYERS, PHD; AND ELITA LIN BURMAS, MA

ABSTRACT Few studies have examined efforts to engage the dental community about roles and responsibilities in recognizing and responding to family violence through targeted educational programs. Evaluation of the Dental Professionals Against Violence course showed 1,213 dental professionals gained knowledge and confidence about identifying and appropriately responding where abuse/violence in patients was suspected. Practice changes included increased awareness of signs and symptoms of abuse among patients and application of the training materials for office staff.

AUTHORS

Barbara M. Aved, RN, PHD, MBA, is president of Barbara Aved Associates, a health care consulting firm in Sacramento.

Larry Meyers, PHD, is a professor of psychology at California State University, Sacramento.

Elita Lin Burmas, MA, is an independent consultant in the field of quantitative psychology in Davis, Calif.

Because the majority of physical injuries from domestic and other forms of interpersonal violence are inflicted to the head and face, such as chipped or fractured teeth, and attempted strangulation marks on the neck, and evidence that many victims interact with dental care providers, dental professionals are in an excellent position to recognize such abuse.[1-3] As legislatively mandated health care reporters in California, dental professionals have the responsibility and legal obligation of reporting suspected cases of child abuse and neglect, and domestic violence where physical assault has occurred. While a growing number of dental providers recognize their responsibilities regarding neglect and abuse, lack of training in dealing with these issues is a major barrier to patient screening and reporting.

This study examined the impact of the Dental Professionals Against Violence training program conducted statewide by the California Dental Association Foundation in 2004-2006. The program challenged the dental community to become collaborative partners in identifying and responding to suspected abuse and neglect, and provided training in how to recognize such signs and symptoms.

Background

The dental profession in California has a history of supporting educational programs to promote recognition and intervention in family violence. In 1994, the Prevent Abuse and Neglect through Dental Awareness program, developed in 1992 by Delta Dental of Missouri, was introduced by Delta Dental of California and provided education to dental professionals. In 1997, the California Dental Association began administering the California PANDA program and expanded it to include elder abuse/neglect and domestic violence. Between 1994 and 2003, more than 10,000 individuals were educated through presentations, semi-

nars, and workshops. In 2003, the work was enhanced and expanded when Blue Shield of California, Blue Shield of California Foundation, and Dental Benefit Providers partnered with the California Dental Association Foundation to create DPAV and provide major funding support. The DPAV curriculum is one of only two such extensive family violence curricula for dental professionals in the country; the other is the University of Minnesota School of Dentistry.[4]

Training Strategy

Grant funding support enabled the program to expand by including a recruitment strategy to attract members from local dental and allied dental societies to become trainers to ensure continuity of the program. Train-the-trainer workshops were offered twice a year at the CDA's spring and fall Scientific Sessions. Trainers delivered the DPAV educational course in two formats: four-hour, in-person seminars (e.g., Scientific Sessions, local dental society meetings), and online through a hosted Web cast service. Continuing education units were offered for dental professionals taking the course.

Study Goals

The expected outcomes for the training course were increased awareness about the extent of family violence and knowledge to recognize it; and increased ability, confidence, and vigilance in reporting it when it is suspected.

METHODS

A purposeful review of the published literature with research findings, policy, and practice implications related directly to the DPAV goals informed the study design and helped to identify items for inclusion in the survey instrument. Several key informants were consulted during the planning phase for data collection, and again at the end of the study to obtain their perspectives about the effectiveness of the program. These individuals included a well-known expert and trainer in the field, and a recognized forensic medical expert and former director of a university medical center domestic violence education program.

PARTICIPANTS WERE in agreement that being a mandated reporter was an appropriate intervention for the dental profession.

Data from DPAV course participants were obtained through written, self-administered survey/post-tests taken at the end of the training session. Along with demographic and practice information, true/false post-test questions based on the course curriculum were incorporated into the survey instrument. A pretest for baseline knowledge was not used as it was expected to provide little value-added information to justify the additional time for completion during the course. Participants self-rated knowledge, perception of acquired skills and confidence level change after taking the training. Using a repeated measures statistical design with the very same questions, it was possible to determine the extent to which course information was retained by the participants.

A protocol for administering the survey to course participants was developed for trainers. Trainers distributed, monitored, collected, and mailed the completed surveys in prepaid mailers to the evaluators. To allow for anonymity in turning in a completed survey/post-test when the course was delivered by a peer, such as during a dental society dinner, the instrument was constructed for participants to detach the personal information sheet and turn it in separately from the survey. Surveys from DPAV course participants were received between September 2004 and March 2006. All participants with readable fax numbers or e-mail addresses who were eligible based on length of time since taking the DPAV course were sent the follow-up survey approximately six months after the course.

Although a mechanism had been created for online course takers to also participate in the evaluation — and "dummy data" confirmed the system had the capacity to collect the survey data when the online course went "live" — technical problems resolved too late by the host company resulted in too few surveys being retrievable from the Web site. Consequently, data from online course takers are not included in this paper.

A survey for the dental professionals who had delivered at least one training session during the project period was sent to them at the end of the project. Twelve individuals met this criterion and returned completed surveys. The purpose was to obtain trainer perspectives about the effectiveness of the course curriculum and materials and feedback for improvement.

A detailed coding scheme and Excel spreadsheets were created for the surveys. The data were cleaned and entered in the spreadsheets and analyzed using SPSS Version 14.0.

FINDINGS

The Study Sample

A total of 21 dental professionals were trained as DPAV trainers in two train-the-trainer formats; however, only 12 of these individuals actually delivered a training session during the project period. The DPAV course was offered in 38 training sessions across the state. Usable surveys/post-tests were returned by 1,213 California dental professionals who attended one of the DPAV trainings between September 2004 and March 2006 and completed a survey, constituting the course participant study sample.

The Study Sample

Dentists comprised about 22 percent of the sample and allied dental professionals (hygienists and assistants) represented 58 percent. About 14 percent of the sample marked "other" (e.g., front office staff, nurses) and 6 percent did not report their profession. Eight of 10 course participants were women, which would be expected with such a high percentage of allied dental participants.

The data on number of years in practice were broken into the categories shown in TABLE 1. Approximately one-third of the participants had one to nine years of experience; close to one-third had 10 to 20 years; and another nearly one-third had more than 21 years of practice. Only 3.6 percent of the respondents had worked in their profession for less than a year. The highest number of years in practice was 49.

Attitude About the Role of Mandated Reporter

Participants were in agreement that being a mandated reporter was an appropriate intervention for the dental profession. On a four-point scale with 4 as "strongly agree," the mean response was 3.01 (SD=.1.15) (TABLE 2). There were no significant differences in how dentists, allied professionals, and others felt about their role as a mandated reporter. However, there were statistically significant differences between the group of individuals who did not report their profession and everyone else, $F(3, 1079)=10.42$, $p < .001$. The individuals who did not report their profession tended to agree less with the appropriateness of being a mandated reporter. Although male participants had a higher extent of agreement than female participants, the differences were not statistically significant.

Experience in Identifying and Responding to Abuse

The dental professionals reported making very little observation or taking action in the six months prior to taking the DPAV course regarding the number of cases where abuse/violence had been suspected; where a referral was made; and where a report was filed concerning violence directed at children, domestic partners, and elders/dependent adults. With regard to *suspected* child abuse, the vast majority (88 percent) believed they saw no patients with any evidence; about 7 percent indicated they believed they saw one such patient and about 2 percent thought they saw two. Almost 90 percent believed they saw no patients with evidence of suspected domestic/partner abuse; about 6 percent indicated they believed they saw one such patient; and about 2 percent indicated they saw two. Approximately 91 percent believed they saw no elderly/dependent patients with evidence of suspected abuse or neglect; and about 5 percent indicated they believed they saw one such patient (TABLE 3).

There were fewer patients reported where referrals were made when abuse/

TABLE 1

Number of Years Practicing in Profession

Length of practice	N	Percent
Less than 1 year	44	3.6%
1 to 4 years	177	14.6%
5 to 9 years	183	15.1%
10 to 20 years	351	28.9%
21 or more years	371	30.6%
Subtotal	1126	92.8%
Did not report	87	7.2%
Total	1213	

TABLE 2

Extent of Agreement About Being a Mandated Reporter

Profession	*n*	*M*	*SD*
Dentist	244	3.11	.97
Allied	611	3.01	1.19
Other	158	3.18	1.14
Did not report	70	2.31	1.21
Total sample	1083	3.01	1.15

Note: Total sample does not include the 108 surveys that were missing a page with this question.

TABLE 3

Number of Patients Where Provider Suspected Violence

Number of Patients Seen	Child Abuse/Neglect	Domestic/Partner Violence	Elder or Dependent Abuse/Neglect
	n (%)	n (%)	n (%)
0	1064 (87.7%)	1091 (89.9%)	1106 (91.2%)
1	86 (7.1%)	71 (5.9%)	64 (5.3%)
2	22 (1.8%)	23 (1.9%)	14 (1.2%)
3	5 (.4%)	4 (.3%)	4 (.3%)
4	5 (.4%)	3 (.2%)	1 (.1%)
5	4 (.3%)	—	4 (.3%)
6	5 (.4%)	1 (.1%)	1 (.1%)
10	3 (.2%)	1 (.1%)	1 (.1%)
15	1 (.1%)	1 (.1%)	—
Subtotal	1195 (98.5%)	1195 (98.5%)	1195 (98.5%)
Did not respond	18 (1.5%)	18 (1.5%)	18 (1.5%)
Total	1213	1213	1213

TABLE 4

Number of Patients Where Provider Made a Referral Based on Suspicion

Number of Patients Seen	Child Abuse/Neglect	Domestic/Partner Violence	Elder or Dependent Abuse/Neglect
	n (%)	n (%)	n (%)
0	1071 (96.9%)	1076 (97.4%)	1089 (98.6%)
1	17 (1.5%)	13 (1.2%)	4 (.4%)
2	4 (.4%)	3 (.3%)	—
3	1 (<1%)	—	—
4	1 (<1%)	1 (<1%)	—
10	1 (<1%)	1 (<1%)	—
Subtotal	1095 (99.1%)	1094 (99.0%)	1093 (98.9%)
Did not respond	10 (.9%)	11 (1%)	12 (1.1%)
Total	1105*	1105*	1105*

*Total sample does not include the 108 surveys that were sent out without this question.

violence was suspected than the number of suspected cases. The greatest majority of participants (approximately 97 percent) made no referrals for suspected child abuse/neglect, and about 1.5 percent indicated they made one such referral; 97.4 percent made no referrals for suspected domestic partner violence; and about 1 percent indicated they made one such referral; and almost 99 percent made no referrals for suspected elder or dependent abuse/neglect (**TABLE 4**).

TABLE 5 shows the number of patients for whom the provider made a report based on suspicion of abuse. Nearly 98 percent did not file reports on patients for suspected child abuse/neglect, and about 1 percent indicated they filed one report. Regarding suspected domestic/partner violence, nearly 99 percent did not file reports on patients for this purpose, and less than 1 percent indicated they filed one report. Likewise, for suspected elder or dependent abuse/neglect, approximately 99 percent did not file reports on patients for this purpose, and less than 1 percent indicated that they filed one report.

