Altered Sensation Preventing Early Childhood Caries HIV Law

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The Great Toothbrush Abrasion Caper

JACK F. CONLEY, DDS

t could only happen in Illinois, the home of the American Dental Association and the stage for 1920s mobster Al Capone. Capone comes to mind because the current Trimarco vs. Colgate Palmolive suit in which the plaintiff seeks compensation for his toothbrush abrasion "disease" seems to aim a symbolic "gun" at the heads of eight manufacturers of toothbrushes (and the ADA and its Seal of Acceptance program).

The suit alleges that toothbrushes are "unsafe and unreasonably dangerous" and should carry package warnings on the "risks of toothbrush abrasion" as well as instruction on how to use brushes to avoid abrasion according to the report in the April 19 ADA News. The ADA is named along with the manufacturers in the suit because it allows the display of its Seal of Acceptance on packages without requiring warnings about harm caused by toothbrushing as a condition of displaying the ADA Seal.

Washington columnist George Will probably provided the best characterization of the trend displayed by this suit when he stated in a May 10 Newsweek commentary, "This suit is just part of a great American growth industry -- litigation that expresses the belief that everyone has an entitlement to compensation for any unpleasantness, litigation that displaces responsibility from individuals to corporations with money."

It is remarkable that individual dentists and hygienists who have provided dental treatment and preventive instructions to the plaintiff over the years were not also included as defendants in this case. After all, the complaint alleges that "manufacturers knew or should have known about the disease/injury/clinical entity (of toothbrush abrasion) since at least 1949." While many of us practicing dentistry today were in grade school at that time, we should have learned long since that we must engage in informed consent discussions with our patients about the dangers of the dreaded "disease known as toothbrush abrasion."

Fortunately, Trimarco and his counsel correctly concluded that dentists' pockets are not as "deep" as the likes of Colgate-Palmolive, Butler, Johnson & Johnson, or even the ADA, to list but a few of those named in the suit. However, at some future time, when toothbrush package disclaimers have been added to remove manufacturers' liability for incorrect use of the toothbrush (this suit makes that inevitable) dentists and dental hygienists who bear responsibility to instruct patients in the proper techniques of brushing could bear the brunt of future litigation if there is a continuing trend in society for individuals to blame others for their failures, and to expect a monetary reward from sympathetic juries in return.

There is another aspect of this caper that is unsettling. Based upon the reporting of events in ADA News, the suit was filed on April 1 and stories broke in the Chicago media on April 12. Eight days later, on April 20, the Council on ADA Sessions and International Programs canceled Dr. Gordon Christensen's agreement to present at the annual session in Hawaii in October of this year. This action appears to convey guilt and a punishment for Dr. Christensen's involvement in this matter, which involved his signature on an affidavit regarding warnings on toothbrush packages that was signed in August 1998 and used in the toothbrush abrasion suit.

On April 27, Dr. Christensen filed a letter with the plaintiff's attorney withdrawing the statement. Further, on May 4, 1999, he signed a sworn statement recanting portions of that statement that had pertained to the ADA and its Seal Program; and, on May 6, he granted a telephone interview, fully explaining the contacts and activities that led to his signing of the statement in question.

Dr. Christensen's explanation provided by ADA News appears to show that he was deceived into believing that his statements and the affidavit were to be used in an effort to secure warnings on toothbrush packages, rather than to support the rather outrageous lawsuit on toothbrush abrasion (which he claims he knew nothing about at the time). Dr. Christensen was quoted as saying, "The ADA has now cleared me of any involvement with this suit." To this observer, that is not the end of the story.

The continuing involvement of the ADA and its Seal program in the lawsuit may be preventing a more open discussion of some issues, including Dr. Christensen's views or statements relating to the Seal program. Despite Dr. Christensen's expertise and standing within the professional community, it would have been inappropriate and unwise for him to make public comments that might link the ADA Seal program to any discussion on toothbrush abrasion without the prior knowledge and approval of the appropriate ADA agencies. As of May 17, it is unclear as to whether this explains the reason for the sanction permanently removing Dr. Christensen from the 1999 Annual Session program. Because of the incomplete explanation, this can only be an assumption. It is unfortunate that a complete explanation of events could not have been made to the profession in a more timely fashion. It is our hope that full explanation and closure will be forthcoming to this entire caper, even before these words appear in print.

It is also unfortunate that the legal system would encourage such an outrageous plan to be hatched, that would entangle the resources of members of the dental industry, the ADA, and Dr. Christensen, when so many more important scientific issues that would benefit the profession and the public are before them.

Impressions

Integrating the Arts

By David G. Jones

Dentists can play an even larger role in the overall health of their patients by paying attention to visual and other clues that could indicate serious underlying medical conditions, suggests a recent study.

Arthur H. Friedlander, DDS, professor of oral and maxillofacial surgery at the UCLA School of Dentistry, and Michael Littner, an MD pulmonologist at the Veterans Administration Medical Center in Sepulveda, are two of four researchers who collaborated on a study that for the first time uncovered a particular link between sleep apnea and an increased risk of stroke. It also showed that the estimated 9 million adult Americans who suffer from obstructive sleep apnea are three times more likely to have diabetes. Their work was published in the May issue of the Journal of Oral and Maxillofacial Surgery.

Friedlander, also the associate chief of staff for graduate medical education at the VA medical center, said he undertook the study because he has long been interested in dentists viewing panoramic radiographs and looking for carotid arterial blockages. By 1994, Friedlander started looking at high-risk patient groups.

"That led me to patients with obstructive sleep apnea, because we already knew that they suffered from strokes at a higher rate than the average population," he says.

Littner, who also serves as a professor of medicine at the UCLA School of Medicine, also knew of studies that showed that strokes are more common in people with obstructive sleep apnea, but he said a direct correlation had not yet been proven.

"Dr. Friedlander had an interest in the cause of strokes, and as a pulmonologist I had an interest in sleep apnea, so we collaborated with my patients who were already diagnosed with sleep apnea," Littner says. "The patients exhibited an increased prevalence of cardiovascular problems with sleep apnea. The question became, 'Why?"

Littner said the medical literature was not clear, so the researchers set about to discover a specific link.

"We started to take panoramic radiographs of the patients, and we found large numbers to have evidence of blockages of their carotid arteries," he says.

The researchers took panoramic X-rays of 54 randomly selected male veterans who had previously been diagnosed with obstructive sleep apnea. Examination of the X-rays showed that 12 of the 54, or 22 percent, had calcified plaques in the carotid artery leading to the brain. The researchers also tested the patients' blood sugar, which revealed that 17 of the 54, or 31 percent, unknowingly suffered from adult-onset diabetes.

"No one had discovered the fact that patients with obstructive sleep apnea have a higher risk of Type II diabetes," Friedlander says. "No one had looked systemically at patients as we did."

The study, that began in mid-1995 and finished near the end of 1997, also showed how dentists can play an increasingly important role in the general health of their patients. Lee V. Heldt, DDS, MD, president of the California Association of Oral and Maxillofacial Surgeons, says that is a logical step beyond the normal screening process dentists use with patients.

"This is a step forward from that, and if dentists can identify a pattern of calcification of the carotid artery, it would certainly be appropriate to refer the patient for a cardiovascular workup," he says. "Of course the other question it raises is the importance of reviewing the past medical history a little further and asking some questions about the quality of sleep, which could prompt a separate consultation for sleep disturbance."

James E. Eckhart, DDS, contributing editor to the August 1998 CDA Journal issue on snoring and sleep apnea, said the study could help raise dentists' awareness.

"It could make dentists more alert to the relationships between obstructive sleep apnea, stroke and carotid blockage, and help the patient seek medical attention to prevent stroke when a blockage is suspected," he says.

Friedlander outlined other clues that could indicate that a patient is at risk for sleep apnea and an underlying and undetected diabetes or predisposition to cardiovascular problems. He said obesity; a thick neck; excessive fat in the palate, tongue and pharynx; an enlarged tongue; a long soft palate; and a small retrognathic mandible are all indicators for obstructive sleep apnea.

According to Eckhart, the information illustrates the value of the panoramic X-ray.

"Patients can benefit by dentists screening suspected obstructive sleep apnea patients with panoramic films to detect possible blockages," he says. "The fact that particularly in older patients carotid blockage can be viewed on a panoramic radiograph may be an additional reason to obtain one of these systems."

Friedlander considers the study's results exciting.

"I think what this material does is more closely align dentistry with aspects of preventive medicine, in which we can identify patients at risk of stroke and help them get needed treatment," he concludes.

Tasteful Dressing

Staff personal appearance is an important part of how patients perceive a dental office. In the May 1999 issue of Dental Economics, Janice Hurley and Jana Tristao offer tips for maintaining the professional look.

They write that the best time to bring up the topic of appropriate dress is during the interview process, but that the subject can be broached with staff at any time. Two important areas should be discussed:

- The value of consistency. If how a potential staff member has dressed for the interview is appropriate for the office, the dentist should mention it and stress the importance of consistently dressing that way. The interviewee should be asked if dressing that way every day is something he or she will be able to do.
- The office's written grooming standard. Having a written policy for both frontand back-office staff is important for projecting a professional image. If what is appropriate is written in detail, it will be easier for staff to follow.

The authors also suggest that a dentist consider investing in staff office wardrobes. If a dentist chooses to do so, they suggest discussing the policy with staff, agreeing on the type of purchases before they are made and setting a dollar figure of about \$500 per person.

Giving Patients a Fair Hearing

With 400,000 deaf people in America, chances are good that a dentist will encounter a deaf or hard-of-hearing person in the office. An understanding of the needs and limitations of deaf patients is important, write Claudia Schmitz, RDH, and Sandra Volkman, RDH, in the January 1999 issue of Access, a publication of the American Dental Hygienists Association.

A Key to Cleft Palate is Discovered

Researchers led by a team of University of California at San Francisco scientists have identified the mechanism by which cleft palate -- the most common craniofacial birth defect in humans -- wreaks its havoc.

Earlier research had already established that abnormalities in the gene for Transforming Growth Factor Alpha (TGF-a) were linked to cleft lip and palate syndromes. TGF-a is a growth factor with many known functions, yet how it related to cleft palate had been a mystery.

The inter-institutional group, led by Rik Derynck, PhD, UCSF professor of cell biology in the Department of Growth and Development, and Zena Worb, PhD, UCSF professor of cell biology in the Department of Anatomy, demonstrated that during normal embryonic development, docking of the molecule TGF-a with the Epidermal Growth Factor Receptor (EGFR), results in the production of a class of proteins called matrix metalloproteinases (MMPs).

Using mice specially bred without the EGFR, the researchers learned that after activation of the EGFR, MMPs regulate the closure of the palate. Palate closure must be closely coordinated with the development of the lower jaw, a process regulated by MMPs. Simply put, if EGFR does not function properly when TGF-a joins with it, MMPs are not produced and cleft palate frequently results.

The study is reported in the May 1999 issue of the journal Nature Genetics.

When communicating with a hard-ofhearing person, the first step is to determine which communication method the patient prefers. There are several options, but many have limitations.

