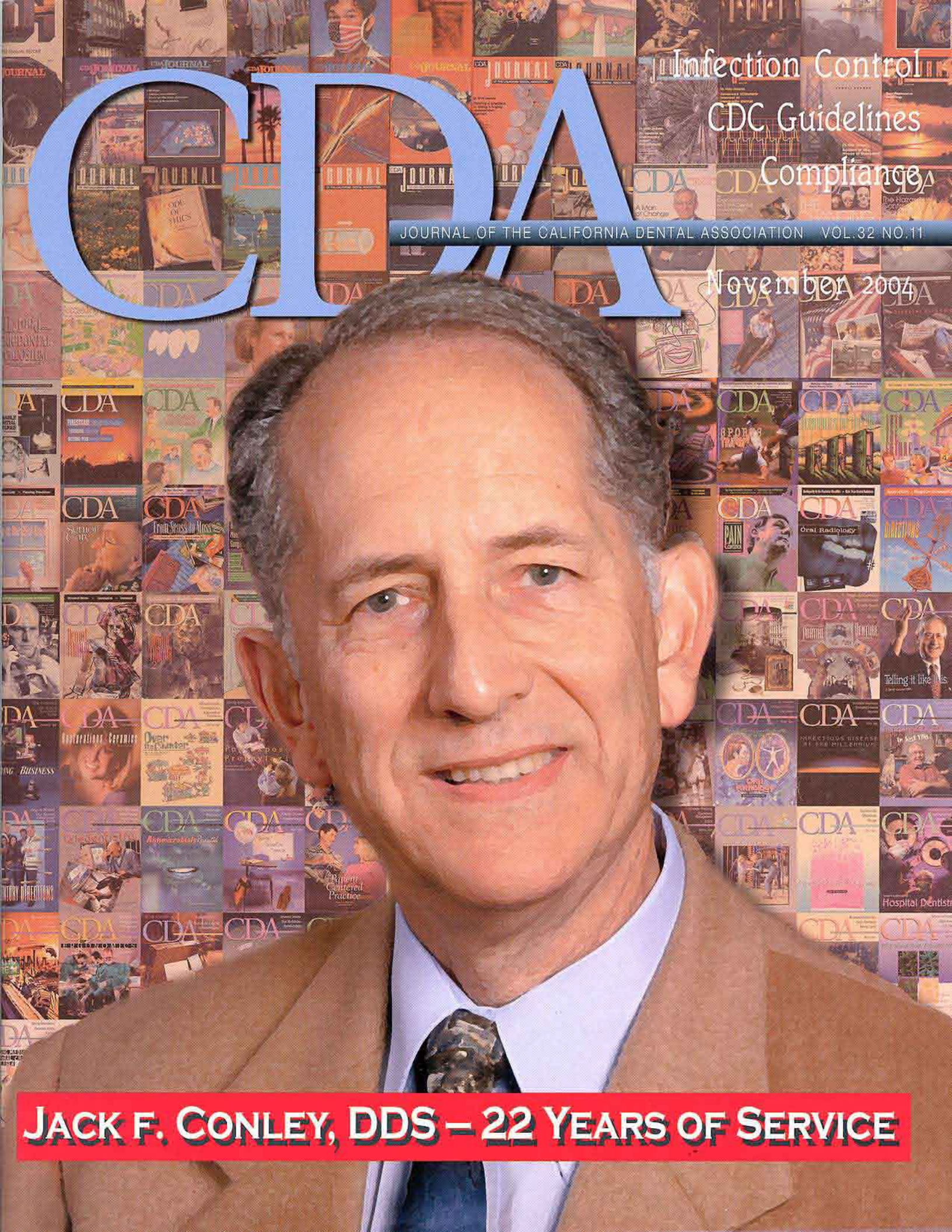
CDA
Infection Control
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JOURNAL OF THE CALIFORNIA DENTAL ASSOCIATION VOL.32 NO.11
November 2004
JACK F. CONLEY, DDS – 22 YEARS OF SERVICE

OF THE CALIFORNIA DENTAL ASSOCIATION
Journal
CDA Journal
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DEPARTMENTS

FEATURES

Jack F. Conley, DDS

I Believe It Is Time to Go

A commentary with the above title first appeared in this space some seven years ago. The phrase is not the brainchild of this writer. As a matter of fact, it was "birthed" by one of our mentors, former CDA President and Associate Executive Director, J. David Gaynor. It was on the occasion of Dave's 1997 retirement as CEO of the predecessor company to 1201 Financial, "The Dentists Company," that we used this phrase in this column for the first time.

Dave was the mentor who started me on my journey in organized dentistry way back in 1969 when he appointed me as program chair for Los Angeles Dental Society. He was also responsible for moving my name forward for consideration for CDA council service several years later. The two of us have had many opportunities over the years to discuss people and events important to the progress of our professional organization. Sometimes these discussions were serious in tone, and sometimes they were lighthearted. I believe it was the latter type of moment when discussing one of CDA's volunteers during Dave's era of volunteerism, that he first pointed out, "I believe it is time to go!" Dave never beat around the bush. He believed in making a critical analysis and then standing by his judgment, whether the topic was a person or an initiative. The concept and formation of TDIC remains at the top of the list of his many sterling contributions to this association.