How Much Did Dental Professionals Learn from the Course?

Course participants self-rated their level of knowledge about recognizing signs of abuse and how to take appropriate action prior to taking the course and right after completing it. (The post-test questions assessed their actual post-training knowledge based on the content of the course curriculum.) The participants as a group reported a statistically significant increase in their perceived knowledge level on every one of the items ($p < .001$) as a result of taking the course (**TABLE 6**). They reported knowing relatively little about this material prior to the course (mean scale values in the range of 2.5) but by its completion, thought they had learned a moderate amount of information about all of these topics (mean scale values in the range of 3.0).

All of the groups reporting their profession reported statistically significant ($p < .05$) increases in self-perceived knowledge level on each of the items (**FIGURE 1**). This pattern was quite different from the group that did not report their profession. This latter group indicated significantly less perceived knowledge than the other groups on almost all of the items. They indicated they were less knowledgeable at the end of the course than they were at the start. This knowledge rating decrease was statistically significant for items regarding reporting domestic partner and elder abuse, making patient referrals,

and recognizing signs and symptoms. Prior to the training, both dentists and allied health professionals believed they were least knowledgeable about how to make referrals and most knowledgeable (although still not at a high level) about recognizing signs and symptoms of abuse, with hygienists and assistants reporting slightly higher levels of knowledge about both of these items than dentists.

Course Post-test

Overall, participants answered the post-test questions slightly more than 80 percent correct, but with considerable variability (**TABLE 7**). Respondents obtained almost 90 percent or better on four of the questions ("a," "c," "d," and "i"). They obtained between 86 percent and 88 percent on questions "h" and "j"; and 77 percent correct on question "f." Respondents performed more poorly on the remaining three items, scoring 68 percent, 59 percent, and 51 percent correct on items "e" (at what step to fill out a report); "b" (incidence of domestic violence); and "g" (immunity from liability). The only statistically significant differences among the professions groups were associated with questions "d" and "h" ($p < .05$). Dentists did significantly better than the allied professionals and others on question "d," increased risk for abuse for patients with physical or mental disability; they also did significantly better than the allied professionals and those who "Did Not Report" on question "h," most abuse survivors wanting to be asked about it by their health care provider.

The reliability of the post-test (as assessed by Cronbach's alpha coefficient) was .533. This relatively low value suggests the items do not comprise a homogeneous content domain (i.e., they tap into relatively independent domains of knowledge). This indicates the respondents differentially learned different aspects of the course, and not that there was an inherent weakness in any of questions. Even though all topics were each appropriately chosen to be in the course, they are not truly related even if they might be seen that way by course participants. The reliability value means one should pay more attention to the individual items and how they test knowledge of specific content area than to the performance on the test as a whole.

TABLE 5

Number of Patients Where Provider Filed a Report Based on Suspicion

Number of patients seen	Child Abuse/Neglect	Domestic/Partner Violence	Elder or Dependent Abuse/Neglect
	n (%)	n (%)	n (%)
0	1078 (97.6%)	1090 (98.6%)	1093 (98.9%)
1	13 (1.2%)	4 (.4%)	2 (.2%)
2	2 (.2%)	1 (< .1%)	—
3	2 (.2%)	—	—
Subtotal	1095 (99.1%)	1095 (99.1%)	1095 (99.1%)
Did not respond	10 (.9%)	10 (.9%)	10 (.9%)
Total	1105*	1105*	1105*

.*Total sample does not include the 108 surveys that were sent out without this question.

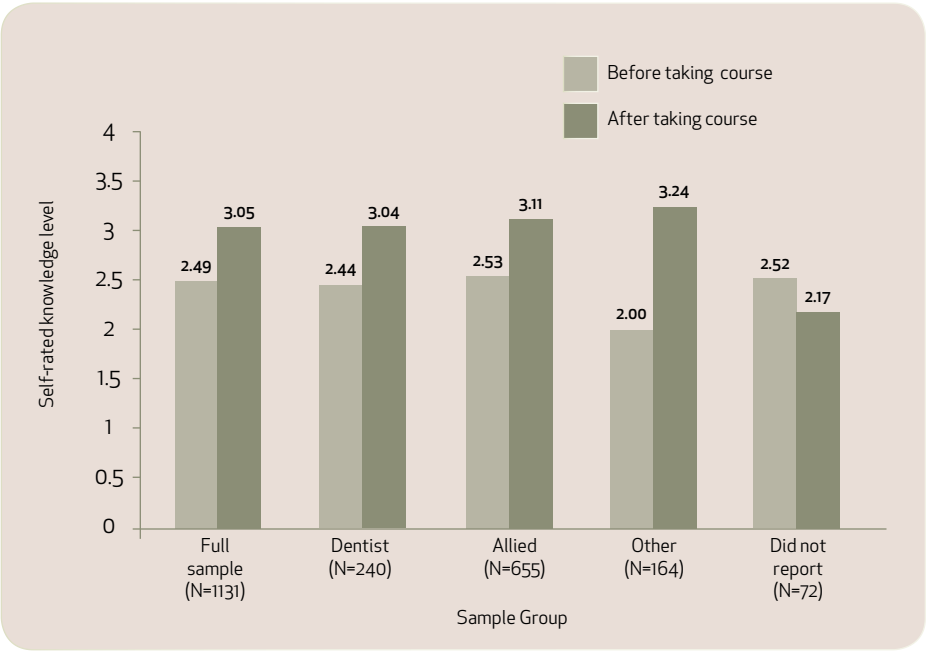

FIGURE 1. Composite means for knowledge level before and after taking the DPAV course

Confidence in Applying What Was Learned

The participants also answered questions about their comfort level or confidence after taking the course in carrying out various functions associated with being a mandated reporter. A scale value of 3 (on a four-point scale) on these questions was associated with the anchor of "somewhat comfortable." Although the differences in functions were not

TABLE 6

Self-reported Knowledge Before and After Training, Full Sample

Item*		Before Taking the Course		After Taking the Course	
	n	*M*	*SD*	*M*	*SD*
Knowing how to make a patient referral to or obtaining information from community resources	1124	2.40	.91	3.01	1.15
Knowing the liabilities and protections for mandated reporters	1107	2.44	.89	3.05	1.21
Knowing how/where to report elder/dependent adult abuse	1124	2.44	.88	3.04	1.20
Knowing how/where to report domestic/partner violence	1126	2.48	.85	3.05	1.20
Knowing how/where to report child abuse/neglect	1126	2.50	.85	3.06	1.23
Knowing the legal responsibilities of reporting	1125	2.55	.87	3.08	1.23
Knowing how to recognize signs and symptoms of abuse/neglect	1123	2.63	.68	3.05	1.22
Total average for all knowledge items	1131	2.49	.71	3.05	1.17

Note. Scale from 1 for "none" to 4 for "a great deal."

*Items are ordered from the largest mean difference to the smallest mean difference.

statistically significant (responses averaged between 2.86 and 3.01), the ability participants seemed the most comfortable with was in recognizing signs and symptoms of abuse/neglect. The area in which they were least comfortable was in asking patients, presumably directly, about abuse when it was suspected.

Participant Feedback About the Course

The respondents as a whole were very positive in their assessment of both the presenters and the value of the course (**TABLE 8**). However, there were significant differences ($p < .05$) between the groups of those that did and did not disclose their profession. Consistently, the "Did Not Report" group was substantially more negative in their evaluations of the presenter and course than the other three groups who were more positive in their evaluations. The three disclosed groups did not differ significantly from one another in their ratings of the course.

Virtually all (97.4 percent) of the participants planned to recommend the course to a colleague. Only two (<1 percent) individuals responded "no" but did not offer a reason. (The remaining 2.4 percent did not answer the question.)

Recommendations for Improving DPAV

A total of 218 comments were obtained in recommendations to improve the course. About one-quarter of the feedback involved audio-visual issues (e.g., use more pictures), and another one-quarter suggested change in the course content or course materials (e.g., role play asking a patient about suspected abuse). While 4.6 percent thought the course was too long, 11 percent indicated that it was too short. Close to 20 percent of the participants thought that the course was excellent in its current form and did not require any change.

Attitude About Training in Abuse as a CE Requirement

Approximately two-thirds of the respondents supported the idea that abuse training should be a continuing education requirement for licensure. While a higher percentage of allied professionals than dentists supported this requirement for C.E., the differences were not statistically different based on a chi square test.

Perceived Effectiveness of the Course Materials

Eight of the 12 trainers who had delivered one or more DPAV training sessions responded to the written survey and believed the materials were simple to use in teaching the major curriculum topics. The trainers also validated the appropriateness of the course materials (PowerPoint slides, handouts) for participant learning, particularly in recognizing signs and symptoms of abuse and neglect. The areas perceived to be somewhat less easy to use and less effective for participant learning were related to the legal responsibilities of reporting, and the liabilities and protections for mandated reporters.

Curriculum Review

An outside, critical review of the DPAV curriculum for content analysis, format, and ease of use was commissioned by the CDAF in summer 2005.[5] The review focused particularly on the online presentation of the course. Overall, the analysis concluded the DPAV curriculum was well-done and well-designed. The content was considered to be accurate, appropriate for the stated goals and helpful, with only a few missing items noted and corrections needed. Specific and detailed recommendations concerning the online

TABLE 7

Post-test Questions (Scored as T/F): Percentage Correct, Full Sample, and by Profession

Item	Full Sample (*N*=1105)*	Dentist (*n*=247)	Allied (*n*=620)	Other (*n*=166)	Did Not Report (*n*=72)
a. Making a report is not an accusation; it's reporting observations or facts.	97.9%	97.6%	98.1%	98.2%	97.2%
b. Domestic violence affects at least 1 out of every 10 American families.	59.2%	53.8%	61.1%	62.7%	52.8%
c. Abusers/care providers may avoid the same physician, but return to the same dentist.	94.8%	97.2%	94.4%	93.4%	93.1%
d. Mental and physical disabilities increase patient risk for abuse/neglect.	95.6%	98.8%	95.5%	92.8%	91.7%
e. The first step when suspecting child, adult, or elder abuse is filing a written report.	67.7%	73.7%	67.3%	63.9%	59.7%
f. Health care provider/patient privilege is not applicable in reporting suspected abuse.	76.6%	80.6%	77.6%	69.9%	69.4%
g. A mandated reporter is immune from civil or criminal liability and cannot be sued.	50.9%	53.9%	51.9%	44.6%	45.8%
h. Most survivors of abuse report wanting their health care provider to ask them privately about abuse.	85.9%	91.9%	85.2%	83.1%	77.8%
i. Failure to make a mandatory report is a misdemeanor, punishable by imprisonment, fine, or both.	93.8%	96.0%	93.4%	94.0%	88.9%
j. Radiographs and photographs of suspected child abuse require parental permission per state law.	88.0%	87.5%	88.6%	88.0%	84.7%
Test as a whole	*81.0%*	*83.1%*	*81.3%*	*79.0%*	*76.1%*

*108 surveys missing these questions were excluded from the data analysis.

presentation, particularly the many slides, attention to attribution, and participant handouts and other course materials were made. The in-depth examination was expected to be useful for making further refinements to the curriculum.