- Lip-reading. Only a small percentage of deaf people can lip-read; and, in even the best of circumstances, only a small part of what is said is understood.
- Writing. Writing can be awkward, especially when scientific terms are involved. Also, for many deaf people, English is a second language.
- American Sign Language. Even hearing people who can use ASL may not interpret responses correctly.
- Interpreter. Hiring an interpreter is the ideal solution to the problem of communicating with the deaf, according to the authors. They note that dentists might have to provide an interpreter by law because the Americans With Disabilities Act states that an interpreter must be provided for a client who requests one. Sign

language interpreters certified by the Registry of Interpreters for the Deaf are available in every state and most large cities.

For communicating with a deaf patient when he or she is outside the office, e-mail and the teletypewriter are suggested.

ADA Survey Center Offers New Reports

Recently released reports available from the ADA Survey Center include:

- Annual Expenses of Operating a Dental Practice -- With statistics for 24 categories of expenses for independent dentists, solo dentists, independent non-solo dentists and new dentists.
- Five reports from the 1996 Dentist Profile Survey -- Each covers a single racial or ethnic group and includes information on family and personal concerns, work-related issues and practice characteristics.
- Dentists in Solo and Non-Solo
 Practice -- This report from the 1997

Survey of Dental Practice compares various aspects of both types of dental practice, including income, gross billings, expenses and time spent in the practice.

For more information call (312) 440-2500, Ext. 2568.

UCSF Receives Record Donation

The UCSF School of Dentistry has received a bequest of \$6.5 million, the largest single gift in the dental school's history.

The bequest came from the estate of Gladys Barber of San Francisco. Her deceased husband, Leland, was a member of the school's class of 1919.

The gift will be used to establish two Leland A. and Gladys K. Barber Distinguished Professorships in Dentistry, each funded at \$2.5 million. The balance of the bequest will be used to fund an endowed chair.

Some Cancer Patients Look for Alternatives

Researchers studied 200 patients with head and neck cancer to determine the prevalence of the use of alternative therapies and the demographics of the patients using alternative medicine. The researchers found that alternative therapies were used to specifically fight cancer directly and as an adjunct to conventional treatment, rather than to treat the adverse effects of conventional treatment.

A majority of patients limit or avoid the use of alternative medicine based on discouragement from their physicians and a lack of solid medical evidence, the researchers write. Patients believe their physicians to be the most knowledgeable source of information about alternative therapies.

- Alternative Medicines Used
- Herbal medicines 50.7 percent
- Pharmacological treatments 16.9 percent
- Manual healing 10.1 percent
- Diet and nutrition 8.7 percent
- Mind-body techniques 7.7 percent
- Traditional and folk remedies 5.8 percent

Honors

Eugene Manusov, DDS, and Eugene Sekiguchi, DDS, were presented with the 1999 Distinguished Community Service Award from the Anti-Defamation League at its recent Dental Division Dinner.

Mahmoud Torabinejad, DDS, MSD, PhD, has been elected treasurer of the American Association of Endodontists. James A. Abbott, DDS, MS, has been elected to the Board of Directors of the same organization.

Albert Solnit, DDS, has been awarded the Pierre Fauchard Honor Award by the Pierre Fauchard Academy's Southern California Section. (have photo)

Peter L. Jacobsen, PhD, DDS, professor and director of the Oral Medicine Clinic at the University of the Pacific School of Dentistry, has received the 1999 Gordon J. Christensen Lecturer Recognition Award. (photo)

New Requirements of the OSHA Bloodborne Pathogens Rule

Eve J. Cuny, RDA, BA; Richard Fredekind, DMD, MA; and Alan W. Budenz, MS, DDS

ABSTRACT In September 1998, a California assembly bill was signed into law that requires significant changes to the Cal/OSHA Bloodborne Pathogens Standard. As of July 1, 1999, all health care employers in the state must begin providing sharps safety devices. For dentistry, this means a shift from the traditional needles to safety needles with engineered, built-in safety mechanisms. Some exceptions are provided in this new regulatory change.

There is no reliable data on the safety and efficacy of the available devices. This article explores the regulatory changes and begins to provide information on the devices available. Design features, usability by the practitioner, and safety to the patient are important issues to consider when deciding whether these devices are appropriate for dental anesthesia. Most practitioners will find it difficult to conduct an independent evaluation and must rely on information in the professional literature to help guide their decisions.

AUTHORS

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Richard Fredekind, DMD, MA, is an associate professor in the Department of Diagnosis and Management and a group practice administrator at UOP School of Dentistry. Alan Budenz, MS, DDS, is an assistant professor in the Department of Anatomical Sciences and chairperson of the Department of Diagnosis and Management at UOP School of Dentistry. n Sept. 29, 1998, Gov. Pete Wilson signed Assembly Bill 1208 into law. This bill, which adds section 144.7 to the California Labor Code, requires the California Occupational Safety and Health Administration to adopt several revisions to the Bloodborne Pathogens Standard. These changes are the first significant changes to the state Bloodborne Pathogens Standard since its required enforcement began in 1992.

Assemblywoman Carol Migden introduced the legislation requiring Cal/OSHA to make these changes in response to a general outcry by health care workers and the media. Beginning in April 1998, the San Francisco Chronicle published a series of articles and follow-up stories titled "Deadly Needles." These articles explored the issue of occupationally acquired HIV and hepatitis among healthcare workers. In spite of universal precautions, including the use of gloves and other protective attire, health care workers continue to be infected with HIV and hepatitis on the job. According to the Centers for Disease Control and Prevention HIV/ AIDS Surveillance Report, 54 health care workers have been infected with HIV

on the job, none of them dental health care workers. Another 133, including six dentists, are classified as possibly having been infected occupationally.¹ These numbers represent only those cases that are reported to the Public Health Services. Controversy remains regarding the true number of health care workers occupationally infected with bloodborne diseases. The reports in the San Francisco Chronicle placed the numbers as high as 60,000 infectious disease transmissions in the past decade with one health care worker each week contracting HIV.² The reporters for the Chronicle list as their sources for these numbers the International Health Care Worker Safety Center, However, the center estimates that there may be from 18 to 35 occupationally acquired HIV infections occurring each year. There is a clear need for more reliable information regarding occupationally related disease transmission to assist public health officials and regulatory agencies in making science-based recommendations and regulations.

At the center of the highly emotional issue is the charge by health care worker unions and other groups and individuals that hospitals were not consistently providing adequate protective devices that are readily available in the medical market.³ Hospitals were charged, and in some instances found guilty, of failing to provide safety devices that were readily available in favor of the less expensive nonsafety needles. Manufacturers of needles were accused of continuing to supply standard needles in an effort to ensure profits when safer devices were available. There were also charges that agencies such as OSHA were not responsive to the needs of these emplovees.

By signing the Migden Bill, Wilson set into motion a series of events that promises eventually to impact every health practitioner in the United States that uses needles, including dentists.

Summary of the Regulatory Changes

In California, an emergency rule is in effect with provisions that must be met by July 1, 1999. The emergency standard requires employers to provide devices with "engineered sharps protection." Cal/ OSHA defines this as "a physical attribute built into a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, which effectively reduces the risk of an exposure incident by a mechanism such as barrier creation. blunting, encapsulation, withdrawal or other effective mechanism." This means that if a safety needle is available for a given procedure, such as dental anesthetic administration, it must be used. Four situations allow for exceptions. The engineering control is not required if:

- It is not available in the marketplace;
- It will jeopardize the patient's safety or the success of the medical, dental or nursing procedure (this must be specifically documented);
- The employer can demonstrate by means of objective evaluation criteria that the engineering control is not more effective in preventing exposure incidents; or
- Reasonably specific and reliable information is not available about the safety performance. The employer must then be actively determining by means of objective evaluation criteria whether use of the engineering control will reduce risk of exposure incidents.

Additional requirements of the emergency provisions call for the keeping of a written sharps injury log. This log must record the date and time of each sharps injury resulting in an exposure incident, as well as the type and brand of device involved. Additionally, the revised Bloodborne Pathogens Standard requires a procedure for:

- Gathering the information required in the log;
- Determining the frequency of use of the types and brands of sharps involved in exposure incidents;

- Identifying and selecting currently available engineering controls;
- Documenting circumstances in which engineering controls are not used because of patient safety determinations; and
- Obtaining the active involvement of employees in reviewing and updating the exposure control plan.

This information should be written in to the exposure control plan currently required by the Bloodborne Pathogens Standards.

The problem the emergency regulation is intended to address is that the existing Bloodborne Pathogen Standard does not adequately prevent occupational sharps injuries. According to a survey of the health care industry, it is estimated that health care workers suffer 96,000 needlestick injuries per year in California.⁴

The figures on needlestick injuries provided by the scientific literature, regulatory agencies, government service agencies, and affected business associations vary considerably, and reference to underreporting of sharps injuries is common in nearly every report attempting to analyze needlestick injuries. This has led to a common view that needlesticks and other occupational exposure incidents to bloodborne pathogens such as sharps injuries are significantly underreported in the health care industry.⁵⁻⁷ This underreporting has led to speculation that bloodborne disease transmissions among healthcare workers are occurring unnoticed and remaining undocumented.

Beyond California

Last year, Federal OSHA asked for information from interested parties on the issue of safety for health care workers exposed to blood and other body fluids. They are currently in the process of reviewing the more than 400 responses received as result of their request for information. It is uncertain at this time what the outcome will be on the federal level.

It is more immediately apparent



FIGURE 1. UltraSafe Syringe



FIGURE 2. HypoSafety Syringe



FIGURE 3. One-handed scoop technique



FIGURE 4. Safety Plus

that the states are not going to wait for a federal rule to act on this issue. Iowa, Illinois, Indiana, Maryland, Massachusetts, Minnesota, Montana, New Jersey, Texas, and Washington all have bills that have been introduced to their state legislatures that would require similar regulation. As of this writing, Connecticut, the District of Columbia, Florida, Georgia, Maine, Michigan, New York, Oregon, Pennsylvania, and Wisconsin all have bills in the process of being drafted or introduced.

Many practitioners and organized dental groups have expressed concern over the effect such requirements will have on dental practices. Of particular concern is the lack of independent data to verify the safety and efficacy of the currently available devices. The California regulation requires the use of objective evaluation criteria, but unfortunately, no resource for such criteria exists for the thousands of dental practitioners.

Uncovering information that provides meaningful results in safety device



FIGURE 5. SafeMateNeedle

evaluation is extremely difficult. To determine if a device reduces injuries, one must first look at previous injury rates as a baseline and compare that to injury rates after implementation of a new device. A sufficient sample size is needed to ensure the data is significant. Because needle injuries are relatively rare in dentistry, conclusions should not be drawn on injury rate changes alone.⁸⁻¹⁰

Safety Devices

In an effort to comply with the Cal/ OSHA requirements, the University of the Pacific School of Dentistry undertook an evaluation of the products for their usefulness in the dental setting. The authors were able to identify four devices that are currently available to dentists.