So when Dave made his decision to leave his role with CDA, we believed that his catch phrase, "I believe it is time to go" was most appropriate in commenting about his contributions and his departure. It is a phrase that really does have universal application. Most of us must make that kind of decision at some point in our lives relative to some facet of our life activity. There are some who unfortunately because of illness or other unexpected events, don't have the privilege to make such a decision, but for those of us who have no constraints upon our decision making such as a specified term of service, it is a reality that eventually we must face.

So thus it came to be, about 18 months ago, that I came to that fork in the road and decided, "I believe it is time to go" at the end of 2004. This seemed like the right time and the right thing to do. There is only one important factor that really weighed in our decision at the time. We believed (and still do) that this is the right time to provide the *CDA Journal* the opportunity to bring forth some new ideas and directions for the future.

It has been a great privilege and an honor to serve the profession in the role of editor for 21 years and eight months. That tenure was not by design. It happened because we have achieved a level of satisfaction in providing regular communication to the membership of CDA and in attracting contributing editors and authors willing to share their expertise with their colleagues through the vehicle of a respected professional publication. As an ex-officio officer of the association, satisfaction also

This is the right time to provide the *CDA Journal* the opportunity to bring forth some new ideas and directions for the future.

came from the opportunity to listen to and contribute to the formulation of policies that have made remarkable contributions to the progress and strength of this organization over these many years.

Our longevity is testimony to the outstanding staff that has been engaged in producing the *Journal*. Their professionalism, creativity, and hard work are key to the product that readers see every month. We have enjoyed working with each and every one of the five individuals who have served in the managing editor role with the Journal. Jeanne Marie Tokunaga and Patty Reyes continue to serve in the Publications Department, providing irrefutable evidence that the publication is in good hands and will continue to demonstrate excellence. Susan Lovelace, who preceded Jeanne Marie, continues to demonstrate her commitment to our profession as executive director in San Diego. The support they have provided us has been outstanding and very much appreciated. We may never be able to find the right words to describe the commitment and high quality of the CDA staff that we personally have had the opportunity to work with throughout this association over these many years.

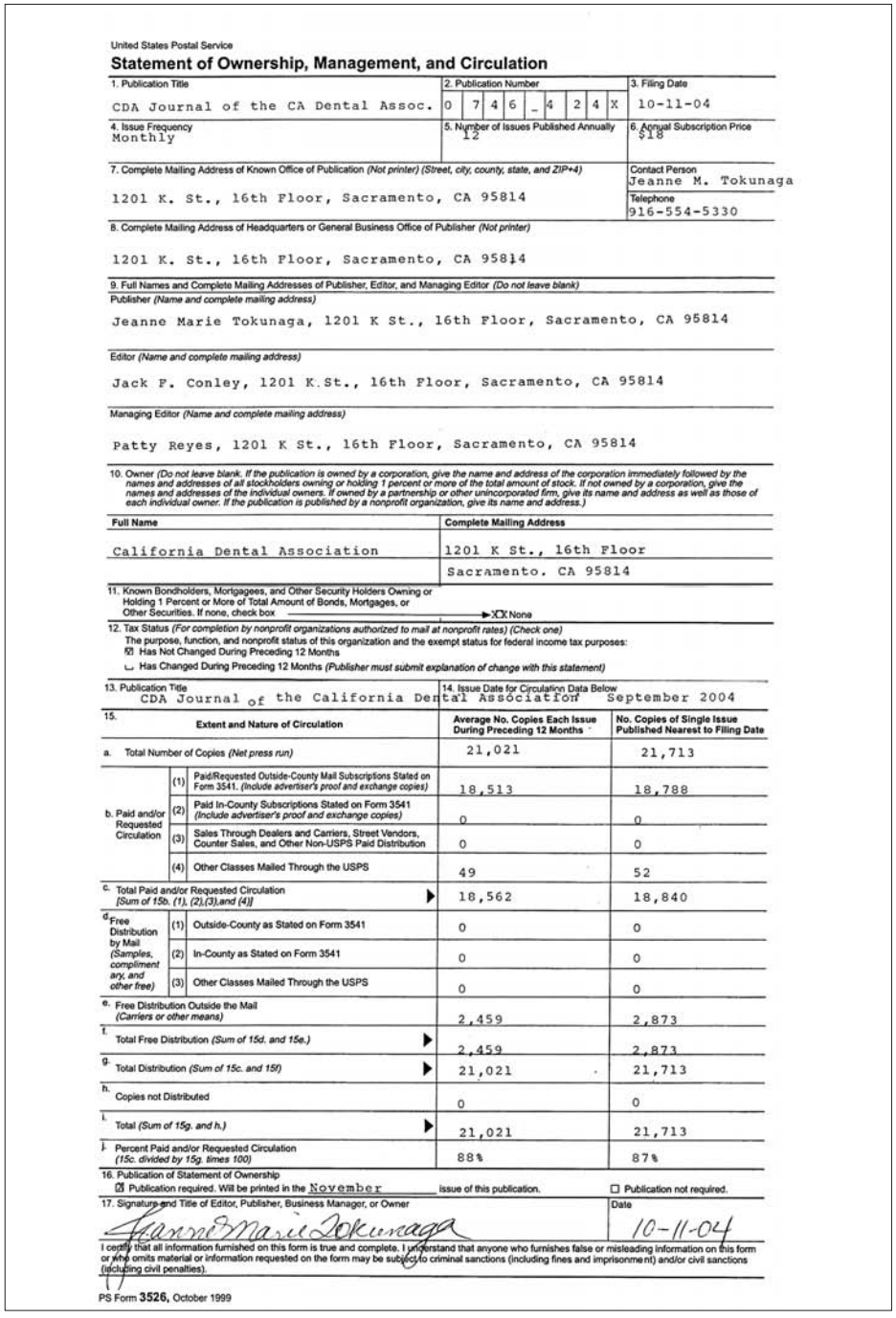
Then there is the legacy that has been spun by "Dr. Bob" Horseman, our venerable contributing editor. His remarkable record of contribution started shortly before our arrival as editor with his participation in a column titled "Your Turn" that alternated with other writers. When we attended our first journalism workshop for new editors, a respected journalism professor who evaluated a 1983 *Journal* issue emphatically convinced us that Bob was a gifted writer who we should never let get away! While we have always kept that challenge foremost in mind, we credit Bob for his joy of writing and spirit of giving to his profession that has kept him sharing his humorous stories with all of us these many years. It should be mentioned that when former managing editor Doug Curley paired the artistry of Charlie Hayward with Bob Horseman's columns, they became really special as Charlie captured Bob's persona in his illustrations. Humor that is appropriate to a professional journal is difficult to craft. A number of dental editors have tried to institute similar offerings in their publications without success. We have been blessed to have Bob and Charlie as a featured part of the *Journal* team and know that their collaboration will continue.