DISCUSSION AND RECOMMENDATIONS

Although there has been increasing research on intimate partner violence and other types of family violence and intervention by medical professionals, few studies have examined efforts to engage the dental community about their role and responsibilities through targeted educational programs. The authors' evaluation of DPAV is consistent with other studies indicating dentists and allied dental professionals who take such a course gain knowledge and confidence about identifying and appropriately responding in cases where abuse/violence in patients is suspected.[6,7]

DPAV generated a systematic change in how dental professionals viewed their role and responsibility relative to violence and neglect in their patients. All of the participants generally supported the proposition that mandated reporting was an appropriate intervention for the dental profession. They also supported training in this topic as a continuing education requirement. Because participants mostly correctly answered the post-test question "abusers/care providers may avoid the same physician, but return to the same dentist," implies an understanding among these participants that dental professionals can be in an excellent position to recognize suspected abuse/violence.

The authors' findings that awareness and confidence increased among course participants are consistent with the significant differences in knowledge gain after taking the course. The least amount of difference in self-reported knowledge before and after taking the course of how to recognize signs and symptoms of abuse/neglect probably reflected providers' belief that they already had a handle on this prior to the course. However, participants reported few numbers of patients in the previous six months where they actually suspected, referred somewhere for, and reported abuse/violence. (The number of cases regarding children was higher than for domestic partners and the elderly, perhaps reflecting a greater sensitivity to mandated reporting for child abuse or the proportion of that age group in the practices.)

Key areas of the curriculum that needed more focus by trainers included addressing legal immunity within the context of providers' fears about lawsuits; making clearer the magnitude of

TABLE 8

Evaluation of the Course, Full Sample, and by Profession

Item	Full Sample		Dentist		Allied		Other		Did Not Report	
	N	*M*	*n*	*M*	*n*	*M*	*n*	*M*	*n*	*M*
The presenter was knowledgeable.	1196	3.18	252	3.22	699	3.22	173	3.35	72	2.31
The presentation style/format was effective for learning.	1198	3.12	253	3.07	700	3.18	173	3.29	72	2.36
The course content was relevant for dental professionals.	1194	3.15	253	3.14	697	3.19	173	3.32	71	2.35
I learned information that was new to me.	1196	3.10	253	3.08	700	3.15	172	3.22	71	2.39
The course take-home materials will be useful to me.	1186	3.12	250	3.13	693	3.15	173	3.29	70	2.24
I learned information and skills I will implement in my practice.	1186	3.10	253	3.09	692	3.13	173	3.28	68	2.32
This course was worthwhile.	1194	3.13	253	3.10	697	3.18	173	3.34	71	2.31
Average for course evaluation items	*1199*	*3.13*	*253*	*3.12*	*701*	*3.17*	*173*	*3.30*	*72*	*2.34*

Note. Scale from 1 for "strongly disagree" to 4 for "strongly agree."

domestic/partner violence in society; and reviewing the required steps when child, adult, or elder abuse is suspected (i.e., report immediately by phone *then* file a written report within the specified number of days). As evidenced by these results, there is a common misbelief among dental and other health care professionals that one cannot be sued when there is immunity from liability, such as for mandated reporters, although that is not the case. Any provider can be sued by anyone, although no subsequent legal action occurs. Knowledge of this and other legal factors associated with mandated reporting needed to be more heavily emphasized in the curriculum.[8,9]

Similarly, future course participants may need to be reminded the incidence of domestic violence is much more common than people think, affecting one of every four families, not one of every 10 as falsely stated in the post-test question.

The participants' greater confidence about their ability to recognize clinical signs and symptoms of abuse and lesser comfort in asking patients about it directly also has important implications for the curriculum. Although sample assessment questions were included in the course curriculum, incorporating role playing into the training and creating scripts that can be practiced at home and used in the office, as suggested by some respondents, may be a good idea for bolstering the professionals' confidence in appropriately intervening when abuse is suspected.

The vast majority of respondents indicated they had no contact with patients in the prior six months who they believed might have been victims of abuse. Perhaps their memories were accurate, even without the benefit of having taken the course to aid in making these estimates. Following the course, dental professionals may have increased their vigilance and recognition skills, but it is not possible to know this or about other desirable practice changes. A follow-up attempt with the DPAV participants six months after taking the course was not successful (e.g., missing or inaccurate contact information, failure to respond to the faxed and e-mailed follow-up survey).

Overall, participants provided very positive feedback about the DPAV course and made constructive recommendations for improvements. We cannot explain the relationship between some participants' failure to indicate their profession and their consistently more negative opinions about the course — as well as their lower level of agreement about the appropriateness of mandated reporting for the dental profession. It may be that such individuals were unhappy about having to complete a survey/post-test or took the course under duress, which influenced their outlook about the course or evaluation topics. The value of the program and effectiveness of the course materials for learning was also corroborated by the key informants and the dental professionals who were trained as DPAV trainers.

The authors' findings also have wider implications for preservice dental education. The authors believe the full scope of the DPAV material should be formally integrated into the curricula of the five California dental schools, as well as the hygiene and assisting programs, as a fundamental part of the didactic instruction. While the dental schools have begun to teach some form of mandated reporter responsibility, it seems clear that raising students' awareness about the incidence of interpersonal violence, how to recognize signs and symptoms among their patients, and make appropriate referrals to community resources is essential for

engaging them early in understanding their unique role and carrying out their responsibilities. Interactive tutorials are one such model for significantly improving dental students' knowledge of and attitudes toward the topic.[10]

Having 21 trainers distributed statewide is a very powerful resource as local people are now available to initiate or respond to requests for trainings. Some of these trainers were educators so it is likely they will integrate the DPAV material into their teaching efforts. This training cadre will also continue to be a resource for information. Anecdotal information from trainers indicated that some have received follow-up telephone calls from course participants saying they had suspicious cases and/or were still not quite sure what their responsibilities were and asking for consultation. Other callers have requested additional information about specific course topics or materials.

There were other noteworthy ripple effects attributable to DPAV and the grant funding. Two issues of the *Journal of the California Dental Association* (May and April 2004) dedicated to the topic were a result as was publication of *Enhancing Dental Professionals' Response to Domestic Violence*, a six-page folio published by the National Health Resource Center on Domestic Violence.[11] Also of significance is the recent approval by the California Dental Board that mandatory reporter laws, as they relate to dental professionals, will be included in the required California Dental Practice Act continuing education program; DPAV is the model for this portion of the CDPA curriculum.

Several study limitations must be noted. Effectively evaluating the impact of this training program would have been greatly enhanced by the ability to measure changes in reported incidences of abuse and neglect, particularly in counties where the greatest concentration of training participants came from. However, abuse/neglect data are not available in California by type of mandated reporter such as dentists despite reporting forms that contain "occupation" (e.g., Report of Suspected Dependent Adult/Elder Abuse, Soc. 341) or "title/reporter category" (e.g., Suspected Child Abuse Report, SS 8572) of the reporter. Conversations with officials in the California Attorney General's Office Crime and Violence Prevention Center, California Department of Social Services Office of Child Abuse Prevention, Department of Justice, and a county district attorney's office confirmed this lack of baseline data. Given the large number of dental providers who were reached with this program — and the recent addition to the California Dental Practice Act training program — it is likely the reported cases of suspected neglect and abuse by dental professionals will increase. However, this information will not be available to future evaluations unless the data on occupation of reporter is collected and available from an appropriate state agency. A second limitation was our inability to follow up six months later with a sufficient number of participants, making it difficult to generalize, and limiting the findings about the program's longer-term impact.

THERE IS A COMMON misbelief among dental and other health care professionals that one cannot be sued when there is immunity from liability.

While most awareness has commonly stopped at the child abuse problem, DPAV served to enlighten dental professionals about the broader problem of elder/dependent adult and intimate partner violence and their role in recognizing and stopping the cycle of abuse. Future support should be available to continue the momentum created by this important program in beginning to change dental practice. ■■■■

REFERENCES

1. Ochs HA, Neuenschwander MC, Dodson TB, Are head, neck and facial injuries markers of domestic violence? *J Am Dent Assoc* 127(6):757-61, June 1996.
2. Gwinn C, McClane GE, et al, Domestic violence: no place for a smile. *J Calif Dent Assoc* 32(5):399-407, May 2004.
3. Sweet DJ, Recognizing and intervening in domestic violence: proactive role for dentistry. *Medscape: Women's Health* 1(6):3, June 1996.
4. Little K, Family violence: an intervention model for dental professionals. Office of Justice Programs, Partnerships for Safer Communities, December 2004, www.ojp.usdoj.gov (Accessed June 14, 2007).
5. Mitchell C, Dental professionals against violence: a curriculum review. Work commissioned by the California Dental Association Foundation, October 2005.
6. Short S, Tiedemann D, Rose DE, Family violence; an intervention model for dental professionals. *Northwest Dent* 76(5):31-5, September-October 1997.
7. Hsieh NK, Herzig K, et al, Changing dentists' knowledge, attitudes and behavior regarding domestic violence through an interactive multimedia tutorial. *J Am Dent Assoc* 137(5):596-603, May 2006.
8. Lough P, Mandated reporting of child abuse: answers for dentists. *J Calif Dent Assoc* 32(4):307-11, April 2004.
9. Glassman PD, Chavez EM, Hawks D, Abuse and neglect of elderly individuals: guidelines for oral health professionals. *J Calif Dent Assoc* 32(4):323-30, April 2004.
10. Danley D, Gansky SA, et al, Preparing dental students to recognize and respond to domestic violence: impact of a brief tutorial. *J Am Dent Assoc* 13(1):67-73, January 2004.
11. Enhancing dental professionals' response to domestic violence. National Health Resource Center on Domestic Violence, www.endabuse.org/health (Accessed June 14, 2007).

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Overdose, Adverse Effects, and Safety of Oral Medications

SHAHROKH C. BAGHERI, DMD, MD; MEHRAN MEHRABI, DMD, MD; HUSAIN ALI KHAN, DMD, MD; AND DEEPAK KADEMANI, DMD, MD

ABSTRACT Overdose of oral medications can be a major concern. This article reviews the clinical presentations, toxic dosages, adverse effects, and the recommended treatments for the most commonly used oral medications in dentistry.

Clinicians need to be aware of the toxicities and adverse effects of the most commonly used oral medications, and recognize the signs and symptoms as early as possible for expedient treatment and referral.

AUTHORS

Shahrokh C. Bagheri, DMD, MD, is in private practice, Atlanta Oral and Facial Surgery, Atlanta, and a clinical assistant professor of surgery at Emory University, Division of Oral and Maxillofacial Surgery, in Atlanta.

Mehran Mehrabi, DMD, MD, is an oral and maxillofacial surgeon stationed with the United States Air Force Base in Biloxi, Miss.

Husain Ali Khan, DMD, MD, is in private practice, Atlanta Oral and Facial Surgery, Atlanta.

Deepak Kademani, DMD, MD, is an assistant professor of oral and maxillofacial surgery, Mayo Clinic, Rochester, Minn.