One system was not evaluated in the clinical setting because of problems with getting it to work in the manner it is intended during the preliminary "bench" evaluation (**FIGURE 1**). Upon resheathing, the needle poked through a vented area in the side if the sheath on more than one occasion, placing the operator's finger at risk of puncture. This same device also required numerous steps for replacing the anesthetic carpule, and after inserting a new carpule it was necessary to leave the needle unsheathed in order to give a subsequent injection. Leaving an unsheathed needle at chairside between injections was deemed unacceptable because of the hazard of unintentional needlestick to the dental team.

Another safety syringe was not tested because it was not identified as available until after the evaluation had commenced (FIGURE 2). A few design problems were identified in a preliminary evaluation of the device that did not involve administering injections to live subjects. The syringe employs a passive aspiration mechanism that does not allow the operator to control the aspiration. The safety mechanism is unique in that it retracts the needle into the syringe shaft when the handle is pulled back after injection. However, all anesthetic must be expressed from the carpule before activation of the safety mechanism. It is not reasonable to express unused solution into the patients mouth. Therefore, it is necessary to remove the syringe from the mouth and transfer to a location where the solution can be released before the safety device is activated. This scenario of handling an unsheathed dental needle outside the patient' mouth does not appear to be an improvement over the one-handed sheathing techniques currently employed by most dentists (FIGURE 3).

TABLE 1.

Needle Systems		
Needle System	Manufacturer Name	Cost per Unit
SafetyPlus	Septodont	\$0.33
SafeMate	Septodont	\$0.22
HypoSafety	Dentsply MPL	\$0.83
UltraSafe	Safety Syringes, Inc.	\$0.59
Traditional Needle	Various Manufacturers	\$0.09

The UOP School of Dentistry evaluated the two remaining devices. The study involved 156 senior dental students who were divided into two groups, each of which was trained in the use of one of the safety needle systems. Each group used one type of safety needle exclusively in the treatment of all patients in the comprehensive care clinic.

During the eight-week evaluation period, each group completed six sets of questionnaires on the usability of the needle. The questionnaire had 11 items covering such topics as visibility of the carpule contents, ease of needle and carpule removal from the syringe, and reliability of the safety feature. The number and nature of needlesticks in each group was also evaluated and compared to the same period in previous years.

The first system evaluated, SafetyPlus is a system that incorporates a sterilizable plastic syringe with a one-use safety needle (FIGURE 4). It is lighter in weight than a traditional needle and syringe, a design issue that the students found more difficult to accommodate.

Overall, it was found to be significantly more difficult and timeconsuming to operate. Carpule removal was much more difficult than a traditional syringe. The carpule contents were more difficult to visualize due to the translucent nature of the needle sheath. The device was also more difficult to use for workers with a smaller hand size. The amount of force required to expel the carpule contents varied significantly from one carpule to the next. If the sheath were not pulled down properly, as was often the case, the needle assembly would separate from the syringe handle during injection.

The second device tested, the SafeMate (**FIGURE 5**), incorporates a clear plastic sheath and needle system that is adaptable to traditional metal syringes. This makes accommodation easier because its "feel" is no different from a traditional needle and syringe. Because the sheath is clear and shorter than the sheath on the SafetyPlus, it was easier to visualize the contents of the carpule while aspirating. However, because it is not vented, this sheath did tend to fog once it was placed inside the mouth.

As with the SafetyPlus, the SafeMate needle could not be reused after it was bent. In nine out of the 11 criteria that were evaluated, this system received more favorable scores than the SafetyPlus. The only criteria in which it was found to be less effective was needle removal from the syringe. This is illustrated by the large number of times the needle was overtightened on the syringe, requiring time-consuming and dangerous breakdown of the device to allow removal from the syringe.

All four systems, plus the traditional needle system, are listed in TABLE 1 according to their manufacturer and approximate cost per unit.

Needlestick Injuries

An important aspect of this study was to determine if the devices do reduce the risk of accidental needlestick injury. During the eight-week preliminary trial, SafeMate had three needlesticks reported in the senior class, while SafetyPlus had two. Of these five exposures, four occurred in the first two weeks of the project and the fifth occurred in the sixth week. An additional exposure occurred to a dental assistant using the SafeMate.

All four SafeMate exposures happened during needle removal when the operator had his or her hand in front of the needle sheath and engaged the locking mechanism, allowing the needle to move forward into the operator's hand. All injured health care workers identified lack of experience as a factor that contributed to the injury. They felt that additional experience with each system and following directions for its use were the best preventive strategies.

The overall exposure rate for both safety needle systems (0.625 exposures per week) was three times greater than it had been in the same academic quarter over the past five years among the senior students (an average of 0.2 exposures per week). From this result, it cannot be stated that either of these safety needle systems was necessarily safer than traditional needle systems.

Clinical Trial Results

The results of this study indicate that SafeMate was less expensive and scored higher in acceptance by the students, but had one more needlestick injury than SafetyPlus. SafeMate seems easier to adapt to and allows use of the standard metal syringe. Specific recommendations for use of SafeMate and improvement in design are listed below.

Operator Issues

- Never place a hand in front of the needle sheath.
- Avoid over-tightening the needle on the syringe.

- Recognize the differences in use between SafeMate and the traditional needle.
- Practice repeatedly all steps in the safe use of the product before using it during a procedure.
- Allow for a learning curve to accommodate to the changes required to efficiently and safely use the product.

Manufacturer Issues

- Vent the sheath to reduce fogging.
- Redesign the needle attachment to the syringe to reduce the chance of overtightening.
- If the needle has been overtightened, redesign the needle sheath to allow easy and safe removal.
- Redesign the sheath locking mechanism to reduce the chances of accidentally engaging it during needle removal.

Conclusions

The results of the product evaluation at UOP do not provide sufficient information to declare that any of the devices are superior in safety to traditional dental needles. It is clear that the health care worker is not removed from risk of needlestick when these self-sheathing needles are employed. Collecting enough data to use statistical models to determine whether injury rates may be reduced does not appear feasible.

The most reasonable approach is to continue engineering and clinical evaluations of the devices. The drawback to clinical trials is that the only means by which to judge efficacy requires health care workers be placed at risk by using untested devices. Engineering evaluations alone do not give valuable clinical information such as whether the device sufficiently aspirates, whether there is fogging when the patient breathes, and any other information related to patient comfort and safety.

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The Etiology of Altered Sensation in the Inferior Alveolar, Lingual, and Mental Nerves as a Result of Dental Treatment

M.A. Pogrel, DDS, MD, and Sri Thamby, BDS, MDSc

ABSTRACT In a review of 163 consecutive patients referred with trigeminal nerve (inferior alveolar or lingual nerve) involvement following dental treatment, the most common etiology was third-molar removal (87 patients). The second most common cause was an inferior alveolar nerve block injection (34 patients), with a smaller number of endodontic and periodontal complications. Female patients outnumbered male 3.3 to 1. Twenty-seven patients were offered surgical exploration and possible nerve repair surgery; of them, 14 underwent surgery. Forty percent of the patients admitted to being involved in litigation during the time they were undergoing treatment.

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here is a perception that nerve involvement as a result of dental treatment is becoming more frequent.1 Differences in gender and etiology of the condition in patients requesting treatment have also been observed.1 There appears to be a predominance of female patients requesting reassurance or treatment of nerve involvement; and patients often seem most disabled when they suffer nerve involvement after relatively minor dental treatment, whereas patients with the same nerve involvement as a result of maxillofacial trauma, tumor resection, or major orthognathic surgery rarely appear to present or request treatment.1 In an effort to clarify and elucidate the factors involved in patients presenting for evaluation and possible management

of altered nerve function following dental treatment, the following study was undertaken.

Materials and Methods

This is a prospective study of 163 consecutive patients referred to the Department of Oral and Maxillofacial Surgery at the University of California, San Francisco. These patients were referred for evaluation and management of altered sensation of one or more areas served by the third division of the trigeminal nerve following dental treatment. All patients were seen and evaluated by one surgeon (MAP). The age and gender of the patients were recorded, as was the type of dental treatment being performed, the specialty status of the dentist performing the

Associated Dental Treatment and Specialty of Dentist in 163 Consecutive Cases of Involvement of the Third Division of the Trigeminal Nerve

Specialty of Dentist	Tooth Removal	Orthognathic Surgery	Endodontic Therapy	Implant	Periodontic Surgery	Other	Local Anesthesia
OMFS	48	8		2	1 	3	
General dentist	45		7	3	2		30
Periodontist	2		1	1	4		2
Endodontist			2		1		2

treatment, and the actual nerve involved. Testing was by pinprick to outline the affected area with a skin marker. The area was then photographed and the degree of involvement tested as previously described2 with Von Frey's hairs,³ two-point discrimination, and Minnesota thermal discs⁴ for temperature sensation. This provided a baseline evaluation against which to measure natural progression and identify those patients who might be helped by microneurosurgery.

Results

Of the 163 consecutive patients included in the study, 125 were female, and 38 were male. Ages ranged from 21 to 72 years for males (mean 28 years) and from 16 to 83 years for females (mean 28 years). TABLE 1 shows the specialty of the dentist carrying out the dental treatment that was presumed to be the causative factor and also the type of treatment being performed. General dentists and oral and maxillofacial surgeons made up the majority of the dentists. Tooth removal was the most common etiological factor, but local anesthesia injections alone were the second most common factor. The patients in the "other" group were three patients having surgical pathology removed, which were mainly cystic lesions. TABLE **2** shows the specialty of the dentist involved and the distribution of the teeth involved when dental extraction was the presumed causative agent. Third molars were the most common

Teeth Involved When Dental Extraction Was Related to Nerve Inolvement	
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	Tooth No. 32	Tooth No. 17	Teeth Nos. 18, 19, or 31
OMFS	24	22	2
General dentist	21	18	6
Periodontist	2		1
Endodontist	2		

teeth involved. TABLE 3 shows the actual nerve involved (inferior alveolar nerve, lingual nerve, or mental nerve only), the side involved, and the specialty of the dentist involved. There were no cases of long buccal nerve involvement in this particular series of patients. **TABLE 4** shows the nerve involved and the specialty of the dentist for each of the lower third molars (Nos. 17, 32). Tables 5 and 6 show a breakdown of those 34 cases where the nerve involvement is assumed to have arisen from an inferior alveolar nerve block of local anestheticalone. They indicate the nerve involved and the type of local anesthetic used. These are cases where there would appear to be no other possible etiological factor in the causation of nerve involvement apart from a local anesthetic nerve block. In particular, no surgical procedure was carried out that could possibly have caused the nerve involvement. All cases had only simplerestorative treatment carried out.

Twenty-seven patients were believed to fulfill the current criteria of the Department of Oral and Maxillofacial Surgery to be offered nerve exploration and possible repair. Of these, 14 patients underwent surgery; and, for a variety of reasons, the other 13 did not. Of the 14 who underwent surgery, two obtained good improvement in sensation, seven obtained some improvement, and five obtained no improvement, as assessed by Von Frey's hair, two-point discrimination, and Minnesota thermal discs. Of interest is the fact that at least 40 percent (65 patients) of these 163 patients were involved in some form of litigation. This information was discovered through patients volunteering it, as a result of a subpoena for records, or through depositions.