For all of these reasons, we know that our successor Alan Felsenfeld will enjoy excellent support from staff, from Bob Horseman, and future contributing editors and authors who will want to contribute to an outstanding professional journal. We wish them all the very best for the future. We would be remiss if we did not express our appreciation to the countless contributing editors and authors who have supported us over the years.

It has been a fantastic journey of service in the profession. As we leave after 35 fast-moving years, it has been more than half a lifetime of memorable friendships and not-to-be missed opportunities to work closely with some of the most giving

Our longevity is testimony to the outstanding staff that has been engaged in producing the *Journal*.

We will always believe that we have gained far more from our experience than we have been able to contribute.



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PS Form 3526, October 1999

individuals in the dental profession, the elected officers of this association. Every president has brought a unique set of skills and a strong commitment to serve the membership. It has been an honor to serve with, and learn from, each of them. We will always believe that we have gained far more from our experience than we have been able to contribute. That has been the true benefit of our service.

We have experienced the increasing complexity of managing a contemporary practice due to the increasing regulatory guidelines and other requirements that have come forth in the past few decades. Similarly, we have seen elective officers of the association undertake an increasing time commitment in order to deal with an increasing menu of issues facing the profession. It has also become more difficult for elected officer leadership, volunteer leadership, and the staff who represent us, to always achieve the results on association initiatives that would be considered the preferred first choice of all of our colleagues. But we have never seen that reality stifle the commitment or the quality of effort to achieve the best for dentistry and the public we serve.

There remain many important initiatives facing CDA. New initiatives will continue to arise requiring the attention of the leadership of the association. We are confident that the outstanding "people" resources of this association now and in the future will continue to successfully address these challenges.

With all of this said, "I believe it is time to go!" CDA

Promotion of the Use of a Thermoplastic Material to Aid in the Identification of Unidentified Human Remains

American Board of Forensic Odontology

introduction

As a pediatric dentist and forensic dental consultant, I am asked by dentists my opinion of "Toothprints: The Dental ID for Safeguarding Children," a procedure that has been advertised in dental journals. The company marketing Toothprints states that "your young patient's unique tooth characteristics, tooth position ..." will be recorded on a thermoplastic wafer and then may be used "to assist authorities in tracking a missing child or making a positive identification." The advertisement further states that it "will give their parents peace of mind." Our impression is that it may give parents a false "peace of mind."

A missing/abducted young child is one of the most tragic incidents in our society. In 1999, statistics showed that 115 children were victims of "stereotypical kidnappings" (the most serious, long-term abductions) that year. (Source: National Center for Missing and Exploited Children.) When such a child is found, hopefully alive, it should not take a Toothprint to identify the child. Tragically, a small percentage of these abducted children are killed. When decomposed remains of a child are found, identification will be first attempted by forensic dentistry. If there are no dental X-rays for the missing child, then DNA will come into play. California has an excellent DNA facility (Department of Justice DNA/Missing Persons Laboratory) and the potential identification of a missing child would become a priority case for the lab.