Pharmacological treatment is a major modality of therapy in dentistry. Not surprisingly, overdose of oral medications can be a major concern. Antibiotics, analgesics and anxiolytics are the most commonly used oral medications in dentistry, the latter two being common causes of adult hospital admissions in the United States.[1] This article outlines the clinical presentations, adverse effects, toxic dosages, and the recommended treatments for commonly encountered oral medications in dentistry.

In the United States there are many systemic analgesics almost all of which contain aspirin, acetaminophen, ibuprofen, or other nonsteroidal anti-inflammatory drugs, or a combination of these agents with other ingredients including opioids. Clinicians frequently recommend or prescribe these medications based on their training or experience. One can safely assume the public is confused and overwhelmed with the tremendous oversupply of such medications.

Prescription anxiolytic medications such as benzodiazepines are relatively safe; however, the margin of safety is clearly decreased when combined with other medications or readily available agents such as ethanol. Antibiotics are uncommonly associated with overdosage, and the lethal dose of most antibiotics are not established. However, mild hypersensitivity reactions are commonly encountered in the dental practice, and even life-threatening anaphylaxis can occur.

It is important for dental professionals to be familiar with the clinical presentations and toxicity of the most commonly encountered oral medications, and provide adequate recommendations for treatment in cases of suspected toxicity.

Analgesics

The toxic effects of NSAIDs are usually as a result of prolonged exposure presenting with acute or chronic systemic manifestations such as renal failure,

gastrodeuodenal damage, and colitis.[2,3] Acute overdoses are usually mild and self-limited.[4] NSAIDs are widely used in the treatment of dental pain and chronic temporomandibular joint disorders. In 1989 the Food and Drug Administration required all NSAID bottles to have special warnings regarding potential gastrointestinal and bleeding complications.

The toxic dosage of most NSAIDs is not available and our toxicological knowledge is predominantly based on single acute case reports of massive overdosage or chronic exposures. The most frequently used nonopioid analgesics in dentistry include acetaminophen, ibuprofen, and naproxen. Nonprescription aspirin remains in common use. After an acute ingestion of 20 grams of ibuprofen, which is equivalent to 100 ibuprofen tablets 200 mg each (more than seven times the maximum recommended daily dose), a 48-year old man developed profound metabolic acidosis and coma but subsequently survived.[5] Symptoms are mostly gastrointestinal (nausea, vomiting, epigastric pain, abdominal pain), but can include tinnitus or in more severe cases renal failure. In one large series of 1,033 inquires regarding ibuprofen ingestion, 705 (65 percent) of patients were asymptomatic; 199 (18 percent) experienced mild symptoms; and 23 (2 percent) experienced moderate symptoms.[6] Ibuprofen fatalities have been mostly reported in children.[6] Fortunately, the incidents have decreased, and it is attributed to the development of child-resistant bottles.[7]

The toxic effects of naproxen are similar to ibuprofen. A 25 gram adult naproxen overdose (38 times the maximum daily dosage) produced only transient nausea and indigestion.[8] Renal failure and severe metabolic acidosis with seizures are also reported with naproxen overdose.[9,10] Ibuprofen and naproxen overdose are not uncommon, but serious toxic effects are unusual.

Aspirin and nonaspirin salicylates overdosage and fatalities have been widely documented.[11] Salicylates were the most common agent responsible for single drug deaths in Ontario, Canada, from 1984 to 1986.[12] Acute toxicity is usually seen in young suicidal adults with a mortality rate of about 2 percent.[13] In addition,

IT IS IMPORTANT
for dental professionals to be familiar with the clinical presentations and toxicity of the most commonly encountered oral medications.

the use of aspirin during pregnancy has been associated with increased risk of congenital defects, neonatal hemorrhage, and other metabolic abnormalities.[14-16] In the study by McGuigan, the presentation of patients on arrival to the emergency services were variable ranging from dead (31 percent) or comatosed (22 percent), to alert but symptomatic (45 percent).[12] The consequences of acute overdose are systemic (respiratory alkalosis, metabolic acidosis) and can prove fatal by ingestion of as little as 2 grams to 4 grams by children, or 10 grams to 30 grams by adults.[17] Bronchospasm is also a known complication of aspirin in patients with asthma or airway hypersensitivity.

This is particularly seen in a condition known as Samter's triad (asthma, aspirin sensitivity, and nasal polyposis). The etiology consists of inhibition of the enzyme cyclooxygenase 1 and subsequent overactivation of the lipooxygenase pathway. This results in an increased production of leukotriene B4, C4, and D4.[18-20] The primary etiologic agent is the release of leukotriene C4 by bronchial mast cells and inflammation of nasal polyps resulting in obstructive airway disease due to bronchospasm.

Clinically large acute overdoses of nonsalicylate NSAIDs only produces mild gastrointestinal upset and central nervous system depression. Effective treatments include emesis within several hours postingestion or administration of activated charcoal immediately postingestion.[13]

Acetaminophen is the most widely used and recommended nonprescription analgesic and antipyretic medication in the United States.[21] In the last three decades it has gained popularity with emphasis placed on its reduced gastrointestinal side effects when compared to NSAIDs. Acetaminophen-induced hepatic necrosis is well-documented and occurs after ingestion of massive doses.[22,23,13] The drug is metabolized almost entirely by the liver glucuronide conjugation and hepatic microsomal enzyme pathway.[17] However, a small amount of the drug is metabolized via N-acetyl-p-benzoquinoneimine, NAPQI, which is a toxic intermediate that causes hepatocellular necrosis. At therapeutic doses, NAPQI is rapidly conjugated by hepatic glutathione and excreted, while at toxic doses glutathione stores are depleted with subsequent accumulation of NAPQI, resulting in oxidative damage and hepatocellular necrosis. Drugs that are metabolized by the alternative liver cytochrome P450 oxidation pathway such as cimetidine, ranitidine, and codeine do not affect the metabolism of acetaminophen.[6,24,25] Conversely, ethanol and barbiturates potentiate acetaminophen hepatotoxicity, probably by utilizing the

hepatic microsomal enzyme system.[26]

The maximum daily recommended dose of acetaminophen in adults is 4 grams and 75 mg/kg in children. The adult lethal dose ranges from 13 to 25 grams (26 to 50 tablets of 500 mg each); however, hepatotoxicity can be seen with ingestion of as little as 5 grams, especially when the liver metabolic pathway is compromised by the abuse of other substances such as ethanol or barbiturates.[13] The first reported case of acetaminophen fatality was in 1966.[22] Fatalities after acute acetaminophen overdose have been well-documented.[27,28]

As clinicians, dentists need to be aware of the delayed onset of clinical symptoms even after ingestion of lethal doses of acetaminophen. Symptoms may not be apparent until three to five days postingestion with development of fulminate hepatic necrosis, encephalopathy, coma, and subsequent death. If the damage done to the hepatocytes is reversible complete resolution of hepatic function can occur. A patient may continue to self-treat dental pain by ingestion of greater amounts without being aware of the progressive liver damage. It is important to carefully question the patient on the exact dosage and chronology of self-medication, and have a low threshold of immediate referral to an emergency room for subsequent treatment. Emergency treatment constitutes of determination of plasma acetaminophen levels, gut decontamination, and administration of the antidote N-Acetylcystine and/or activated charcoal.

Several prescription oral narcotics are available on the market (codeine, hydrocodone, oxycodone), the majority of which are structurally similar of morphine and therefore, have potential for abuse and the development of tolerance. Patients with toxic overdose can present with a range of symptoms including decrease in body temperature, respiratory depression, hypotension, constipation, euphoria, stupor, and pinpoint pupils. Fatal intoxications resulting from ingestion of these medications alone are rare. A recent study of postmortem databases from the medical examiners' and coroners' (ME/C) offices in 23 states over a five-year period revealed that of the 919 drug abuse cases, the vast majority (N=889, 96.7 percent) were multiple drug abuse deaths.[29] Lethal doses of most narcotics are not well-established. However, the symptoms of narcotic overdose need to be addressed promptly since they are frequently coingested with other agents that can drastically increase the toxicity. The effect of opioids can be rapidly and effectively reversed with the opioid antagonist naloxone. Fatalities and poisonings with ingestion of preparations that combine narcotics with acetaminophen or aspirin are documented.[30,31]

ACETAMINOPHEN-induced hepatic necrosis is well-documented and occurs after ingestion of massive doses.

While there is no magic combination, it has been found that the combination of an opioid and a NSAID, or acetaminophen are not only more efficacious but also reduce the prevalence of side effects compared to higher doses of individual drugs given to achieve the same analgesic effect.[32-35]

Benzodiazepines

Benzodiazepines are potent anxiolytic and hypnotic agents with anticonvulsant and muscle relaxant properties, commonly prescribed in dentistry for the treatment of dental anxiety prior to procedures and for the treatment of myofascial pain dysfunction. There appears to be a large number of people who use benzodiazepines chronically and a significant amount of abuse/nonmedical use is evident.[36] In 2005, McCabe published a survey correlating the nonmedical use of prescription benzodiazepine anxiolytics in a cohort of U.S. college students. They reported that the lifetime prevalence of nonmedical prescription benzodiazepine anxiolytic use was 7.8 percent; past year prevalence was 4.5 percent; and past month was 1.6 percent.[37]

Caution must be taken when prescribing benzodiazepines for the treatment of chronic temporomandibular disorders or MPD. Abuse and dependence with benzodiazepines is well-established. In 1991, an estimate of 50,792 reports of abuse involving anxiolytics (mostly alprazolam and diazepam) was reported.[38]

The lethal dose of benzodiazepines has not been established. Death from oral administration of benzodiazepines alone is very uncommon; however, their toxicity is synergistically increased when taken in combination with other toxicologic agents such as ethanol.[39,40] In one case, a healthy male fully recovered after ingesting 2 grams of diazepam (200 to 1,000 times the recommended dose for sedation) and required only observation.[41] Two individuals who attempted suicide with alprazolam also recovered with minimal clinical manifestations of toxicity after oral ingestion of 30 mg and 60 mg, respectively (therapeutic dose is 0.25 to 1.0 mg/tid).[42]

Most overdose patients require only observation in a health care facility and

consideration for psychiatric counseling. Acutely, the sedative effects of diazepam can be reversed with the shorter acting benzodiazepine antagonist flumazenil.

Ethanol

A discussion of ethanol is included in this article because of the potential hazards of simultaneous alcohol abuse and the already mentioned medications. Ethanol is a central nervous system depressant with preferential suppression of inhibitory neurons causing the excitation seen at low ethanol concentrations. The degree of neurologic impairment is dependent on many variables including coingestion of other drugs. The lethal dose is reported to be 5 to 8 g/kg for adults and 3 g/kg in children.[13] In a healthy 70-kg male, this would translate into approximately an acute dose of 1,250 ml of vodka (40 percent ethanol); 4,200 ml of wine (12 percent ethanol); or 12.5 liters of beer (4 percent ethanol). Therefore, it becomes very uncommon for fatalities to occur exclusively from elevated ethanol concentrations, but rather occur due to accidents secondary to neurologic impairment. In addition, alcoholics who consume large amounts of ethanol develop tolerance and subsequently require larger quantities of the agent to produce similar toxic effects.[43]

The adverse interactions of alcohol with the most commonly used medications is well-documented. An additive effect with increased gastrointestinal bleeding is observed with salicylates and other NSAIDs.[44] The increased bleeding time observed with ingestion of NSAIDs can be exaggerated when compounded by thrombocytopenia and decreased liver coagulation factors seen in alcoholic cirrhosis. The increased production of toxic metabolites in chronic alcohol abuse can lead to increased acute hepatotoxicity with the consumption of acetaminophen, decreasing the toxic dose.[45,46] A synergistic increase in central nervous system depression is seen with the use of benzodiazepines, causing potentially dangerous levels of sedation.[39,40]

Alcohol is the most commonly abused CNS depressant in the world. It is more prevalent among men in lower socioeconomic groups; however, it cuts across all ethnic, cultural, educational, and geographical boundaries.[47] The need to be aware of the potential increased side effects of commonly prescribed medications when a positive history of alcohol abuse is apparent.