Discussion

The rate of nerve involvement following some dental procedures has been documented. The incidence of inferior alveolar nerve involvement following third-molar removal has been estimated at from 0.5 percent to 5 percent.^{1,5-9} The incidence of lingual nerve involvement following third-molar removal has been quoted as from 0.6 percent to 2 percent.¹⁰⁻¹³ The incidence of

The Nerve Involved and the Specialty of the Dentist in 163* Consecutive Cases

	Right			Left			
Specialty of Dentist	IAN**	Lingual	Mental	IAN**	Lingual	Mental	
OMFS	17	21	0	20	13	0	
General dentist	15	30	1	25	25	0	
Periodontist	1	2	1	2	3	1	
Endodontist	3	0	0	1	0	1	

* The total is more than 163 because 19 patients had more than one nerve involved.

**Inferior alveolar nerve.

TABLE 4

Analysis of the Type of Dentist Involved, The Nerve Involved, and the tooth Involved When Nerve Involvement is Related to Tooth Extraction*

	Tooth Removed							
	Tooth	No. 17 Tooth No. 32 Teeth Nos. 18, 19,						
Specialty of Dentist	IAN*	Lingual	IAN*	Lingual	IAN*	Lingual		
OMFS	17	21	0	20	13	0		
General dentist	13	11	8	18	3	1		
Periodontist	0	1	0	1	0	0		

* The total exceeds the number of patients because 16 patients had more than one nerve involved after tooth extraction. ** Inferior alveolar nerve

TABLE 5

Cases Caused by an Inferior Alveolar Nerve Block							
Type of Anesthetic	Number of Cases	Usage by LA by den- tists in the U.S.**					
Lidocaine 2% with epinephrine 1:100,000	16	62%					
Prilocaine 4%	1	13%					
Prilocaine 4% with 1/2000,000 epinephrine	11						
Mepivicaine 3%	3	23%					
Unknown*	3	, 					

* In all cases because the dentist had not documented the type of local anesthetic and at least two types were in routine use in the office.

** Personal communication, Astra Corporation, 1998

TABLE 6

Cases Caused by an Inferior Alveolar Nerve Block						
Nerve Involved Number of Cases						
Inferior alveolar	6					
Lingual	23					
Both 5						

temporary nerve involvement following bilateral sagittal split osteotomies has been put as high as 80 percent to 100 percent with an incidence of permanent nerve involvement of about 11 percent.¹⁴⁻¹⁶ The vast majority of the patients in this study were not referred nor seen until several months after the causative incident because any transient neuropraxia would have been expected to resolve by that time. In the case of the relatively small group of patients who were seen in the first few weeks following injury, they were all followed up until any neuropraxia would have been expected to resolve so that all the cases in the study may be considered permanent. Estimates have stated that up to 97 percent of inferior alveolar nerve injuries and 83 percent of lingual nerve injuries recover spontaneously.1 The inferior alveolar

nerve may recover more consistently since it is contained within a bony canal, which helps guides regeneration.

The patients seen in this study are likely to be an atypical group of patients since they have been referred to a tertiary care center. They may well not represent the true incidence and spectrum of the problem. In particular, the number of cases resulting from local anesthetic injections alone may be atypical. This was felt to be a very unusual condition, and it was only following a previous publication¹⁷ that the possibly true incidence of this condition has become more apparent. Following the publication of the aforementioned article,17 the senior author (MAP) has received in excess of 400 telephone calls from dentists around the United States (and some from abroad) describing patients with long-term nerve involvement where the etiological factor could only have been an inferior alveolar nerve block. Those patients were not included in this study, and the only patients included were those who were personally seen and examined by the senior author. Even so, the incidence of this problem would appear to be higher than has previously been supposed. Utilizing the current figures and the approximate numbers applied in the previous article14 where the number of dentists in the San Francisco Bay Area is known and the approximate usage of local anesthetic and the distribution of inferior alveolar nerve blocks is known, it is estimated that long-term nerve involvement may result from approximately one in every 175.000 inferior alveolar nerve blocks. This is four to five times more frequent than previous numbers have suggested¹⁷⁻¹⁹ and still almost certainly underrepresents the condition. As an example, there are no cases of nerve involvement due to

an injection when the dentist was an oral and maxillofacial surgeon since all these patients had surgery that was presumed to be the etiological factor. It is possible that some of the cases where the nerve involvement has been attributed to a surgical procedure may in fact have the local anesthetic injection as the etiological factor; but this could never be determined, and the nerve involvement has been ascribed to the surgical procedure. When the proportion of each local anesthetic used nationally in the United States is considered (TABLE **s**), it does appear that prilocaine may be overrepresented and mepivicaine underrepresented; but the numbers are small and local usage in the San Francisco Bav Area may not mirror national figures.

The difference in the referral rates in females as opposed to males with nerve involvement is hard to explain when it is assumed that the incidence of the condition would not have a gender bias. It is possible that some of the same etiological factors are involved as in temporomandibular joint dysfunction, where the incidence may be equal between the sexes, but females present more frequently to a referral center.²⁰

One interesting figure is the 40 percent increase in lingual nerve involvement in relation to the removal of tooth No. 32 compared with No. 17. This may be a statistical anomaly due to the relative small numbers in the study, but it could also be of clinical importance. Since most dentists are right-handed and, in the United States, both tooth No. 32 and No. 17 are normally taken out from the right side, there are some fundamental differences in removal technique. In removing bone for tooth No. 17, one is basically working forehand, whereas removal of No. 32 involves working backhand for a right-handed

surgeon. This may create problems in some cases. Additionally, one should have relatively better visibility for tooth No. 32 as opposed to No. 17 if one is sitting on the same side, and this may produce overconfidence and perhaps a greater tendency to curette the socket aggressively or remove follicular remnants on the lingual side, where the lingual nerve may become involved.

The criteria for surgical exploration and possible nerve repair are evolving. During the time span of this study, the authors' criteria stated that nerve surgery was offered to anyone with less than 30 percent of residual feeling (tested with Von Frey's hairs, twopoint discrimination, and Minnesota thermal discs) and to those patients with dysesthesia that was materially affecting their quality of life. With total anesthesia, patients were offered surgery at two to three months, while paresthesia patients were offered surgery at four to six months if there had been no improvement for two months. Dysesthesia patients were offered surgery at two to three months if the condition was not improving. It was believed that 27 patients fulfilled these criteria; but, of these, only 14 underwent surgical exploration and possible repair. In some cases, patients declined because they did not wish to undergo further surgery or did not wish to accept the possible risks and complications. In some cases, there were financial implications that caused patients to decline surgery.

The fact that at least 40 percent of these patients were involved in litigation is of obvious concern. The incidence may have been higher since this figure represents only those patients who spontaneously offered this information or from whom a communication had been received from an attorney. Patients were not actively questioned on this point.

Cases caused by root canal treatment or implant insertion were all inferior alveolar nerve cases where the treatment was performed posterior to the mental foramen. It seems obvious that implant insertion and endodontic treatment carried out posterior to the mental foramen must have adequate preoperative radiographic identification of the inferior alveolar nerve and suitable precautions to avoid its involvement, which in some cases would mean not carrying out the treatment. The eight cases associated with orthognathic surgery were all sagittal split osteotomies. Six were inferior alveolar nerves, and two were lingual nerves. Of the seven cases related to periodontal surgery, five were lingual nerve involvement related to the distal wedge procedure, and two were a mental nerve related to a crown lengthening procedure (one carried out by a periodontist and one by an endodontist). It does appear that some distal wedge techniques in the retromolar area may place the lingual nerve at risk when one considers that in from 15 percent to 20 percent of cases, the lingual nerve may be placed anatomically superiorly18-20 and thus may not be protected by the lingual plate of bone.

Conclusion

It would appear that permanent nerve involvement to the inferior alveolar and lingual branches of the trigeminal nerve as a result of dental treatment remains a problem. The most common single cause would appear to be associated with third-molar removal; but, among other causes, iatrogenic involvement from an inferior alveolar nerve block appears to be a significantly underrecognized problem. Many cases are not preventable, which raises the issue of informed consent. Although surgical correction is available in some cases, the results are suboptimal.

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Cost-Effectiveness Model for the Prevention of Early Childhood Caries

FRANCISCO J. RAMOS-GOMEZ, DDS, MSC, MPH, AND DONALD S. SHEPARD, Ph.D.

ABSTRACT This study presents and illustrates a model that determines the cost-effectiveness of three successively more complete levels of preventive intervention (minimal, intermediate, and comprehensive) in treating dental caries in disadvantaged children up to 6 years of age. Using existing data on the costs of early childhood caries (ECC), the authors estimated the probable cost-effectiveness of each of the three preventive intervention levels by comparing treatment costs to prevention costs as applied to a typical low-income California child for 5 years. They found that, in general, prevention becomes cost-saving if at least 59 percent of carious lesions receive restorative treatment. Assuming an average restoration cost of \$112 per surface, the model predicts cost savings of \$66 to \$73 in preventing a one-surface carious lesion. Thus, all three levels of preventive intervention should be relatively cost-effective. Comprehensive intervention would provide the greatest oral health benefit; however, because more children would receive reparative care, overall program costs would rise even as per-child treatment costs decline.

AUTHORS

Francisco J. Ramos-Gomez, DDS, MSc, MPH, is an assistant professor in the Department of Pediatric Dentistry at the University of California at San Francisco and the director of Pediatric Services at San Francisco General Hospital. Donald S. Shepard, PhD, is a research professor at the Institute for Health Policy, Heller School, Brandeis University. ost children seeking emergency treatment are affected by early childhood caries (ECC), also known as baby bottle tooth decay

or nursing caries. ECC is a complex, multifactorial disease causing severe decay of primary teeth. ECC poses a serious threat to child welfare, particularly among young disadvantaged children. The overall prevalence of ECC varies from 5 percent to 72 percent, depending on diagnostic criteria, age, race, and population. ECC can manifest itself in severe pain, infection, abscesses, or chewing difficulty and can lead to malnutrition, gastrointestinal disorders, and low selfesteem. Decay of primary teeth can affect children's growth, lead to malocclusion by adversely affecting the correct guidance

of the permanent dentition, and cause poor speech articulation. Studies have also shown that ECC may be associated with the future decay of the permanent dentition. ECC patients generally cannot be managed in the dental chair and, therefore, need anesthesia for treatment. All of these factors make this disease very expensive to treat, and many of the parents of these patients cannot afford to follow their dentist's recommendations. The population most in need of medical and dental care for ECC does not receive it because of the scarcity of funds, lack of insurance to pay for regular preventive dental visits, and difficulty in gaining access to dental providers.

If diagnosed early, ECC is preventable. To stem the incidence of this infectious disease, the American Academy of

Frequency and Cost of Each Intervention Component

Item	Risk Assessment	Preventive Treatment	Counseling	Incentives and Outreach
Frequency age 1	1.0	1.6	1.6	1.6
Frequency age 2	1.0	3.0	3.0	3.0
Frequency age 3	1.0	2.2	2.2	2.2
Frequency age 4	1.0	1.5	1.5	1.5
Frequency age 5	1.0	1.5	1.5	1.5
Total frequencies*	3.8	7.3	7.3	7.3
Unit cost per component	\$25	\$30	\$25	\$10
Cost in total cohort**	\$95	\$219	\$183	\$73

5-Year cumulative costs – minimal: \$314

5-Year cumulative costs – intermediate: \$497

5-Year cumulative costs – comprehensive: \$570

* Total frequencies are based on the assumption that 75 percent of the recommended services would be utilized.