In our opinion, there are many reasons why these bite impressions would be of limited value for the identification of children. It is recommended that rather than introducing bite impressions into their practices, that our colleagues expend efforts to obtain and retain good dental records for their young patients. Following is the position paper recently completed by the American Board of Forensic Odontology covering bite impressions.

Duane E. Spencer, DDS, is a diplomate of the American Board of Forensic Odontology.

Abstract

There has been a recent effort to promote the use of a thermoplastic bite impression material for the identification of children. The American Board of Forensic Odontology is a certification board for forensic dentists in the United States and Canada. It is the position of the ABFO that this technique is of limited value when used for the dental identification of children.

A presentation was made to the Odontology Section of the American Academy of Forensic Sciences in Dallas, Texas, in February 2004. The presentation promoted the use of a thermoplastic material to record the morphology of the human dentition for use by qualified personnel to identify missing persons. Currently, the target population for the recording of this information is children. In addition to recording the morphology of the dentition, the presenter claimed that the material, properly stored after impressing the teeth, could also be used as a source of DNA for identification purposes, as well as a source of the individual's scent to be used by tracking dogs. The weeks and months following this presentation generated significant comments and concerns regarding the information presented amongst members of the ABFO and members of the Odontology Section of AAFS. It was suggested that the ABFO look into this tooth impression method and comment on its validity and usefulness in the identification process. The following comments regarding this method have been formulated following significant input from diplomates of the ABFO.

The ABFO is a certifying organization for dentists who wish to become board certified in the field of forensic odontology, and as such, requires its diplomates to maintain significant experience in the use of the human dentition for identification purposes. The ABFO also has a mission to promote and enhance the science of forensic odontology. As the ABFO primarily deals with the dentition, the comments in this paper will be confined to the use of the thermoplastic material as it relates to the dental identification process. Experts in DNA analysis and tracking should address the issues of DNA and scent.

This method should not be considered a substitute for obtaining and keeping accurate conventional dental records.

Position Paper

The concept of using an inert material to record the morphology of the teeth is not new, although its use in the identification of children may be somewhat novel. Historians have recorded the use of tooth impressions centuries ago, in wax, to identify documents as being authentic and from a certain author. Wax bite impressions as exemplars in the analysis of bite mark evidence have been used for several decades. The concept of using tooth impressions in a thermoplastic material for identification purposes was actually pursued in the late 1980s by a Dr. Dennis Welch. His concept was to use the same thermoplastic material that was presented at the 2004 AAFS meeting to record the anatomy of the dentition, and then using the scanning software developed for the cruise missile system, develop a database of mapped dentitions for comparison to unknown mapped dentitions of human remains recovered but not identified. Dr. Welch eventually abandoned this project due to failure to obtain the necessary venture capital to establish the database that would be usable to produce a list of possible identification candidates. Dr. John Wagner was also involved in this project as the developer of the thermoplastic material.

The technique proposed at the 2004 AAFS meeting in Dallas, which uses Dr. Wagner's material to record the morphology of the dentition, is one that has merit in aiding in the identification process of human remains. However, without a database of mapped dentitions, the product as now marketed, has limited value. It may be of some use in cases where no other antemortem (before death) dental information is available for comparison. The imprint of teeth in the thermoplastic material might be of use to help identify an individual by comparing unique morphological features of the teeth. The inability to develop a list of possible candidates that could be compared to an unidentified dentition reduces the usefulness of this procedure. Until a method of digitally mapping the impressions of teeth for comparison is attained, the

It is not the ABFO's intention to dampen their enthusiasm, but it is imperative these organizations understand the current limitations of this procedure.

utilization of thermoplastic tooth impressions for identification should be considered limited. There are current systems in place (e.g., dental radiography) which provide information on the human dentition and related structures in a more accurate and expedient manner.

It has been stated that a trend toward less restorative dental treatment with children would increase the value of thermoplastic dental impressions. Although this trend may exist, there are other systems in place, and others being developed, that are taking the lower incidence of dental restorations into account.

Companies marketing, or considering marketing, thermoplastic material for bite impressions for forensic use should be cautioned to neither mislead the dental profession nor the general public (especially parents) into thinking that this form of recording personal identification information is the best method for identification purposes. This method should not be considered a substitute for obtaining and keeping accurate, conventional dental records. Dental records should include detailed treatment records and radiographs of the dentition and surrounding structures. Dental models and intraoral/extraoral photographs are also sometimes used for identification purposes. Systems are currently in place to efficiently compare dental treatment, or the lack of it, in large populations. At this point in time, these systems are the best way to link dental information of missing persons with those of unidentified remains. Future technology may provide a better means to compare between known and unknown databases.

As stated above, the recording of the dentition in a thermoplastic material may have merit in aiding in the identification process of human remains, especially in cases of permanent dentitions and in cases where no dental records are available. In such cases one would need to be certain that the bite impression was not only accurate but was taken within a reasonable time preceding its use in comparison with the human remains.