MOST OVERDOSE patients require only observation in a health care facility and consideration for psychiatric counseling.

Antibiotics: The Penicillins and Clindamycin

Penicillin was discovered by Fleming in 1928, but was not commercialized until World War II. This low-cost, age-proven, and highly efficacious agent against oral pathogens is the most commonly prescribed antimicrobial in dentistry.[48-50] Compared to other antibiotics, it has a low side effect profile making it very attractive to clinicians and patients. The toxic dose of oral penicillin is not established and toxicity is uncommon, even with ingestion of quantities well above the therapeutic dose.

The usual adult dose of oral penicillin V is 1-2 grams/day in divided doses (25 to 50 mg/Kg in children), with an effective maximum dose of 4 grams/day. The peak plasma concentration following oral dose is reached in 30 minutes to one hour.

The majority of penicillin is eliminated via the kidneys with a half-life of 30 minutes to one hour. In patients with renal failure, the half-life is drastically increased to 12 hours to 20 hours, and a higher dose is achieved rapidly. Lethal doses of the penicillin and other beta lactams are not established. There are no established doses or blood levels consistent with the development of toxic clinical manifestation such as myoclonic seizures. Both recent and historic reports of seizure activity with the use of massive amounts of intravenous beta lactam antibiotics are available, however; the authors found no reports with oral administration.[51,52]

The hypersensitivity observed with penicillins is not dose-dependent. Fortunately, the feared Immunoglobulin E (IgE) mediated anaphylactic reactions to penicillins are uncommon, occurring in less than 20 per 10,000 courses of treatment with a fatality of 1 per 100,000, usually secondary to intravenous administration.[53] This life-threatening reaction is initiated with the release of histamine from mast cells secondary to binding of penicillin metabolites to the IgE receptors on mast cells. This results in increased bronchial secretion, edema, and subsequent respiratory distress accompanied by generalized vasodilatation and hypotension. This condition untreated can result in respiratory and cardiovascular arrest and subsequent death. A milder hypersensitivity manifesting as a skin rash may be present in as many as 10 percent of population.[54,55] This is

also far more common with intravenous routes compared to oral administration.

Lincomycin, the parent substance leading to the development of clindamycin was discovered in 1962 in Lincoln, Neb. The dose range of oral clindamycin for the treatment of odontogenic infections is 150 mg to 450 mg three times a day (pediatric dose 8 to 20 mg/kg/day). It has a half-life of three hours and it is cleared via the renal and hepatic pathways. Patients with renal and/or hepatic diseases will have an increased bioavailability and half-life. Toxic dosages for humans remains to be determined. However, convulsions, depression, and death have been reported in mice receiving intravenous administration of 855 mg/kg, and death has been reported in rats receiving oral administration of 2618 mg/kg of clindamycin.[56]

Clindamycin is a broad spectrum antibiotic with greater coverage compared to penicillin. This high spectrum of antibiotic coverage is also responsible for its most feared side effect: pseudomembranous colitis.[57] This condition is not exclusive to clindamycin, and can be seen with any broad spectrum antibiotic such as cephalosporins (a common causative agent), or extended spectrum penicillins such as amoxicillin. Also, pseudomembranous colitis needs to be differentiated from antibiotic-associated diarrhea, which is far more common. In pseudomembranous colitis, loss of normal flora will allow for selective growth of clostridium difficile, the bacteria responsible for the production of the toxin. The symptoms include fever, abdominal pain and cramps, leukocytosis, along with a green-colored diarrhea, or blood in the stool.

Pseudomembranous colitis is confirmed by a clostridium difficile toxin enzyme linked immunoassay or tissue culture assay. Upon confirmation, clindamycin should be discontinued and the patient referred to a physician for treatment with metronidazole or oral vancomycin. The frequency of pseudomembranous colitis with clindamycin has been reported as 0.1 percent to 10 percent of cases, and is found to be dose-independent with both oral and intravenous administrations.[58,59] Diarrhea without pseudomembranous features is also seen in 2 percent to 20 percent of patients.[60] Therefore, development of diarrhea is not synonymous with pseudomembranous colitis.

PSEUDOMEMBRANOUS colitis needs to be differentiated from antibiotic-associated diarrhea, which is far more common.

Conclusion

In this brief article, the authors reviewed the overdose, adverse effects, toxicities, and characteristics of the most commonly used oral medications in the dental practice. Careful patient history and a high index of suspicion are essential to identify patients at risk. General knowledge of the toxic doses and recognition of symptoms of these medications will allow for expedient referrals and treatment of patients.

TABLE 1 summarizes the commonly prescribed oral medications in the dental practice, their therapeutic, toxic and/or lethal doses, along with the symptoms, and recommended treatment. ■■■■

REFERENCES

1. Meredith TJ, Epidemiology of poisoning. *Pharmacol Ther* **59:**251-6, 1993.

2. Loeb DS, Ahlquist DA, Talley NJ, Management of gastroduodenopathy associated with use of nonsteroidal anti-inflammatory drugs. *Mayo Clin Proc* 67:354-64, 1992.

3. Jick H, Rodriguez LAG, Risk of upper gastrointestinal bleeding and perforation associated with individual nonsteroidal anti-inflammatory drugs. *Lancet* 343:769-72, 1994.

4. Court H, Volans GN, Poisoning after overdose with nonsteroidal anti-inflammatory drugs. *Adverse Drug React Acute Poisoning Rev* 3:1-21, 1984.

5. Lee CY, Finkler A, Acute intoxication due to ibuprofen overdose. *Arch Pathol Lab Med* 110:747-9, 1986.

6. Halperin SM, Fitzpatrick R, Volans GN, Ibuprofen toxicity. A review of adverse reactions and overdose. *Adverse Drug React Toxicol Rev* 12:107-28, 1993.

7. Litovitz T, Manoguerra A, Comparison of pediatric poisoning hazards: an analysis of 3.8 million exposure incidents: a report from the American association of poison control center. *Pediatrics* 89:999-1005, 1992.

8. Fredell EW, Strand LJ, Naproxen overdose. *JAMA* 238(9):938, August 1977.

9. Kulling PE, Backman EA, Skagius AS, Renal impairment after acute diclofenac, naproxen, and sulindac overdoses. *Clin Toxicol J Toxicol* 33:173-7, 1995.

10. Martinez R, Smith D, Frankel L, Severe metabolic acidosis after acute naproxen sodium ingestion. *Ann Emerg Med* 18:1102-4, 1989.

11. McGuigan MA, Death due to salicylate poisoning in Ontario. *Can Med Assoc J* 135:891-4, 1986.

12. McGuigan MA, A two-year review of salicylate deaths in Ontario. *Arch Intern Med* 147:510-2, 1987.

13. Ellenhorn MJ, Schonwald S, et al, Ellenhorn's Medical Toxicology: diagnosis and treatment of human poisoning, second edition. Williams and Wilkins, Baltimore, Md., 1997.

14. Zierler S, Rothman KJ, Congenital heart disease in relation to maternal use of Bendectin and other drugs in early pregnancy. *N Engl J Med* 313:347-52, 1985.

15. Heinonen DP, Slone D, Shapiro S, Birth defects and drugs in pregnancy. Publishing Science Corp., Littleton, Mass., 1977.

16. Buck ML, Grebe TA, Bond GR, Toxic reaction to salicylates in a newborn infant: similarities to neonatal sepsos. *J Pediatr* 122:955-8, 1993.

17. Kumar V, Cotran RS, Robbins SL, Basic Pathology, fifth edition. Sauders, Philadelphia, Penn., page 229, 1992.

18. Shore, SA, Austen, KF, Drazen, JM, Lung biology in health and disease: lung cell biology. In: eicosanoids and the lung; L'Enfant C, Massaro D (eds), Marcel Dekker, Inc, New York, 1989.

19. Laitinen LA, Laitinen A, et al, Leukotriene E4 and granulocytic infiltration into asthmatic airways. *Lancet* 341(8851):989-90, April 17, 1993.

20. Cai Y, Bjermer L, Halstensen TS, Bronchial mast cells are the dominating LTC4S expressing cells in aspirin-tolerant asthma. *Am J Respir Cell Mol Biol* 29(6):683-93, December 2003; E-pub June 19, 2003.

21. Rose SR, Subtleties of managing acetaminophen poisoning. *Am J Hosp Pharm* 51:3065-8, 1994.

22. Davidson DGD, Eastham WN, Acute liver necrosis following overdose of paracetamol. *Br Med J* 2:497-9, 1966.

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TABLE 1

Most Commonly Encountered Oral Medications in the Dental Practice

	Daily Therapeutic Dose	Toxic/Lethal Dose	Clinical Symptoms of Overdose	Treatment
ANALGESICS				
Aspirin	40-60 mg/kg/day	LD 0.07-0.1g/Kg	Vomiting, hyperapnea, tinnitus, lethargy, coma, seizures, death	Induced emesis if in first 3 hrs. Activated charcoal, alkalinize urine, hemodyalisis
Ibuprofen	3200 mg (maximum daily recommended dose)	LD Unknown LD_{50} rat 1g/kg	Dizziness, nausea, vomiting, tinnitus, epigastric pain, coma, renal failure	Supportive care. Treat seizures and hypotention, activated charcoal, induced emesis, gastric lavage in massive OD
Naproxen	1500 mg (maximum daily recommended dose)	LD Unknown LD_{50} rat 543 mg/kg LD_{50} dogs >1g/kg	Dizziness, nausea, vomiting, tinnitus, epigastric pain, edema, diarrhea, headache	As above
Celecoxib	400 mg (maximum daily recommended dose)	Unknown	Abdominal pain, flatulence, diarrhea, dyspepsia, nervousness, tinnitus, rash	As above
Acetaminophen	4000 mg (maximum daily recommended dose)	LD 13-25g Toxic dose 5-15 g	Early: None or minor GI symptoms 24-72 hrs: Encephalopathy, ARF, liver failure, coma, death	Activated charcoal, N-Acetylcystine, induced emesis, dialysis
NARCOTICS				
Codeine	Not to exceed 360 mg in 24 hrs. Usually 60 mg q 6 hours. Can develop tolerance	LD_{LO} 5 mg/kg LD rat 600 mg/kg Estimated fatal dose in humans is 1.5 g	Decreased temperature, respiration and blood pressure. Euphoria, stupor, pinpoint pupils, death	Supportive care /ACLS Naloxone
Hydrocodone	Usual oral dose: 5-10 mg q 6 hrs. Can develop tolerance	Unknown	As above	Supportive care /ACLS Naloxone
Oxycodone	Usual oral dose: 5-10 mg q 6 hrs. Can develop tolerance	Unknown	As above	Supportive care /ACLS Naloxone
BENZODIAZEPINES				
Diazepam	For anxiety 2-10 mg PO bid to qid.	LD_{LO} 50 mg/kg	Respiratory depression, lethargy, drowsiness, cardiovascular collapse, bradycardia, death	Supportive care/ACLS Flumazenil
Alprazolam	Therapeutic dose is 0.25-1 mg	Unknown	Respiratory depression, lethargy, drowsiness, cardiovascular collapse, bradycardia, death	Supportive care/ACLS Flumazenil
Triazolam	Therapeutic dose is 0.125-0.25 mg per day. Maximum dose is 0.5 mg/day	Unknown	Respiratory depression, lethargy, drowsiness, cardiovascular collapse, bradycardia, death	Supportive care/ACLS Flumazenil

TABLE 1 CONT.