** Cost in total cohort is total frequencies multiplied by cost per intervention.

Pediatric Dentistry and the American Academy of Pediatrics recommend that children have their first dental visit by their first birthday. The academies recommend this proactive, preventive approach to counsel parents about the need for preventive dental care and to explain the expected milestones in dental development, as highlighted in the Anticipatory Care Guidance for Children's Dental Health.¹ Counseling visits for parents should cover topics such as oral development, fluoride intake, oral health and hygiene, eating habits, and the prevention of injuries. Preventive treatment provided prenatally for mothers is also an important element in inhibiting caries development in children. Early childhood dental visits combined with appropriate prenatal care for mothers may help to prevent or delay the formation of early childhood caries. Effective anticipatory care guidance consists of appropriate risk assessment and monitoring for children combined with parental counseling visits.

ECC is a preventable disease that unnecessarily affects the most vulnerable population. However, general dental practitioners can make a significant contribution to preventing this illness by welcoming young children into their practices. The protocols for preventing this disease are easily understood and implemented, and they can be readily integrated into general practices. Anticipatory care guidance measures provide dentists with an opportunity to help parents enhance the oral health of their children; at the same time, the dentist can reinforce positive oral health behaviors among all family members.

Background

Prevalence

Low estimates of the prevalence of caries among disadvantaged children age 3 to 5 years range up to 15 percent in fluoridated communities and up to 20 percent in nonfluoridated communities.²³ A recent California study reported the following prevalence rates among disadvantaged children age 8 months to 7 years when various diagnostic criteria were applied:

 Presence of any labiolingual lesion on the maxillary incisors -- 27 percent;

- Presence of at least 2 carious maxillary incisors -- 32 percent;
- Presence of at least three carious maxillary incisors -- 27 percent
- Five or more decayed, missing and filled teeth -- 36 percent.⁴

Another study on prevalence found that 50.2 percent of Native American Head Start children age 3 to 5 years had ECC.⁵

Costs

The cost of treating one child for ECC has been estimated to range from \$700 to \$1,000.⁶ Current dental practice recommends that these lesions be treated to help prevent caries in the permanent teeth and to guide the eruption of the permanent dentition. Cook found that the mean total cost of restoring an ECC patient requiring general anesthesia in a Choctaw Indian population was \$2,142.⁵

A study of Canadian aboriginal children addressing issues related to the cost of treating ECC found that travel by the child and family to distant centers for treatment under general anesthesia by pediatric dentists was the usual method of treating affected children.⁷ Records of 884 children treated for ECC from 1980 to 1988 in Manitoba and related data on travel, lodging, medical, dental, hospital, and nursing costs indicated that treatment was significantly more expensive for the more remote groups than for those located closer to treatment centers (p < 0.001). This difference was primarily the result of travel and medical costs associated with hospitalization and the administration of general anesthesia. These findings suggest that resources should be allocated on the basis of regional need and that the development of community-based preventive programs and treatment programs could potentially save substantial treatment costs in preschool Canadian aboriginal children.⁷

Incidence Parameters Used in Estimation (Nonfluoridated Areas) With No Preventive Intervention

	Year 1	Year 2	Year 3	Year 4	Year 5	Average
Percent of children at high risk of ECC	20	40	40	45	50	39
Number of teeth/surfaces	10/50	20/100	20/100	20/100	20/100	18/90
New carious surfaces, low-risk child	0.50	1.00	1.00	1.00	1.00	0.90
New carious surfaces, high-risk child	2.40	4.80	4.80	4.80	4.80	4.32
New carious surfaces, average risk for children*	0.88	2.52	2.52	2.71	2.90	2.31

* Average risk is based upon 61 percent of children being low-risk and 39 percent of children being high-risk, as shown in the first row of the table.

Ramos-Gomez demonstrated that the cost of treatment for ECC in disadvantaged children in Northern California increased with the number of decayed, missing or filled teeth (dmft), ranging from \$408 for dmft two through five to \$1,725 for dmft 16-20.⁴ Many patients failed to comply with recommended treatment for reasons of cost. This study showed that:

- The prevalence of ECC varies depending upon the clinical criteria used for diagnosis;
- The cost of rehabilitating primary dentition increases in proportion to the number of teeth involved; and
- Parents of low-income patients avoid treatment of ECC for a variety of reasons related to the cost.

Although the proportion of affected children who receive restorative dental care is unclear, the potential costs associated with ECC are clearly large.

Effectiveness

Approximately 5.9 million U.S. children younger than 6 live in poverty.⁸ If 15 percent of these children each received \$408 in restorative dental care (the lowest of the above estimates), the cost of treatment for caries in this population would be \$361 million. Despite the large costs associated with ECC, no studies have examined the cost-effectiveness of ECC prevention programs. One impediment to such studies is the paucity of information about the effectiveness of preventive interventions for caries in children younger than 6. However, one recent study found that a fluoride varnish regimen reduced ECC by 40 percent to 51 percent among children age 4 to 5.9 Furthermore, fluoride varnish treatments inhibit ECC with reductions of up to 50 percent to 70 percent in pit and fissure surfaces and even higher in approximal surfaces.^{10,11}

In this paper, the authors have estimated the cost-effectiveness of prevention programs for ECC in a hypothetical cohort of 1-year-old children followed over a five-year period, making assumptions about the costs and impacts of a proposed program based on available evidence and, in some cases, clinical judgment. Although many of the estimates, admittedly, have wide margins of error, the cost-effectiveness analysis reported herein provides useful magnitudes and should serve as a useful conceptual framework for the guidance of policy in this area. Due to the lack of research data on this population of very young children, the estimates were based on information that came from a variety of sources, based on different experiences, and may be subject to limitations to its external validity. Because of these limitations, the estimates presented are not offered as definitive outcome measures, but rather as preliminary figures that may serve to guide policy makers until this model can be enhanced.

Study Methods

Definitions of Preventive Interventions

The authors analyzed three preventive interventions incorporating successive components of the Anticipatory Care

Guidance: minimal, intermediate, and comprehensive, which incorporate four treatment components. The proposed minimal preventive program has two components: risk assessment and preventive treatment. The intermediate intervention adds another component, counseling. The comprehensive intervention adds a final component, outreach and incentives.

Treatment Components

- Risk assessment. Risk assessment is based on studies that indicate that the primary predictor of future caries is parental caries, sibling caries, inappropriate feeding practices, and characteristics of the behaviors of the parents or caregivers. Although some costly laboratory techniques can enhance risk assessment, for purposes of this study, the risk assessment would be based on information given at one annual visit to a pediatric dentist, beginning at age 1 year. Assumptions of risk assessment are presented under Incidence Rates.
- Preventive treatment. Preventive treatment is the application of fluoride varnish by a dental hygienist at sixmonth intervals based on the regimen of Twetman and colleagues.⁹
- Counseling. Based on the same

Cost-Effectiveness (Cost per Carious Surface Averted – Over Five Years)

Type of Intervention	Effectiveness (from "Study, Results" in text)	5-Year Cost (From Table 1)	Effect (Number of Carious Surfaces Averted)*	Cost Per Carious Surface Averted**			
Minimal Exam and varnish	40%	\$314	4.32	\$72.69			
Intermediate Exam, varnish, and counseling	70%	\$497	7.32	\$65.74			
Comprehensive Exam, varnish, counseling, and outreach	80%	\$570	8.36	\$66.28			

* The effect estimates are based on the assumption that the number of carious surfaces over five years with no intervention would be 10.80. This is based on an annual incidence of 2.16 carious surfaces per child, multiplied by five years of exposure. The figure 2.16 carious surfaces per child is the result of 84 percent of children living in nonfluoridated areas developing 2.31 caries annually, as shown in Table 2, and 16 percent of children living in fluoridated areas developing 1.38 caries annually. ** Cost per carious surface averted is the result of five-year cost divided by number of carious surfaces averted. Cost per carious surface averted assumes no treatment was provided, the most conservative assumption.

recommendations as those for risk assessment, counseling of parents or caregivers would entail additional visits if the child is at high risk. The desired outcome of the counseling visits, besides delivering good oral health education, would be to achieve behavioral change in specific practices, and they would cover the topics of oral development, fluoride, oral hygiene/health, habits, nutrition and diet, and injury prevention, addressing age-specific issues for each topic according to the Anticipatory Care Guidance.

For example, a discussion of nutrition and diet for ages 6 to 12 months would focus on the issues of ECC tooth decay pattern and the role of consistency of sugar in caries, with recommendations to encourage weaning at the appropriate time. At 12 to 24 months, the issues would include plaque and the role of frequency of sugar in caries, with discussions of carbohydrates contributing to caries as well. From 2 to 6 years, the focus would shift to snacking and sugar intake at home and at school, the use of food to reinforce behavior. and the relationship of a healthy diet to oral health, with advice to review the child's diet and to refrain from using food as a behavioral tool. Each topic is similarly outlined with issues and actions

according to these age groups.

 Outreach and incentives. Outreach and incentives are intended to reinforce attendance at the annual assessments and to reinforce practice of the habits recommended in the counseling visits. The outreach consists of telephone and personal prompts as well as advocacy by a public health dental hygienist, as practiced in the Spokane Access to Baby and Child Dentistry Program of the Spokane Dental Prevention Project in Spokane, Wash. That program alleviated disruptions arising from broken appointments and bringing siblings to the dental office.¹² The outreach is estimated to cost \$4 per patient, based on the labor cost of the public health dental hygienist. Incentives are assumed to consist of a \$5 voucher for toys or a prepaid phone card. The incentives are contingent on increases in the assessed knowledge of the caregiver (e.g., not putting a child to sleep with a bottle) and favorable results of risk assessment. One-third of Medicaid recipients are assumed to be eligible for a \$3 transportation benefit, which, when spread over all patients, results in an average cost of \$1 per visit. The \$10-per-child cost of the incentive and outreach

intervention is the sum of the \$4 outreach cost, the \$5 incentives cost, and the \$1 transportation benefit cost.

Derivation of Cost Savings

- Prevention costs. The estimated cost of each intervention was based on 1996-97 California Dental Medicaid (Denti-Cal) reimbursement rates13 and rates for the Spokane Dental Prevention Project.¹² **TABLE 1** sets forth the recommended frequencies of the interventions and their costs. Although only 16.8 percent of children age 1 through 5 received an initial assessment in 1993 under Medicaid,14 for this paper, the authors estimate that 75 percent utilization rates would be achieved for all interventions, based on preliminary results from the Spokane Dental Prevention Project.
- Treatment costs. Treatment costs were derived from a group of 115 patients with ECC treated at the pediatric dental clinic at the University of California at San Francisco in 1992. Patients were assigned to the following four categories, according to dmft: 2 to 5, 6 to 10, 11 to 15, and 16 to 20. The average cost of treatment for each category was: \$408 (dmft 2 to 5), \$950 (dmft 6 to 10), \$1,488 (dmft 11 to 15), and \$1,725 (dmft 16 to 20).⁴ The overall average

treatment cost per surface (\$112) was calculated by averaging the average cost per surface in each dmft category based on the midpoint of the category (\$117, \$119, \$115, and \$96, respectively).