The presenter at the AAFS meeting stated that current efforts with thermoplastic bite impressions are aimed at children. It must be understood that children present unique and potentially limiting circumstances when using this technique. These include, but are not limited to:

1. Accurately taking the impression on a young child.

2. The ongoing growth and development of a child's mouth produce changes in the teeth and oral structures, as does also early orthodontic treatment.

3. Decomposed remains of children can present special dental identification challenges such as single rooted primary teeth, teeth with resorbing roots, and developing permanent teeth which are often missing, leaving few teeth for comparison. In such cases, dental radiographs would be preferable to a thermoplastic bite impression for identification purposes.

In conclusion, the use of a thermoplastic material to record the anatomy and morphology of the dentition should not be completely discouraged but the treatment provider and the consumer should understand the limitations of its use for forensic dental identification. The ABFO understands and certainly appreciates the humanitarian gestures that organizations are making in attempting to apply this procedure to the identification of children. It is not the ABFO's intention to dampen their enthusiasm, but it is imperative these organizations understand the current limitations of this procedure and encourage the use of other more conventional forms of dental information recordkeeping. CDA

The Impact of Mercury on the Environment

Do the Neptune Society and funeral parlors and medical schools that cremate bodies remove all amalgam-filled teeth prior?

I read the article in the July 2004 *CDA Journal* regarding mercury danger and removing amalgam from dental wastewater by Environ International Corp./Jay A. Vandeven, (Page 564). It caused me to wonder about how government agencies use sometimes suspect data and make assumptions and projects that often lose their basis in reality.

As we all know, after years of testing, amalgam is considered safe in humans' mouths. Therefore, the scrap that passes down our chairside evacuation lines is also considered stable and safe. (However, if I read the July *CDA Journal* articles correctly, the Environmental Protection Agency considers amalgam waste as 50 percent hazardous mercury in all its calculations.) For the scientific community, it seems amalgam scrap is only hazardous when the mercury is released via incineration. The article made a point of saying only 6.7 percent of Public-Owned Treatment Works (POTWs) incinerate their "biosolids" where the amalgam waste ends up. The article goes on to explain that costs to dentists statewide to eliminate all amalgam waste (I thought this was safe anyway) from possibly getting to these 6.7 percent POTWs was going to cost millions or about $130,000 to $280,000 per pound of amalgam.

I have several questions:

- Why require ALL dentists to capture amalgam waste when only the communities where the 6.7 percent POTWs exist actually incinerate waste?
- Why not require the 6.7 percent POTWs to NOT incinerate?
- Do the Neptune Society and funeral parlors and medical schools that cremate bodies remove all amalgam-filled teeth prior?
- Why does the EPA continue to get away with classifying amalgam as 50 percent hazardous mercury, which flies in the face of all research on the subject?

John W. Burk, DMD
Santa Barbara

Contributing editor's response:

Dr. Burk raises questions that have likely popped up in the minds of other dental professionals unfamiliar with environmental science and policy. Environmental agencies do not dispute the safety of dental amalgam. Rather, these agencies seek to control the impact of mercury ***from all sources*** to the environment. Dentistry is just one of the sources — a small one, but one with a significant public profile. Other high-profile targets include crematories. The main targets for federal regulation are the coal-burning power plants and waste incinerators. Research on how to effectively control the environmental impact of mercury is ongoing, but there is still much to learn. For example, it is known that waterborne microorganisms play a key role in converting inorganic mercury to the more harmful methylmercury. Researchers are looking into different means of preventing this conversion. Research is under way to determine whether publicly owned treatment plants release less mercury to the water and to biosolids if the majority of dentists in their service areas have installed amalgam separators. Regardless of the outcome of this research, dentistry must take the lead in implementing environmentally sound practices.

Richard T. Kao, DDS, PhD

Illustration: Matt Mullin

Oral Health and Diabetes: What's the Link?

Diabetics may have a higher incidence of oral problems because elevated glucose levels seem to help bacteria thrive.

In honor of November as National Diabetes Awareness Month, dental professionals are urged to enlighten consumers — especially those who may be unaware of their risk — of the common signals of the disease including bleeding gums, bad breath and blurry vision.

The American Diabetes Association estimated 17 million U.S. residents have the chronic disease, a third of them unaware they have it.

Researchers said that since diabetes often manifests itself in the mouth, dentists can be the first to diagnose the condition. Diabetics may have a higher incidence of oral problems because elevated glucose levels seem to help bacteria thrive. Among these oral symptoms are periodontitis; loose or sore teeth; chronic bad breath or a bad taste in one's mouth; and swollen gums that bleed during brushing. Diabetics cannot properly use or produce insulin. And without insulin injections, diabetics can have a build up of sugars in their bloodstream.

The three major types of diabetes are Type I, Type II and gestational. Approximately 90 percent to 95 percent of people with diabetes

A CDC study shows that maintaining normal blood glucose levels may prevent diabetic retinopathy.

have Type II. As the population ages and more Americans become obese, there is an increase of diabetes, said the National Diabetes Education Foundation.