Most Commonly Encountered Oral Medications in the Dental Practice

	Daily Therapeutic Dose	Toxic/Lethal Dose	Clinical Symptoms of Overdose	Treatment
ANTIBIOTICS				
Penicillin	Effective maximum dose of 4g/day	LD unknown Toxic P.O. dose unknown Toxic dose for IV penicillin: 10 million units/d or CSF>5 mg/L	Seizure with single high dose (IV) or chronic excessive doses in patients with renal failure	Supportive care/ACLS Treat seizures as needed
Amoxicillin	Effective maximum dose 3g/day	Unknown	Minimal with acute oral overdose Acute renal failure caused by crystal deposition in excessive IV administration	Supportive care/ACLS Treat ARF as needed
Clindamycin	600-1800 mg/day in divided doses	Unknown	Minimal with acute oral overdose Hypotension and cardiopulmonary arrest reported after rapid IV administration	Supportive care/ACLS

ACLS: Advanced cardiac life support

ARF: Acute renal failure

GI: Gastrointestinal

LD: Lethal dose

LD_{50}: Lethal dose IN 50 percent of the population

LD_{LO}: Lowest lethal dose

OD: Overdose

23. Black M, Acetaminophen hepatotoxicity. *Gastroenterology* 78(2):382-92, 1980.

24. Downie A, Ali A, Bell D, Severe metabolic acidosis complicating massive ibuprofen overdose. *Postgrad Med J* 69:575-7, 1993.

25. Kim J, Gazarian M, Johnson D, Acute renal failure and ibuprofen overdose: a pediatric case report. *Vet Hum Toxicol* 35:340, 1993.

26. McClain CJ, Kromhout JP, et al, Potentiation of zcetaminophen hepatotoxicity by alcohol. *JAMA* 244(3):251-3, 1980.

27. Clark R, Thompson RPH, et al, Hepatic damage and death from overdose of paracetamol. *Lancet* 1:66-70, 1973.

28. Canalese J, Gimson AES, et al, Factors contributing to mortality in paracetamol-induced hepatic failure. *Br Med J* 282:199-201, 1981.

29. Cone EJ, Fant RV, et al, Oxycodone involvement in drug abuse deaths: a DAWN-based classification scheme applied to an oxycodone postmortem database containing over 1000 cases. *J Anal Toxicol* 27(2):57-67, 2003.

30. Balikova M, Maresova V, Fatal opiates overdose. Toxicological identification of various metabolites in a blood sample by GC-MS after silylation. *Forensics Sci Int* 94(3):201-9, 1998.

31. Gerostamoulous J, Burke MP, Drummer OH, Involvement of codeine in drug-related deaths. *Am J Forensic Med Pathol* 17(4):327-35, 1996.

32. Dionne R, Berthold C, Therapeutic uses of nonsteroidal anti-inflammatory drugs in dentistry. *Crit Rev Oral Biol Med* 12:315-30, 2001.

33. Wideman GL, Keffer M, et al, Analgesic efficacy of a combination of hydrocodone and ibuprofen in postoperative pain. *Clin Pharmacol Therapy* 65:66-76, 1999.

34. Giles AD, Hill CM, et al, A single-dose assessment for ibuprofen/codeine combination in postoperative dental pain. *Int J Oral Maxillofac Surg* 15(6):727-32, 1986.

35. Cooper SA, Engle J, et al, Analgesic efficacy of an ibuprofen-codeine combination. *Pharmacotherapy* 2:162-7 1982.

36. Juergens SM, Benzodiazepines and addiction. *Psychiatr Clin North Am* 16(1):75-86, March 1993.

37. McCabe SE, Corrlelates of nonmedical use of prescription benzodiazepine anxiolytics: results from a national survey of U.S. college students. *Drug Alcohol Depend* 79(1):53-62, 2005.

38. National Institute on Drug Abuse, Annual Emergency Room Data 1990, Series I Number 10A: data from the Drug Abuse Warning Network (DAWN) (1991). National Institute in Drug Abuse, Rockville, Md., 1991.

39. Greenbalat DJ, Allen MD, Noel BJ, Acute overdose with benzodiazepine derivatives. *Clin Pharmacol Ther* 21:497-514, 1977.

40. Serfaty M, Masterton G, Fatal poisonings attributed to benzodiazepines in Britain during the 1980s. *Br J Psychiatry* 163:386-93, 1993.

41. Greenblatt DJ, Woo E, et al, Rapid recovery from massive diazepam overdose. *JAMA* 240:1872-4, 1978.

42. McCormick SR, Nielsen J, Jatlow PI, Alprazolam overdose: clinical findings and serum concentrations in two cases. *J Clin Psychiatry* 46(6)247-8, June 1985.

43. Perper JA, Twerski A, Wienand JW, Tolerance at high blood alcohol concentrations: a study of 110 cases and a review of the literature. *J Forensic Sci* 31:212-21, 1986.

44. Rossof IS, Encyclopedia of clinical toxicology. A comprehensive guide and reference. Parthenon Publishing, New York, 2002.

45. Maddrey WC, Hepatic effects of acetaminophen-Enhanced toxicity in alcoholics. *J Clin Gastroenterol* 9:180-5, 1987.

46. Schiodt FV, Rochling FA, et al, Acetaminophen toxicity in an urban county hospital. *N Eng J Med* 337(16):1112-7, October 1997.

47. Waldinger RJ, Psychiatry for medical students, second edition. Washington, D.C., American Psychiatric Press, p.417, 1990.

48. Epstein JB, Chong S, Le ND, A survey of antibiotic use in dentistry. *J Am Dent Assoc* 131:1600-9, 2000.

49. Karlowsky J, Ferguson J, Zhanel G, A review of commonly prescribed oral antibiotics in general dentistry. J Can Dent Assoc 59(3):292-4, 297-300, 1993.
50. Owens BM, Schuman NJ, Antibiotics and dentistry: a brief review. *J Clin Ped Dent* 18(2):129-34, Winter 1994.
51. Bassilios N, Restoux A, et al, Pipercillin/tazobactam-inducing seizure in a hemodialysed patient. *Clin Nephrol* 58(4):327-8, 2002.
52. Bloomer HA, Barton LJ, Maddock RJ Jr., Penicillin-induced encephalopathy in uremic patients. *JAMA* 200:121, 1967.
53. Idsoe O, Gothe T, et al, Nature and extent of penicillin side reactions with particular reference to fatalities from anaphylactic shock. *Bull World Health Organ* 38:159, 1968.
54. Gadde J, Specene M, et al, Clinical experiences with penicillin testing in a large inner city STD clinic. *JAMA* 270(20):2456-63, Nov. 24, 1993.
55. Chiu AM, Kelly K, Anaphylaxis: drug allergy, insect stings, and latex. *Immunol Allergy Clin North Am* 25(2):389-405, May 2005.
56. McEvoy GK, et al (ed). American Hospital Formulary Service, drug information. American Society of Health-System Pharmacists, Bethesda, Md., 2004.
57. Bennett JE, Dolin R. *Principles and Practice of Infectious Disease*, sixth ed., Churchill Livingstone, 2004.
58. Aldridge KE, Gelfand M, et al, A five-year multicenter study of the susceptibility of the Bacteroides fragilis group isolates to cephalosporins, cephamins, penicillins, clindamycin, and metronidazole in the United States. *Diagn Microb Infect Dis* 18:235-41, 1994.
59. Tedesco FJ, Clindamycin and colitis: a review. *J Infect Dis* 135(Suppl):S95-S98, 1977.
60. Chambers HF, Antimicrobial agents: protein synthesis inhibitors and miscellaneous agents. In Hardman JG, Limbird LE (ed), Goodmand and Gilman's The pharmacological basis of therapeutics, 10th edition, New York, 2001.

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Anticaries Effectiveness of a Fluoride and Nonfluoride Sealant

STANLEY B. HEIFETZ, DDS, MPH; ABRAHAM YAARI, DMD, MS; AND HOWARD PROSKIN, PHD

ABSTRACT This study compares the retention and anticaries effect of a fluoride and nonfluoride sealant. Two hundred and ninety-four children were divided into two groups. Participants had sealants applied to their first molars. Examinations were conducted after a mean retention of 1¼ years. Mean occlusal retention for both groups was 75 percent. Both groups showed extremely low DMF. The lack of any measurable decay compromised the study's ability to detect any enhanced protection from the fluoride sealant.

AUTHORS

Stanley B. Heifetz, DDS, MPH, clinical professor, Division of Disease Prevention Health Promotion and Epidemiology, University of Southern California, School of Dentistry.

Abraham Yaari, DMD, MS, associate professor, Division of Disease Prevention Health Promotion and Epidemiology, University of Southern California, School of Dentistry.

Howard M. Proskin, PHD, is president of Howard M. Proskin & Associates Inc., Rochester, N.Y.

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A successful fluoride-containing sealant should meet the requirements of retention comparable or superior to that of conventional nonfluoride sealants, and of constant release of low levels of fluoride for a prolonged period of time. Such ambient fluoride exposure would prove most effective in conferring anticaries benefits.[1] Clinical studies have reported similar rates of retention for a fluoride and nonfluoride sealant, but the latter has not been compared with its chemical analogue.[2]

In vivo findings of the cariostatic effect of fluoride sealants on enamel have shown reduced depth of artificial lesions and decreased enamel solubility.[3,4] However, results of the few clinical trials of the anticaries effects of fluoride sealants have been less than encouraging.[3] The addition of fluoride to a sealant may offer a caries preventive advantage or, as Simonsen has opined, may have more of a marketing than clinical benefit.[5]

The present investigation was initiated to evaluate the retention and effectiveness of Delton Plus, a fluoride sealant, compared with Delton, its nonfluoride analogue, when included in an ongoing school-based preventive dentistry program. Interim results on retention after eight months of study have been published.[6] Abstracts of final results after 1¼ years on retention and anticaries effects have been presented at IADR and AADR meetings.[7,8] Final results of the study are presented in this report.