- Incidence rates. TABLE 2 sets forth the assumptions used to derive incidence rates for the analysis. Based on conservative preliminary data from an underserved group of young children, it was assumed that the proportion of children at high risk of ECC would increase from 0.20 in year 1 to 0.50 in year 5. Second, it was assumed that in the absence of a preventive intervention in a nonfluoridated area. the incidence of ECC would be 10 new carious lesions per 1,000 surfaces per year in low-risk children and 48 new carious lesions per 1,000 surfaces per year in high risk children. The number of new carious surfaces was derived by multiplying the annual carious lesion incidence rate by five (the number of surfaces per tooth) times the number of teeth present. The authors calculated that in the absence of preventive interventions, the annual incidence would be 2.31 carious surfaces per child in a cohort from a nonfluoridated area. In a cohort from a fluoridated area, the incidence of carious surfaces would be 40 percent lower than in a nonfluoridated area, or 1.38 surfaces per child per year. Approximately 16 percent of children in California live in fluoridated areas.15 Thus, in the absence of the proposed preventive interventions, children in California age 1 to 5 years would have an annual incidence of 2.16 carious surfaces per child, which is the weighted average of 2.31 in nonfluoridated areas and 1.38 in fluoridated areas.
- Cost-effectiveness. The term "costeffective" can have varying meanings.¹⁶

The most common meaning is that a proposed intervention produces a superior outcome at a reasonable cost in relation to the improvement achieved.¹⁷ In that case, costeffectiveness is expressed as the cost per unit improvement in outcome. It is calculated as the net cost of the proposed intervention divided by the improvement in outcome. The most stringent meaning of cost-effectiveness, more precisely termed "cost saving," is that a proposed intervention is "less costly and at least as effective" as the status quo.¹⁸

Results

TABLE 3 sets forth the five-year costs associated with the interventions. the effectiveness estimates, the effect estimates, and the costs required to achieve the effects. The cost per carious surface averted was derived by dividing the five-year cost by the five-year effectiveness in carious surfaces averted.¹⁸ The authors assumed that the minimal intervention (exam and varnish) would be 40 percent effective, that the intermediate intervention (exam, varnish, and counseling) would be 70 percent effective, and that the comprehensive intervention (exam, varnish, counseling, and outreach) would reach the goal of 80 percent effectiveness. The 40 percent effectiveness assumption for the exam and varnish intervention was based on the lower bound of effectiveness reported by Twetman and colleagues.⁹ The 70 percent and 80 percent effectiveness assumptions are based on clinical observations at the UCSF Pediatric Dental Clinic. Given these assumptions, the number of carious surfaces averted in each child in the California cohort would range from 4.32 to 8.60 over five years. The intermediate intervention is the most cost-effective, as its cost per carious surface averted is

the lowest (\$65.74). Dividing the cost per carious surface averted (\$65.74) by the cost of treatment per surface (\$112) yields a cost saving threshold of 59 percent. Thus, the authors' proposed interventions would be cost saving if at least 59 percent of the carious surfaces would have been treated. While current treatment rates are probably lower in disadvantaged children, these treatment rates are already reached in less deprived populations and will be met in the future in poorer populations.

Discussion

This study was limited by the shortage of data that address the cost of treatment, the cost of prevention, or the effectiveness of preventive interventions for carious lesions in children vounger than 6. Although the authors have used the best available data, the margin of error for the estimates is admittedly large. Future studies should test the accuracy of the assumptions with respect to the cost of treatment and prevention and the effectiveness of preventive interventions. Among the factors that should be addressed by future research are lack of compliance with the recommended regimen, loss to follow-up, in-migration and out-migration, the time out of work for the parents, and the psychological trauma for a child to undergo emergency dental treatment at such an early age.

Conclusions

Policy makers should consider subsidizing and promoting preventive interventions for ECC for two reasons: First, the interventions will have a substantial impact on the oral health of a particularly vulnerable population of children, reducing ECC by 40 percent to 80 percent as assumed in the study results. Second, when the cost of the interventions is compared to the cost of treatment, part of the costs will be offset by savings in treatment costs. Furthermore, the interventions are likely to save costs as dental treatment becomes more widespread. Moreover, the increased benefits would include ensuring that the first dental visit for a very young child is free of pain and trauma, increasing acceptability of dental procedures, and, most important, improving access to oral health for children from underserved communities at risk. Federal, state, and local agencies would experience considerable savings in treatment costs, which could then be used for more vast and effective preventative and innovative programs for the enhancement of oral health and oral disease prevention targeted for pregnant women, babies, and preschool children.

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The Dentist, HIV and the Law: Duty to Treat, Need to Understand

DAVID I. SCHULMAN, JD

ABSTRACT An understanding of three areas of law — anti-discrimination, workplace safety, and privacy and confidentiality — is helpful to dentists in meeting their responsibilities to treat HIV-infected individuals. This understanding also will assist in establishing a practice atmosphere in which HIV-infected patients will feel comfortable enough to fully disclose their condition and discuss treatment options with the care provider.

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Editor's note: Because of a perceived need for continued attention to the legal considerations governing treatment of HIVinfected patients in the dental office, David I. Schulman, JD, author of the well-received 1993 CDA Journal article "The Dentist, HIV and the Law: Duty to Treat, Need to Understand" was asked to write a new article updating changes in this area. His response was that, except for a recent decision in a key court case and a few changes to the references, the original article still reflects the current law on this topic. For our readers' benefit and understanding of this complex issue, we are reprinting the original article with a new author's preface to make note of that important court decision.

uthor's preface: I am pleased to write a new author's preface to the article, "The Dentist, HIV, and the Law: Duty to Treat, Need to Understand," which originally appeared in the September 1993 issue of the CDA Journal as part of an issue on HIV and dentistry.

The original article discussed the three important areas of law that dentists should understand in order to meet their responsibilities to HIV-infected patients, as well as their staffs: antidiscrimination, workplace safety, and privacy and confidentiality. Those three areas remain the three foundations for proper handling of HIV and AIDS issues within the dental office. So, why reprint the article? And why should those who read it the first time read it again? The answer lies in the renewed attention about dentists and AIDS discrimination generated by one of 1998's most closely watched U.S. Supreme Court cases. Bragdon v. Abbott¹. concerned a dentist's claim that he had a right to refuse to treat a person with HIV because of the infectious risk she posed.

Our office filed a friend of the court brief in Bragdon, and cited our Journal article to the court.a So we were pleased when the Supreme Court, in its ruling handed down last June, held that dentists do have a duty to treat people with HIV. In so holding, the court rejected Bragdon's claim that courts should defer to his assessment of whether a patient with HIV posed too much risk to him, his staff, or other patients. Instead, the court ruled, deference should be given to the opinion of public health officials, because they are the ones best trained to assess risk. Bragdon could present evidence to rebut their conclusions, but he could not claim that his opinion about the infectious risk posed by Sidney Abbott, the HIV-positive patient in the case, should override that of public health officials.

Some historical perspective helps explain the fears of those like Dr. Bragdon.

The advent of the AIDS epidemic marked the end of a brief "golden age" of infectious disease control that began with the first polio vaccine in 1954, and ended in 1981 with the first AIDS case reports. That brief golden age was when many professionals were trained in their fields. It was a time when everyone – dentists, infectious disease specialists and the public, alike – came to believe that the eternal threat of epidemics had been vanquished forever, at least for those nations wealthy enough to afford the latest technology.

So it was a great shock when AIDS appeared and undermined our sense of invulnerability. Those coming into dentistry today know about bloodborne infectious risks. But for those who grew up or were trained during that brief golden age, their shaken sense of invulnerability sometimes translates into mistrust of the data, and of those responsible for assessing it. Bragdon resoundingly rejected those fears.

While the citations in the original article are to California cases and statutes, its basic approach is useful anywhere in the United States. And while it is written specifically for dentists, the analysis is applicable to all health care providers' duty to treat – and, it is hoped, to care.

Dentists are often the first to notice the clinical changes that signal the onset of symptomatic HIV disease, making them vital to helping HIV-infected people maintain good health. Yet too frequently the relationship between the dentist and the HIV-infected patient is adversarial.

Patients hide their status, even when they know they are withholding information important to their care, because of discrimination and rejection experienced with other dentists. In turn, this mistrust and lack of candor makes caring providers feel frustrated and abused.

How can the tensions in this important relationship be changed?

The purpose of this article is to lessen such tensions by acquainting dentists with HIV-related law, and the policies and purposes behind such regulations. In doing so, we hope to assist in establishing an atmosphere of confidence and trust – for all dental patients, office staff and dentists.

The author brings a unique perspective to this discussion: the AIDS/ HIV Discrimination Unit of the Los Angeles City Attorney's Office is the only government agency in the country that both enforces an AIDS civil rights law and advises a large employer, the City of Los Angeles (an employer of 40,000), regarding its own legal rights and duties. While the city does not have dentists on staff, its police, firefighters, paramedics and medical staff face similar challenges – and responsibilities.

This article shares an approach that has proved useful in assisting city staff to meet their responsibilities. This approach requires an understanding of three legal areas – anti-discrimination, workplace safety, and privacy and confidentiality law.

Practice tips to help the dentist meet legal responsibilities and establish an atmosphere in which HIV-infected patients will feel comfortable fully disclosing their condition also are offered.

Do not rely on this article to answer specific legal questions. These should be reviewed with your own attorney, though he or she may find this a useful resource.

HIV is Bloodborne

Together, non-discrimination, workplace safety, and privacy and confidentiality law form a framework for understanding AIDS legal duties. This framework rests upon a fundamental finding that requires discussion first – that HIV is bloodborne. HIV legal analysis depends upon this finding, for very different rights and responsibilities would follow if HIV's vector of transmission were different – if it were airborne, for example.

That HIV is bloodborne is as solid a foundation upon which to base law and policy as are other findings that we base decisions upon every day. It has been examined in courtrooms across America dozens, if not hundreds, of times. In case after emotional case involving such highly charged issues as the right of HIVinfected children to attend schools, courts have regularly upheld this foundational matter.

We emphasize this finding's firmness because so many insist, when it comes to HIV, that they receive absolute assurance ... despite the fact that science, of course, cannot provide such assurance about anything.

This wish for certainty is understandable, for HIV is frightening. It helps, however, to place it in context.

Science's tremendous breakthroughs

the identification of microbes that cause disease, the emergence of antisepsis and sanitation, the discovery of antibiotics
led many professionals and laypeople alike to believe that epidemics had now become things of the past, at least for industrialized nations.