Those with diabetes should take extra care of their teeth since they are more apt to be susceptible to periodontal disease and oral infections than those who are not diabetic. Brushing twice daily and replacing toothbrushes every three months can cut down on the amount of bacteria in the mouth. Daily flossing promotes healthy gums and prevents gingivitis. Diabetics should visit the dentist every six months and are encouraged to schedule their meal times with their insulin injections.

In addition to their oral health, diabetics also should be cognizant of the effect the disease has on their eyes. Increased levels of sugar in the blood over an extended time may destroy blood vessels in the back of the eye, preventing the eye from obtaining the required nutrition needed to maintain vision. The condition, diabetic retinopathy, may result if left untreated and could lead to blindness. Symptoms of diabetic retinopathy may include blurred vision; difficulty reading; and seeing flashing lights, dark spots or seeing rings around lights.

However, since the early stages of diabetic retinopathy may not present any symptoms, a yearly eye exam may prevent vision loss. Approximately 40 percent to 50 percent of people with diabetes have annual vision screenings. Early treatment is critical, said the American Optometric Association, because once the eye damage has occurred, the effects typically are permanent. The Centers for Disease Control recommends those with diabetes and those at risk for the condition have their eyes dilated and examined annually.

A CDC study shows that maintaining normal blood glucose levels may prevent diabetic retinopathy. Additionally, since high blood pressure also can cause eye damage, it is recommended that diabetics check their blood pressure a minimum of four times a year.

There is more information about diabetes available online: Centers for Disease Control Division of Diabetes Translation, www.cdc.gov/diabetes/about/index.htm; the American Diabetes Association, www.diabetes.org/homepage.jsp; and the National Diabetes Education Program, ndep.nih.gov.

HIPAA Kit Available From ADA

The American Dental Association Seminar Series is offering "HIPAA: The Current Issues," to assist dentists in preparing for compliance with the Health Insurance Portability Act regulations.

The security kit is designed to streamline staff training and includes a PowerPoint presentation and a downloadable PowerPoint viewer to facilitate compliance by April 21, 2005.

The ADA's security manual features easy-to-follow guidelines, sample policies and procedures on various topics ranging from developing password management policies to preventing viruses from damaging computers and appointing a HIPAA security official.

The HIPAA security regulations, which the Department of Health and Human Services released in 1996, were created to protect electronic patient health information. Data is anything tying a patient's identity to that person's health, health care, payment for health care like charts, invoices and X-rays.

The HIPAA Security Kit is available through the ADA Department of Salable Materials. The price is $149.95; $99.95 for members. Dentists can call the ADA, (800) 947-4746 or go to the product catalog online at ADA.org. The catalog number for the security kit is J685.

Members seeking clarification on the HIPAA regulations are encouraged to contact the ADA Council on Dental Practice. For more information, contact Robert Lapp, PhD, director of the ADA Department of Dental Informatics, (800) 621-8099, Ext. 2750. Lapp speaks on HIPAA issues and participated in the development of ADA comments and consultations on all proposed and final regulations.

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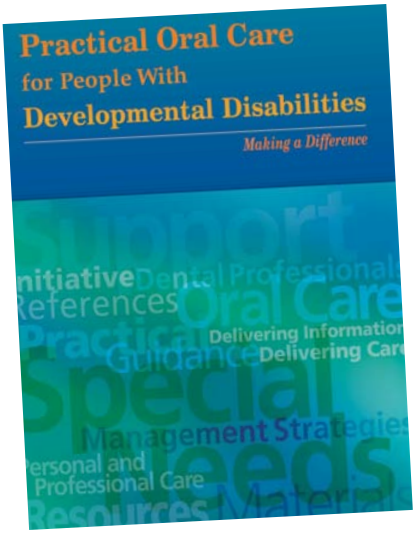


With an estimated 80 percent of people with developmental disabilities residing in group residences or with their families, the National Oral Health Information Clearinghouse created a series of publications, *Practical Oral Care for People With Developmental Disabilities*. It was developed for dental professionals to give information needed to provide quality oral health care to those with special needs.

"I commend the dedicated and talented NOHIC staff for producing this excellent series of publications for dental professionals interested in providing dental care for persons with developmental disabilities," said Sanford J. Fenton, DDS, professor and chair of the Department of Pediatric Dentistry and Community Oral Health at the University of Tennessee College of Dentistry in Memphis. He also is director of dental services at Crittenden Memorial Hospital in West Memphis, Ark.