Methods

For the past two decades, the University of Southern California, School of Dentistry, has been conducting a mobile clinic sealant program to improve the dental health of children in inner city schools of Los Angeles.[9] Children in selected schools have limited access to dental care. Details of the study design and retention findings after an average of eight months study

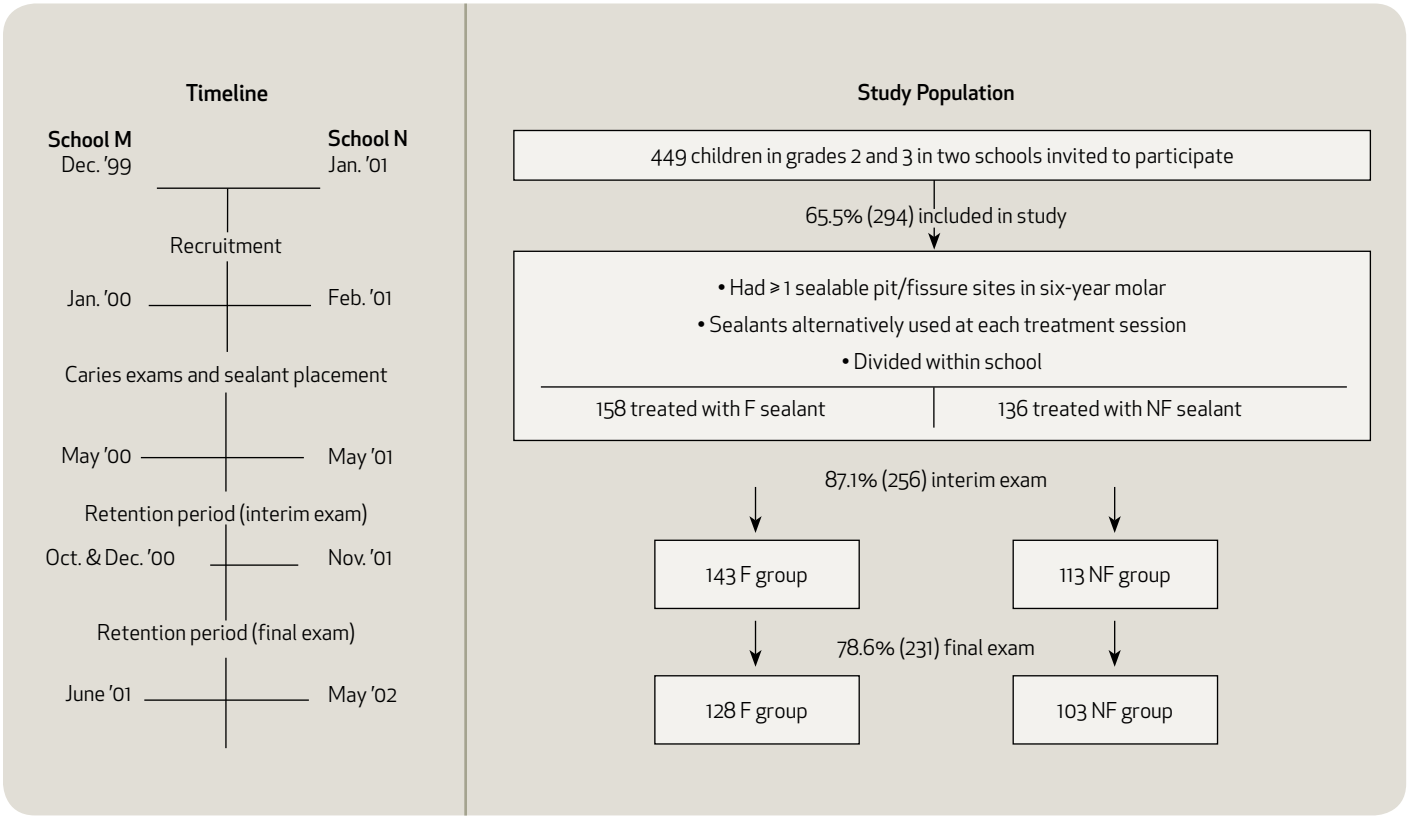

FIGURE 1. Schematic progression of study activities.

have been reported.[6] Donation by the manufacturer of both (Delton) and Delton Plus (2 percent NaF) prompted a study to compare the two types of sealants within the existing program. A total of 294 second and third graders, mainly 7 to 9 years old, in two program schools were divided within their school to receive either the fluoride or nonfluoride sealant. Because the transverse ridge separates the mesial and distal fissure systems of upper six-year molars, the unit of observation was site rather than surface. Subjects had to have one or more occlusal or buccolingual pit and/or fissure sites in six-year molars that were sound, or incipient decayed and sufficiently erupted, to participate in the study.

Supervising faculty determined the sites that were suitable for sealant application. Freshman dental students applied the sealants. They also administered a 1.23 percent APF gel, provided oral hygiene instruction and distributed toothbrushes. Shortly before the study began, the City of Los Angeles fluoridated its water supply (8/99). All clinical examinations in the study were conducted by the same two investigators. Criteria for sealant retention were those of Simonson's and for dental caries those of the ADA's Councils on Dental Research and Dental Therapeutics.[10,11] All first molars were examined but only those that initially received sealant were included in the analyses (**FIGURE 1**).

FIGURE 1 shows a schematic progression of study activities by timeline and number of study subjects. Because study activities were determined by the fixed schedule of the mobile clinic sealant program, it took approximately 2½ years to complete the study. Of the initial number of participants, 78.6 percent were present for the final exam; 128 in the fluoride; and 103 in the nonfluoride group.

Statistical Analyses

Chi square tests were performed on demographic data by sealant type. Analyses of variance, ANOVAs, were used for subjectwise assessment of group comparability and for comparison of

TABLE 1

Summary of Demographic Data Subjects Present at the Final Examination

		F (n=128)	NF (n=103)	p-value
Age (years)	Mean	7.73	8.08	
	S.D.	0.68	0.82	<0.001[1]
	Range	6-9	6-10	
Gender n (%)	Male	54 (42.2%)	50 (49.0%)	0.301[2]
	Female	74 (57.8%)	52 (51.0%)	
Ethnicity n (%)	Hispanic	121 (98.4%)	95 (96.0%)	0.130[3]
	Other	2 (1.6%)	4 (4.0%)	

[1] p-value from t-test.
[2] p-value from chi square test.
[3] p-value from Fisher's Exact test.

TABLE 2

Number of Occlusal and Buccolingual Sites Sealed at the Final Examination and Duration of Retention

		F (n=128)	NF (n=103)	p-value*
No. occlusal sites sealed per subject	Mean	3.48	3.49	0.978
	S.D.	1.50	1.57	
No. B-L sites sealed per subject	Mean	2.26	2.22	0.819
	S.D.	1.00	1.02	
Duration of retention (months)	Mean	14.25	14.58	0.069
	S.D.	1.21	1.53	

* p-value from ANOVA

mean percentage retention and caries scores. Where sitewise assessment was used, because of the lack of independence, the analysis was limited to descriptive statistics. All statistical test hypotheses employed a significance level of α=0.05.

RESULTS

Retention

TABLE 1 shows demographic data of the final participants. The two sealant groups were well-balanced with respect to gender and ethnicity; both groups being more than 96 percent Hispanic. At baseline, subjects in the fluoride group were significantly lower in age than the nonfluoride group by about four months (**TABLE 1**).

Notwithstanding the small difference in mean age, **TABLE 2** shows that the mean number of sealed occlusal sites per child was virtually identical, 3.48 and 3.49. Corresponding scores for buccolingual sites were also comparable. The duration of retention after sealant placement in the fluoride group averaged 14.25 months, and in the nonfluoride group, 14.58 months (P=0.07) (**TABLE 2**).

TABLE 3 shows findings for fluoride and nonfluoride groups by extent of retention on occlusal sites. Mean percentages of sealed occlusal sites per subject for full retention were similar 58 and 55 percent, respectively; for "Any" sealant retention (full or partial), both groups scored 75 percent. Mean subjectwise percentage retention on buccolingual sites (data not shown) were steeply lower than corresponding scores for occlusal sites, as low as 28 percent for Any retention in both groups; "Observed" differences between the groups in "Full" and Any retention were not statistically significant, P=0.31 and 0.83, respectively (**TABLE 3**).

TABLE 4 shows data of the frequency of sites fully retaining sealant that either was sound or had incipient decay at baseline. No clinical difference is apparent in their respective frequencies of full retention, 45.23 percent and 43.21 percent, respectively. However, results are based on a small proportion of incipient sites; only 7 percent of the 1151 sites were available for study (**TABLE 4**).

Anticaries Effectiveness

TABLE 5 shows that for both groups, of the initially sound sites losing their sealant completely or partially during the study period, 90.8 percent remained sound (DMF=0); only 9.2 percent experienced decay (DMF=1). The tabular data also show numerically greater percent DMF increment of zero for sites with partial sealant loss compared with those of complete loss (**TABLE 5**).

For the preponderance or 82 percent (190/231) of children who completely or partially lost sealant from initially sound sites, **TABLE 6** shows that both the fluoride and nonfluoride groups experienced similar, extremely low mean DMF attack rates, less than 1/10 site per child or 0.087 and 0.094, respectively. DMF attack rates

TABLE 3

Mean Percentage of Occlusal Sites Per Subject Exhibiting Full or Any (Full Or Partial) Sealant Retention at the Final Examination

Study group	Number of subjects	Mean % Occlusal Sites per Subject*	
		Full	Any
F	128	58.07 ± 33.42	74.87 ± 31.76
NF	100	54.65 ± 36.98	74.80 ± 31.10
p-value **		0.309	0.830

* Mean ± S.D.
** p-value from ANOVA

TABLE 4

Distribution of Full Retention on Final Exam for Sealed Sites Sound or With Incipient Decay at Baseline

Baseline Diagnosis	Number Sites Sealed	Number Fully Retained	Percent Fully Retained
Sound	1070	484	45.23
Incipient Decay	81	35	43.21
Total	1151	519	45.09

TABLE 5

Distribution of Sitewise Percent DMF Increment for Initially Sound Sealed Sites by Extent of Sealant Loss by Group

Study Group	Sealant Completely Lost		Sealant Partially Lost		Sealant Completely or Partially Lost	
	DMF=0	DMF=1	DMF=0	DMF=1	DMF=0	DMF=1
F	199 (88.4%)	26 (11.6%)	78 (97.5%)	2 (2.5%)	277 (90.8%)	28 (9.2%)
NF	177 (88.9%)	22 (11.1%)	71 (95.9%)	3 (4.1%)	248 (90.8%)	25 (9.2%)

per subject for sealed sites that initially had incipient decay as expected were much greater, 0.375 for the fluoride group and 0.300 for the nonfluoride group (data not shown). However, subjects in each group numbered 16, too small for the clinical results to be meaningful (TABLE 6).