Because we thought we had forever rid ourselves of this fundamental terror, the advent of an epidemic, of a previously unknown pathogen with a different vector of transmission, revived the ancient impulse to scapegoat and blame – and gave it added virulence. In America, this impulse was made worse yet, because HIV broke out first among already stigmatized groups – gays and IV drug users. Because of the intersection of IV drug use, poverty and race, many were further stigmatized because they were African American or Hispanic.

Our shock that there was a new epidemic at all combined with the fear of those who are different, of those with disease, and of death itself, to create the discrimination problems antidiscrimination law combats.

AIDS Anti-discrimination Laws

The City of Los Angeles enacted the nation's first AIDS anti-discrimination law in August 1985, the month following the disclosure of Rock Hudson's illness. Today, AIDS discrimination is illegal throughout the United States under the Americans with Disabilities Act of 1990 and the Federal Rehabilitation Act of 1973, as well as many state and local statutes. In California, the Fair Employment and Housing Act was amended to include HIV in its definition of disability, and the Unruh Civil Rights Act prohibits discrimination in the provision of services.

Such laws combat the impulse to scapegoat and blame by extending to people with HIV the same protections that society has evolved for all who are disabled. Under such laws, dentists may not refuse to treat HIV-infected people, just as they may not refuse to treat other disabled people – or members of other groups that have been singled out historically for discrimination, such as African Americans, women, or Jews.

Civil rights laws do not require dentists to treat every black person, woman, Jew, or disabled patient who seeks care. For instance, an African American patient with a problem a dentist is not qualified to treat should be refused care and properly referred to a specialist, just as any patient presenting a problem beyond the scope of a dentist's competency should be.

These laws do require, however, that stereotypes, generalizations, misapprehensions and prejudices about such groups not be applied to individuals. For instance, dentists cannot refuse to treat African Americans because of bigotry or prejudice.

Similarly, disability right laws require that overly broad generalizations about disease be set aside in favor of individually based evaluation. For instance, dentists may not refuse to treat all heart patients. However, those who have just had openheart surgery who are too medically fragile to be treated in a private operatory should be referred to care in a more sterile environment.

In just the same way, dentists can't refuse to treat all HIV-infected patients. For instance, asymptomatic HIV patients should never be refused care merely because they have HIV, because asymptomatic patients, by definition, present no clinical symptoms that might be beyond the scope of a dentist's competency and training.

On the other hand, an HIV-infected patient with a tooth in the middle of a Kaposi's sarcoma lesion that needs to be extracted should be referred to an oral surgeon, just like other patients requiring complex extractions.

The key in all cases is an individualized approach based on each person's particular condition.

Dentists may not plead ignorance as a reason for refusing to treat HIV-infected

patients. As professional codes of conduct and community standards of practice make clear, dentists must know about HIV just as they must know about other common medical conditions.

Nor may dentists refuse to treat HIV-infected patients because they are infectious.

The U.S. Supreme Court in 1987 established a two-part test for determining when an infectious risk was so great that it justified discrimination. In School Board v. Arline,² the court held that, before discrimination was justified, (1) the risk to others must be reasonably accommodated and (2) the remaining risk must still be significant.

Studies have shown3 that HIV poses nothing remotely approaching a significant risk of transmission in dental or health care settings even without reasonable accommodation. With reasonable accommodation – that is, proper infection control, which is discussed in the next section – HIV's already remote risk is reduced even more.

Workplace Safety

Dentists and others who encounter blood in the workplace used to maintain a two-tier approach to workplace safety to protect against exposure to bloodborne disease. For patients showing clinical signs of disease, heightened precautions involving barriers, disinfection and waste disposal were used. For all others, blood was handled more casually.

Following the discovery of slow-acting viruses in the mid-1970s, the dangers of this approach became apparent. People infected with slow-acting viruses (called lentiviruses, from the Latin word for "slow") are always infectious even though they might not become ill for years. A workplace safety system, then, that required precautions only when someone appeared ill protected staff from only a small portion of those who actually posed risk. The result was a substantial rise in hepatitis B infection rates among dentists and other health care workers.^{4,b} In response, experts proposed that this two-tier approach to workplace safety be abandoned in favor of one that treated all blood, at all times, from all sources, as if it were infectious – a strategy called universal precautions.

Universal precautions were developed because of the threat posed by hepatitis B. By 1985, however, the Centers for Disease Control and Prevention recommended them to prevent transmission of HIV, another lentivirus, though one far less infectious than hepatitis B.5

State and federal law now require the use of universal precautions,^{4.6.7} and the failure to maintain them is deemed to be unprofessional conduct by the California Patient Protection Act of 1991.⁷ CDC has issued dental infection control recommendations that discuss universal precautions in detail.8

Since universal precautions require the same high standard of infection control for all patients, it is discriminatory to impose a surcharge for such measures for HIV-infected patients.

There is another interesting policy consequence of the "universal" nature of universal precautions. Not only is disclosure not necessary for staff safety, it can actually increase risk. This conclusion seems counterintuitive initially. It seems obvious that disclosure would lead dentists to be more careful with infected patients, even if they followed universal precautions properly – that is, for everyone. Studies by occupational safety specialist Dr. Julie Gerberding at San Francisco General Hospital suggest, however, that such hypervigilance may actually be counterproductive.

In fact, Dr. Gerberding's research suggests that hypervigilance may increase exposure rates because staff, self-conscious about their patients' status, become awkward in their surgical procedures and techniques.^{9,c}

Disclosure can also actually increase risk by leading staff to assume it's OK to revert to more casual precautions for patients who aren't known to be infected - but may be.

The Los Angeles City Attorney's Office recently recommended that the city's fire department not broadcast the HIV status of rescue victims to paramedics because of these staff safety disclosure concerns, a recommendation the department has adopted.¹⁰

Privacy and Confidentiality

Once HIV anti-discrimination and workplace safety principles are understood, HIV privacy and confidentiality protections make sense.

Dentists do not have the right to require disclosure of HIV test results so they can refuse to treat because disability rights law prohibits refusing to treat solely on the basis that a patient is HIV-infected.

Similarly, dentists have no right to require disclosure so they can decide when to take proper safety precautions because state law requires that such precautions be in place at all times, with all patients.

Dentists arguably have the right to require disclosure when it is relevant to proper patient care and treatment, just as all relevant medical information should be disclosed.

Many HIV-infected patients, however, admit lying on medical questionnaires for fear, often based on many painful experiences, that they'll be refused care if they disclose truthfully. Such behavior is not in the patient's own best interest, nor does it foster trust and goodwill with his or her dentist.

Dentists, then, face two privacy challenges – establishing an office environment in which HIV-infected patients trust they can be candid about their condition and properly protecting such information when it is disclosed.

At the end of this article there are suggestions to help make patients feel safe enough to make full disclosures. In this section, though, we discuss your duty to protect such information when you receive it.

The law has long extended special privacy protection to information, such

as a diagnosis of mental illness, that is especially likely to lead to stigma and discrimination if disclosed.

The law has begun to extend such special protection to HIV information, but since this area of law is still evolving, dentists must consult their own attorneys to determine its precise impact on their practice.

Three levels of protection have emerged so far: general statutory and common-law privacy protections, special HIV laboratory test result protections, and state and federal constitutional privacy protections.

1. General Statutory and Common-Law Duties

The first level of HIV privacy protection is the dentist's general statutory and common-law duty to protect all medical information in his or her possession because such information is disclosed only for the purpose of the patient's care.

Not so long ago, dentists, physicians and other care providers were more aware of the need to protect patients' privacy because the stigma caused by fear and ignorance about many medical conditions was common. More recently, however, sensitivity to patient privacy has decreased as scientific knowledge replaced myth and ignorance about so many conditions. It has decreased, as well, as disclosure to third parties – insurance companies and utilization review committees, for example – has become so common.

As the damaging consequences of disclosure have diminished, care providers have had little incentive to remain vigilant about protecting privacy since lawsuits would only be filed when damages could be proved.

Fear and ignorance about HIV has dramatically reversed this trend. Wrongful disclosure of HIV information can result in substantial injury, including loss of employment, cancellation of insurance, eviction, even abandonment by family and friends. To protect against the substantial liability for consequential and punitive damages they can face under general statutory and common law privacy provisions, dentists should re-educate themselves about their general duties to protect patient privacy.

2. Health and Safety Code Provisions

The second level of HIV privacy protection specially protects HIV laboratory test results. These provisions, codified as Chapter 7, Part 4, Division 105 of the California Health and Safety Code,d impose special statutory duties regarding HIV testing and disclosure.

Since Chapter 7 imposes special duties and burdens, it helps to understand its background. It was originally enacted in 1985, at the time the HIV test was first licensed to protect the state's blood supply, in response to public health concerns that arose with the HIV test's first commercial availability.

One concern was that if the test were not available elsewhere, people wishing to learn their HIV status would donate blood for that purpose. This caused concern since no screening test could be 100 percent reliable: More high-risk individuals donating blood could mean more false-negative blood entering the blood supply. In response, legislation was enacted to create special alternative, anonymous test sites.

The second concern was to create an incentive for people to get tested despite the fear they might become victims of discrimination. Chapter 7 was enacted in response.

Chapter 7 (beginning at Section 120975e of the Health and Safety Code) requires special patient consent before an HIV test may be conducted, imposes special civil and criminal penalties for unauthorized test result disclosures, requires specific written authorization for each disclosure, prohibits use of the test for health insurance or employment purposes, and forbids unauthorized test result disclosure, even in response to a subpoena. To guard against unauthorized disclosure, many dental and health care providers chart test results in a separate portion of the patient's chart on a different color of paper, and train their records staff never to include them in filing insurance claims or in response to other record requests.

Despite the important public policy purposes of Chapter 7, its provisions have been the source of some confusion and concern. As originally enacted, many believed it prohibited a member of the test subject's health care team, who was authorized to receive the test result, from disclosing it to another member of the team who was not specifically authorized to receive it. A subsequent amendment remedied this problem so that now a single authorization permits all care providers access to the test result for the purpose of patient care.

Another problem was Chapter 7's scope. Since its purpose was to halt discrimination by protecting privacy, many thought that it prohibited disclosure of such statements as "I'm HIV positive" as well as the actual laboratory test results, since such statements derive solely from the test. Some even thought it included such statements as "I have AIDS," since they, too, usually are based in part upon a positive test.

A 1991 California appellate court case, Urbaniak v. Newton,¹¹ rejected these more expansive interpretations. In Urbaniak, the plaintiff claimed he disclosed he was HIV-positive to a nurse for the sole purpose of protecting her and others from her unsafe handling of instruments contaminated with his blood, and asked her not to make further disclosures. When she did, he claimed she and those who made subsequent disclosures violated Chapter 7.

The Urbaniak court rejected the plaintiff's claim and ruled, instead, that Chapter 7's scope was limited only to actual laboratory test results. Dentists should consult their own attorneys to determine the impact of Urbaniak on their practice, especially in light of the court's ruling discussed in the section that follows:

3. The Constitutional Right to Privacy

Though the Urbaniak court ruled that the nurse's alleged disclosure did not violate Chapter 7, it did rule that her alleged actions violated California's constitutional right to privacy. Unlike the federal right, which is limited to government action, California's constitutional right to privacy regulates private actions as well – such as the activities of dentists.