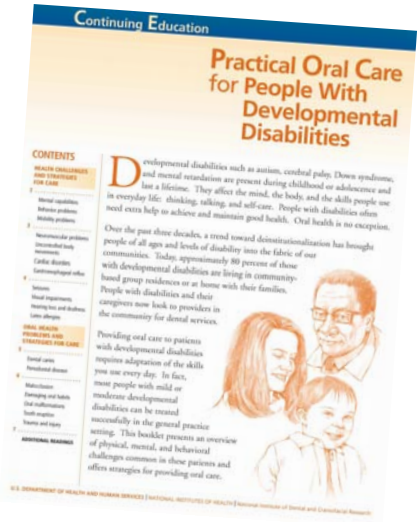
"The practical information included in these monographs, for example, will enable general practitioners to comfortably and competently treat the majority of individuals with mental retardation, currently about 3 percent of the population, in the private office setting," said Fenton.

The series of booklets are:

- Continuing Education: Practical Oral Care for People With Developmental Disabilities;
- Practical Oral Care for People With Autism;
- Practical Oral Care for People With Cerebral Palsy;
- Practical Oral Care for People With Down Syndrome;
- Practical Oral Care for People With Mental Retardation;
- Wheelchair Transfer: A Health Care Provider's Guide;
- Dental Care Every Day: A Caregiver's Guide.

A list of resources is available to oral health professionals and the program also offers two hours of continuing education credit.

To order the booklets, contact the National Institute of Dental and Craniofacial Research, National Oral Health Information Clearinghouse, 1 NOHIC Way, Bethesda, Md., 20892-3500; call (301) 402-7364; visit the website, www.nidcr.nih.gov; or e-mail nohic@nidcr.nih.gov.



"The practical information included in these monographs will enable general practitioners to comfortably and competently treat the majority of individuals with mental retardation ... in the private office setting."

Sanford J. Fenton, DDS

Pandemic Influenza Plan in the Works

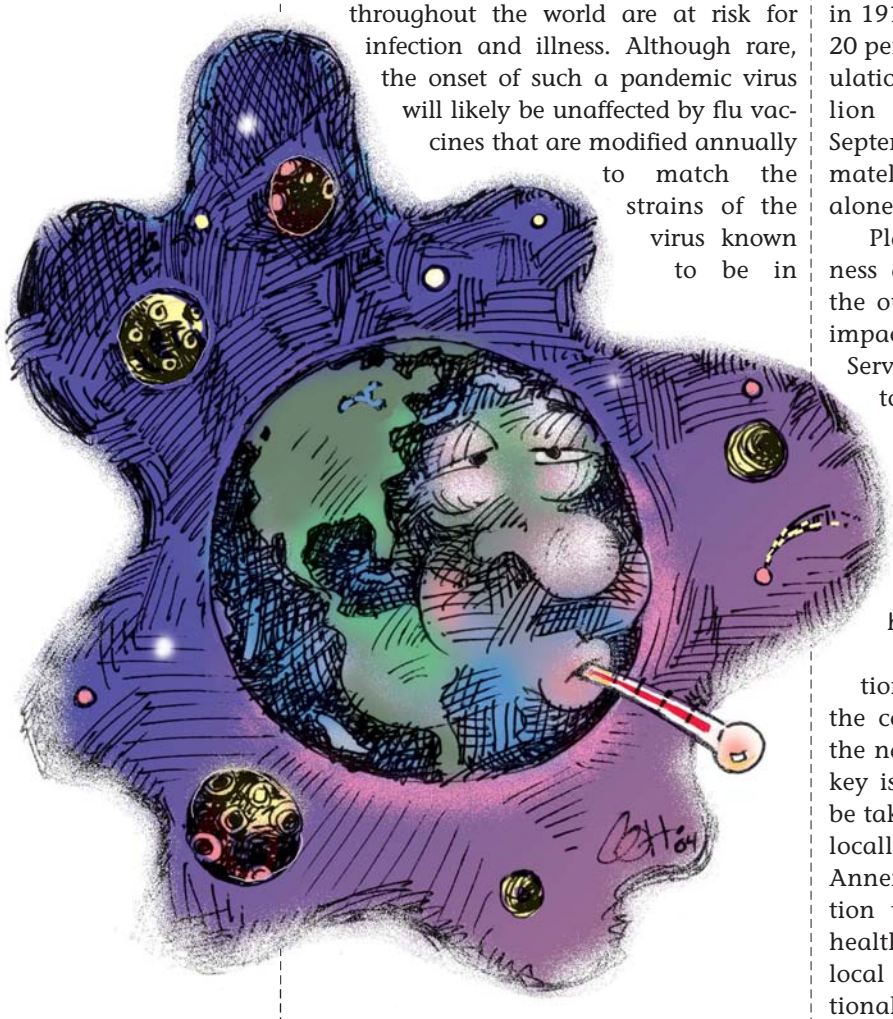
"OUR PROPOSED STRATEGY DRAWS UPON THE WEALTH OF EXPERIENCE AND KNOWLEDGE WE HAVE GAINED IN RESPONDING TO A NUMBER OF RECENT PUBLIC HEALTH THREATS, INCLUDING SARS AND AVIAN INFLUENZA."

TOMMY G. THOMPSON
HEALTH AND HUMAN SERVICES SECRETARY

The draft plan to provide guidance to national, state, and local policy makers and health departments for public health preparation and response in the event of influenza outbreak is now available online.