Discussion and Conclusions

Final results after 1¼ years are consistent with those after eight months of study in that the fluoride and nonfluoride sealants continued to show no difference in retention and are in agreement with reviews comparing the two types of sealants.[2,5,12] Also in agreement with other studies is the relatively poor sealant retention on buccolingual sites compared with occlusal sites.[13-15] Concerning anticaries results, at baseline, the 294 subjects had a caries prevalence on six-year molars of 1.6 DMFS/child. Because of the moderate past caries experience, a measurable amount of new decay could be anticipated among study subjects. However, it was unanticipated that the additive effect of the combined preventive measures included in the sealant program might be so profound as to inhibit further decay, compromising the capability of the study to detect any enhanced protection from the fluoride sealant. Another possible plausible explanation for the minimal decay is that the remaining eligible sound six-year molars that lost sealant were less caries prone to begin with.

For a sound fissure, when the sealant remains fully intact, the fissure is completely protected from decay; and when fully or partially lost, the fissure is equally at risk as if it was never sealed.[12] But there is equivocal evidence to also show that when a sealant is partially retained, some anticaries benefits are conferred, compared with unsealed control sites.[13,16,17] In the present study, sites with partial sealant lost had numerically greater zero increment than sites with complete or partial sealant loss, ≥ 96 percent compared with 91 percent, respectively (TABLE 5).

Concern is still sometimes heard about sealing teeth with incipient decay as done in the present study. A large body of evidence has accumulated showing that when the sealant remains intact no further progression of the incipient lesion occurs.[5,12] However, that leaves the question of whether teeth with incipient lesions that partially lose their sealant are more, less, or equally at risk than teeth with incipient lesions that were never sealed. As for retention itself, in the present study, no clinical difference was observed in the frequency of full retention between sound teeth and teeth with incipient decay that were sealed (TABLE 4). However, results are based on only a small proportion of incipient sites, 7 percent of the 1151 sites were sealed. Therefore, the issue in question cannot be authorita-

TABLE 6

DMF Attack Rate per Child for Sealed Sites Initially Sound That Completely or Partially Lost Sealant by Group

Study Group	Sealant Completely or Partially Lost	
	Number of subjects	DMF rate/child*
F	106	0.087 (0.241)
NF	84	0.094 (0.247)

* p-value=0.875 from ANOVA
( ) Standard Deviation

tively addressed by the data in this study. However, the current method of clinically diagnosing incipient pit and fissure caries is fraught with poor sensitivity, correctly calling from 20 percent to 80 percent of true enamel caries; the reciprocal being the falsely negative range.[18,19]

One can, therefore, assume that purportedly sound fissures that partially lose sealant erroneously include a certain unknown proportion with incipient decay, this study being no exception. That "sound" fissures with partial sealant loss have, in the few studies previously reported herein, shown anticaries benefits, suggests that fissure sites with incipient decay that partially lose sealant, at best, may receive some anticaries protection and at worst, appear to be at no more at increased risk of further caries progression than unsealed fissures with incipient decay. Further research is needed to determine the fate of incipient caries in fissures where the sealant has been partially lost.

The present investigation, it should be noted, is the result of a relatively short-term sealant study. There is consensus that sealant therapy does not impart long-term effective anticaries protection unless the sealant remains fully intact and most effective when applied to those pits and fissures in the earliest stages of the carious process. Moreover, the routine application of fissure sealant to sound surfaces is viewed as overtreatment in some European countries.[10] The targeting of fissures at highest risk for sealant therapy has been recommend by investigators in this country.[13,20] And as far back as the mid 1980s, the NIDR was advocating the sealing of incipient lesions.[21] The challenges of improved sealant chemistry and of increased sensitivity in diagnostic methods for the clinical detection of incipient caries must be met if the cost-benefit ratio of sealants is to become appreciably more favorable. ■■■■

REFERENCES

1. Curzon MEJ, Toumba KJ, In vitro and in vivo assessment of a glass slow fluoride-releasing device: a pilot study. *Brit Dent J* 196:543-6, 2004.
2. Morphis TL, Toumba KJ, Lygidakis NA, Fluoride pit and fissure sealants: a review. *Int J Paediatr Dent* 10:90-8, 2000.
3. Jensen ME, Wefel JS, et al, Effects of a fluoride-releasing fissure sealant on artificial enamel caries. *Am J Dent* 3:75-8, 1990.
4. Hicks MJ, Flaitz CM, Garcia-Godoy F, Fluoride-releasing sealant and caries-like enamel lesion formation in vitro. *J Clin Pediatr Dent* 24:215-9, 2000.
5. Simonsen RJ, Pit and fissure sealant: review of the literature. *Pediatr Dent* 24:393-414, 2000.
6. Heifetz SB, Yaari A, Proskin HM, Retention of a fluoride-releasing sealant compared with its nonfluoride analogue: interim results of a clinical study after an average of eight months. *J Clin Dent* 15:1-5, 2004.
7. IADR/AADR/CADR 83rd general session in Baltimore, Md.: Heifetz SB Yaari A, Proskin HM, Fluoride and nonfluoride sealant retention: results after 1¼ years. *J Dent Res* 84(Spec Iss A): 1789, 2005.
8. AADR/ADEA 35th annual meeting in Orlando, Fla.: Heifetz S, Yarri A, Proskin HM, Anticaries effectiveness of fluoride and nonfluoride sealant after sealant loss. *J Dent Res* 85 (Spec Iss A): 491, 2006.
9. University of Southern California, School of Dentistry: community programs sealant project, www.usc.edu/hsc/dental/community/sealant_project.htm (Accessed June 14, 2007).
10. Simonsen RJ, Retention and effectiveness of a single application of white sealant after 10 years. *J Am Dent Assoc* 115:31-6, 1987.
11. American Dental Association, Council on Dental Research and Council on Dental Therapeutics: proceedings of the conference on the clinical testing of cariostatic agents, ADA, Chicago, pp. 87-8, 1972.
12. Feigal RJ, The use of pit and fissure sealants. *Pediatr Dent* 24: 415-22, 2000.
13. Feigel RJ, Sealants and preventive restorations: review of effectiveness and clinical changes for improvement. *Pediatr Dent* 20:85-92, 1998.
14. Barrie AM, Stephan KW, Kay EJ, Fissure sealant retention: a comparison of three sealant types under field conditions. *Community Dent Health* 7:273-277, 1990.
15. Ripa L, Occlusal sealants: rational and review of clinical trials. *Clin Prev Dent* 4:3-10, 1982.
16. Horowitz HS, Heifetz SB, Poulson S, Retention and effectiveness of a single application of an adhesive sealant in preventing occlusal caries: final report after five years of study in Kalispell, Mont. *J Am Dent Assoc* 95:1133-9, 1977.
17. Charbeneau GT, Dennison JB, Ryge G, A filled pit and fissure sealant: 18-month results. *J Am Dent Assoc* 95:299-306, 1977.
18. Ekstrand KR, Ricketts DNJ, et al, Detection, monitoring, and logical treatment of occlusal caries in relation to lesion activity and severity: an in vitro examination with histological validation. *Caries Res* 32:247-54, 1998.
19. Lussi A, Validity of diagnostic and treatment decisions of fissure caries. *Caries Res* 25:296-303, 1998.
20. Heller KE, Reed SG, et al, Longitudinal evaluation of sealing molars with and without incipient dental caries in a public health program. *J Publ Health Dent* 55:148-53, 1995.
21. National Institutes of Health, Consensus development conference statement on dental sealants in the prevention of tooth decay. *J Am Dent Assoc* 108:233-6, 1984.

TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT
Stanley B. Heifetz, DDS, MPH, Division of Disease Prevention Health Promotion and Epidemiology, University of Southern California, School of Dentistry, 925 West 34th St. Room 4208, Los Angeles, CA 90089.

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Oscar Living in a Felix World

Once a male dentist leaves the office, he metamorphoses into his Mr. Hyde persona before he reaches the parking lot.

Robert E. Horseman, DDS

ILLUSTRATION BY CHARLIE O. HAYWARD

Dentists by definition are generally considered focused, precise people with an excitement level about that of CPAs. The box inside of which they think, is full of millimeters, microns, and other tiny little quarks that have to be handled painstakingly with rubber gloves. Their work has been compared to that of repairing a fine watch while somebody spits on their hands, painting the Sistine Chapel wearing boxing gloves or solving Rubik's Cube blindfolded in a fetal position in less than 45 seconds.

Dentists spend their working hours in immaculate surroundings with the exception of the one that requires the rubber gloves. How is it then that they maintain their savoir faire in this stressful workplace? The answer: Female staff.

There are male dentists and there are women dentists. I have no idea how women dentists live their lives after leaving the sanctuary of the office, but I suspect the neatness syndrome carries over at home. That's their nature. Once a male dentist leaves the office, he metamorphoses into his Mr. Hyde persona before he reaches the parking lot. Unless he has been raised in a family of sisters, aunts, and a mother bereft of a father to introduce him to the perks of his testosterone heritage, he is now an honorary citizen of Slobbovia.

How do I know this? My wife explains it to me on a fairly regular basis using inside information her mother passed on to her. All women are privy to these facts originally observed by Eve when she mentioned to Adam that one simply did not leave apple cores on the Chippendale or neglect to use a coaster under the vino flagon.

The list of no-nos has grown exponentially since then until I am hard put to explain away the condition of my desk to my severest friend and best critic. My theory that I still believe has merit, is that since the Grimm Brothers (1785-1863) wrote of the benevolent elves that snuck in during the night to make shoes for the kindly shoemaker, elves have gone bad. There are roving bands of malevolent

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DR. BOB, CONTINUED FROM 594

Travelocity-type rogue gnomes who come in after I am sound asleep and raise havoc with my desk. I have not seen them, but how else to explain the messiness of my sanctum sanctorum? My wife, past whom very little gets, claims she knows the real reason and elves are just another manifestation of an untidy mind.

How exciting, then, to find vindication in the form of *The Perfect Mess*, a book written by Eric Abrahamson and David H. Freedman, subtitled *The Hidden Benefits of Disorder*.

"A book written about the virtues of messiness by two *guys*?" my bride scoffs.

"Case closed."

In their defense and in defense of messes in general, I quote reviewer Debra Hamel who says, "They argue the cost of maintaining order can be higher than the benefits accrued from it." There! I rest my own case.

The Perfect Mess cites a police chief in Bradford, Penn., who was fired for not having a neat desk and then goes on to state, "Fortunately for the world, Albert Einstein did not work for the city of Bradford. Einstein's desk at the Institute for Advanced Study in Princeton, N.J., was maintained by all personal and photographic accounts, [to be] in a stupendous disarray."

To those of us who aren't absolutely anal compulsive on order, the two authors claim there has been no research to support the benefits of neatness. Furthermore, as a highly effective prioritizing and accessing system, you can't beat a messy desk up to a point. The urgent, important stuff written on cryptic Post-it notes tends to stay close to the surface because of the adhesive backing. The safely ignorable material gets buried until spousal prodding suggests a semi-annual cleanup is in order. My sophisticated filing system then gets crammed in drawers never to be seen again. A minor flaw if you believe in the "clean slate" theory.

Kate Lorenz, article and advice editor for CareerBuilder.com, brightly suggests, "If you don't inject a little disorder in your life, you most likely will miss out on the serendipity of an unplanned success."

I see no point in having my office staff read this material, but I feel better already. ■■■■