"There can be no doubt that disclosure of HIV-positive status may under appropriate circumstances be entitled to protection under [the state's constitutional right to privacy]. The condition is ordinarily associated either with sexual preference or intravenous drug uses. It ought not to be, but quite commonly is, viewed with mistrust or opprobrium. ... [I]t is clearly a private fact' of which the disclosure may be offensive and objectionable to a reasonable [person] of ordinary sensibilities."¹²

It is likely that other courts will conclude that this ruling should be applied to all HIV information – an AIDS diagnosis, a patient's T-cell count or information about HIV-related drugs, for example – since such disclosures are all likely to result in the stigma and discrimination which concerned the court in Urbaniak. A line of federal cases has already begun to extend federal constitutional protection to such information.^{13-16,18}

You must review with your own counsel the impact the imposition of a constitutional duty to protect patient privacy would have on your own practice. We have advised Los Angeles' fire department that we do not believe such protections prohibit further disclosures that are essential to the purpose for which an initial disclosure was made, such as the care and treatment of a patient, for example.¹⁰ It does mean, in our opinion, that courts will, under this standard, strictly scrutinize the reasons for each disclosure, impose heightened duties to protect such sensitive information against improper disclosure, and impose more severe penalties for wrongful disclosures.

Practice Hints

How, then, can the well-intentioned dentist in private practice make his or her way through this still evolving array of privacy requirements and protections?

It helps, first, to remember that HIV privacy laws are emerging in response to a real problem – wrongful disclosure of patients' HIV information can hurt and injure by leading to discrimination. As a federal court observed in one of the earliest HIV privacy rulings,

"[T]here are few matters of a more personal nature, and there are few decisions over which a person could have a greater desire to exercise ontrol, than the manner in which he reveals [an AIDS] diagnosis to others."¹⁷

Dentists, like others in society to whom such volatile information is entrusted, must learn to protect it property. That does not mean, as some have concluded, that such information cannot be used. Indeed, dentists may be under a duty to disclose a patient's HIV information when relevant to proper patient care, such as when making a referral to a specialist. Even HIV laboratory test results may need to be disclosed, with proper authorization pursuant to Chapter 7. How and when this should be done, and with what kind of consent from the patient, should be carefully considered and reviewed with your attorney.

One part of a solution to these issues is to develop record-keeping systems and staff training that ensure that HIV information is properly used, but not abused. This is difficult in an era in which our sensitivity to the need for medical privacy has generally weakened. It is made more difficult still by the fact that patient records are used for many more purposes than when they were kept primarily for the care of the patient.

In developing an approach to protect privacy, it helps to take the time to educate staff well, and to review who has access to all records and why. Review all office record-keeping policies.

Discuss office policies with an attorney. When the need to disclose HIV information arises, such as when you refer patients to a specialist, determine whether special waiver forms should be developed for patients to sign that explain why you need to disclose such information.

These efforts will help establish that you were aware of the importance of patient privacy, and took steps to safeguard it. Should a mishap occur and a patient's information be wrongfully disclosed, a court is far more likely to look favorably upon a practice that sought to protect patient privacy, but failed, than on one that never took steps to address such important issues at all.

What Else Can Dentists Do?

There is a range of other steps dentists can take once they have learned about their duties to treat, maintain a safe work environment, and protect patient privacy.

1. The first and foremost is repeated, effective staff training. Staff should learn why compliance with anti-discrimination, occupational safety and health, and patient privacy protection requirements makes sense so that these fundamentals are not perceived as unreasonable burdens and demands.

2. To protect patient privacy, staff should learn not to post charts where others can see them, and not to talk about patients' conditions in areas of the office where they might be overheard by other patients.

3. An atmosphere should be established in which HIV-infected patients feel free to be candid about disclosing their status. Most don't want to withhold such information because they know it's important to their own optimum, sound treatment. Three statements at the top of your medical intake questionnaire can signal your patients that they can be candid with you:

- This office does not discriminate on the basis of race, sex, sexual orientation, national origin, age, or disability.
- This office is in compliance with the latest state and federal infection control requirements.
- This office protects the privacy of all patients.

Your other patients won't notice the first and last statements, and will be reassured to read the second. Your HIV-infected patients, however, will read between the lines and know that you understand – and care.

Conclusion

Our purpose has been to acquaint dentists with the ways HIV law is evolving a balance between fears and the duty to treat others as we would want to be treated ourselves.

In past epidemics, law often served to justify the scapegoating and blame that so often was a substitute for knowledge and understanding. Today, law serves as a bridge, connecting those who are ill with those who care.

The law cannot mandate understanding. But with understanding, the law's requirements can make sense, allowing us to see ourselves in the other, and our humanity in ourselves.

Acknowledgement

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a. The brief can be found on the Los Angeles City Attorney's website at www. cityofla.org/ATTY/bragdon.htm.

b. The Hepatitis Branch of CDC estimated that, in the 1980s, there were approximately 200 health care worker deaths each year from occupationally acquired hepatitis B, along with 2,100 cases of clinical acute hepatitis and 8,700 infections overall.⁴

c. Dr. Gerberding's colleagues at San Francisco General learned something else that does not at first seem obvious: that surgical gloves may provide protection against needlestick transmission, even when punctured, by reducing the amount of innoculum injected into the skin by at least 50 percent.

d. Note that while this citation is different from the one in the original article, the statutes discussed remain the same; they merely have been renumbered.

e. Section 120975 was originally numbered Section 199.20.

References/

1. 524 U.S. 624 (1998).

2. School Board v. Arline, 480 U.S. 273 (1987).

3. McCray E, Occupational Risk of Acquired Immunodeficiency Syndrome Among Healthcare Workers. New Eng J Med, Vol. 314:1127-32, 1986.

4. U.S. Dept. of Labor, Occupational Safety and Health Administration, 29 CFR Part 1910.1030, Occupational Exposure to Bloodborne Pathogens; Final Rule. 56 Federal Register 64,009, Dec. 6, 1991.

5. CDC, Recommendations for Preventing Transmission of Infection with Human T-Lymphotropic Virus Type III/ Lymphadenopathy-Associated Virus in the Workplace. 34 MMWR 681, 683, 1985.

6. California Occupational Safety and Health Standards Board, Title 8, Calif. Code of Reg., Section 5193 (adopted Jan. 6, 1993). 7. California Patient Protection Act of 1991 (SB 1070) B & P Code §1680 (dd).

8. CDC, Recommended Infection Control Practices for Dentistry, 1993. 42 MMWR, No. RR-8, 1993.

9. Gerberding JL, Littell C, et al, Risk of exposure of surgical personnel to patients' blood during surgery at SF General Hospital. New Eng I Med, 32:1788-93, 1990. 10. Letter from Los Angeles Deputy City Attorney David 1. Schulman to Los Angeles Fire Battalion Chief Dennis R. Keane

re: Disclosure of HIV or AIDS information regarding patients receiving emergency medical services (Dec. 21, 1992). 11. Urbaniak v. Newton, 226 Cal. App. 3d 1128 (1991). Please note that the statutes discussed in the case have since been renumbered by the Legislature. See footnote X, above. 12. Urbaniak, p 1140.

Harris v. Thigpen, 941 F. 2d 1495, (11th Cir. 1991).
 Nolley v. County of Erie, 776 F. Supp. 715, (E.D. NY 1991).
 Doe v. Borough of Barrington, 729 F. Supp. 376 (D. NJ 1990).
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 Doe v. Coughlin, p 1237.

 Woods v. White, 689 F. Supp. 874 (W.D. WI 1988).
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Dr. Bob

Mice Teeth

t is generally conceded that members of the genus Mus have been accorded little respect in our society. They are the Rodney Dangerfields of their species. A research team of scientists sits around in a laboratory, sipping Yoo Hoo and hitting the onion dip while musing over what to try next before their grant expires.

"I know," one of the White Coats says, "let's get a mouse and inject it with something."

"Capital!" the rest agree, and first thing you know some mouse-intensive research is under way from which few rodents will escape without serious emotional trauma. The animal-rights people have been strangely mute on this subject, even though mice are routinely sliced, diced and marinated with every bacterial and surgical insult you can think of in the name of science. Unfortunately, mice have been notoriously lax in practicing any sort of birth control. With a little forbearance, they could have achieved the enviable status of the endangered gnatcatcher, and nobody would dare mess with them.

Only Mickey, Jerry and Mighty have emerged unscathed from this rodent ethnic cleansing, a lesson the balance of the non-union mouse population without agents seems not to have learned. A pity, because the April 1999 issue of the Journal of the American Dental Association records the newest depredation on mousedom being performed at Guy's Hospital in London. We assume the personnel at Gal's Hospital want nothing to do with this outrage, especially if it involves interaction with actual mice.

I quote JADA: "They recently discovered Barx-1, a gene that controls what type of tooth is grown. By blocking a Barx-1 inhibitor called BMP4 (the first three BMPs were already spoken for) -- which causes incisors to grow -- they modified cells in mice that normally create incisors and caused the cells to produce molars." Stay with me here, because this gets a little weird. When the genetically modified cell samples were two or three days old, and without so much as a by-your-leave from the mouse, researchers implanted them just outside an adult mouse's kidney. This mouse had left the room briefly for a little run on the wheel, and in its absence, its buddies "volunteered" it for the kidney/tooth experiment. You can imagine how surprised and honored it felt when it returned to find itself on the OR schedule. "Why me?" were its exact words.

"The kidney is one of the optimum sites for growing teeth," says Paul Sharpe, PhD, a professor of craniofacial development at Guy's Hospital and a member of the research team. I bet you didn't know that -- and you call yourself a dentist! I bet you would have implanted the cells in

Robert E. Horseman, DDS the mouse's jaw someplace, and that's why Paul is on the team and you're not.

Anyway, two or three weeks later, a tooth developed just outside the mouse's kidney, resulting in the mouse having to get up several times during the night, turning on lights and bonking into things to the point where the compassionate researchers removed it and examined it.

"Yessir, that's a tooth all right," they all agreed, placing it carefully under the patient's pillow and referring the confused mouse to its urologist for some post-op treatment.

Now the researchers, flushed with success, say they "want to learn more about which genetic markers and commands are given to cause teeth to form in a certain formation and position." Dr. Sharpe says, "Regrowing teeth would be an obvious aim."

Before you get all flushed yourself with the portents of this amazing discovery, the guys back at the hospital say they hope that in 10 to 20 years their work will lead to teeth being grown on demand. They want to develop a gel containing the genetic material that would form a new tooth wherever it was placed. "Within two or three weeks, a new tooth would grow and work exactly as the lost tooth," Dr. Sharpe exults. The "lost tooth?" Yes! Here is the best part -- the researchers say, ideally, the gel "would be placed in a cavity in the patient's mouth." These scientists are playing pretty loose with the term "cavity." We know what a cavity is, and you don't stuff genetic material in it. Amalgam maybe, or composite resin, so apparently we've got 10 to 20 years to get this straightened out. The point is, their intention is good news for those of us who have enough trouble with our kidneys as it is. But who is going to explain this to the mouse?