"This plan will serve as our roadmap on how we as a nation, and as a member of the global health community, respond to the next pandemic influenza outbreak, whenever that may be," said Health and Human Services Secretary Tommy G. Thompson. "Our proposed strategy draws upon the wealth of experience and knowledge we have gained in responding to a number of recent public health threats, including SARS and avian influenza."

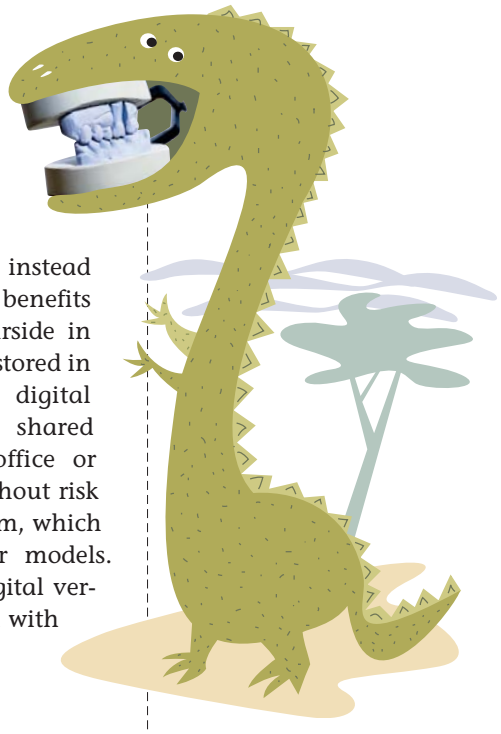
Influenza pandemics are explosive global events in which most, if not all, people throughout the world are at risk for infection and illness. Although rare, the onset of such a pandemic virus will likely be unaffected by flu vaccines that are modified annually to match the strains of the virus known to be in circulation among humans worldwide. Unlike gradual changes occurring in the influenza viruses appearing every year during "flu season," a pandemic influenza virus is one representing a major, sudden shift in the virus' structure, increasing its ability to cause illness in a large proportion of the population. In previous influenza pandemics, large numbers of people fell ill, sought medical care, were hospitalized and died.



In the 20th century, three influenza pandemics occurred. The last was in 1968 with the Hong Kong flu outbreak. In the United States, that resulted in nearly 34,000 fatalities. The Asian flu pandemic in 1957 claimed 70,000 people. The most deadly influenza pandemic outbreak was in 1918 with the Spanish flu. An estimated 20 percent to 40 percent of the world's population became ill and more than 50 million people died worldwide. Between September 1918 and April 1919, approximately 675,000 deaths in the United States alone were a result of the Spanish flu.

Planning and implementing preparedness activities are imperative to improve the outcome of a response and lessen the impacts of a pandemic. Human Health Services is participating in several efforts to help with the nation's preparedness for an outbreak and has increased its support for activities related to an influenza pandemic in five major areas: surveillance, vaccine development and production, antiviral stockpiling, research, and public health preparedness.

The draft plan includes a core section and 12 annexes. The plan explains the coordination and decision making at the national level; provides an overview of key issues; and outlines steps that should be taken nationally, on the state level, and locally prior to and after a pandemic. Annexes provide supplemental information to private sector organizations and health departments to use in developing local preparedness plans as well as additional technical information to support the core document.



Computer Models Outpacing Plaster Models

Digital models are quickly replacing the plaster cast. This follows the trend of more offices using computer-based recordkeeping and digital photography being the preferred route over film for its improved diagnostic quality images at a reasonable cost

In the June 2004 issue of *The Angle Orthodontist*, a comparative study determined that the accuracy and reliability of computer-based models are acceptable to most practitioners.

The authors said the total cost of computer-based modeling and relative convenience will ultimately determine its acceptance by the orthodontic profession.

Utilizing computer models instead of plaster models has many benefits such as they can viewed chairside in seconds and thousands can be stored in a small space. Additionally, digital models can be electronically shared over a network within an office or among a number of offices without risk that handling will damage them, which can be the case with plaster models. Unlike physical models, the digital version can be numerously copied with minimal or at no cost.

Dental Volunteers Needed in Cambodia

The University of Health Sciences in Phnom Penh, Cambodia, is looking for volunteers to train faculty, graduates and students through its new dental education program.

"This is an exciting opportunity for North American dentists to mentor their Cambodian colleagues who are deeply committed to rebuilding their profession," says Stuart Sheer, DDS, program director. "Volunteers will also be able to contribute to improving local oral health by working with the Khmer Association for Development, an oral health care project housed in a primary school about 40 minutes outside of Phnom Penh."

Health Volunteers Overseas kicked off the volunteer program last May through its Dentistry Overseas division. Health Volunteer Overseas is an American Dental Association partner in volunteer activities worldwide. Their mission is to educate and train health care professionals throughout the globe.

Volunteers are required to be members of the ADA or the Canadian Dental Association and hold a valid license. Volunteers for the program provide support and training at the dental school along with hands-on clinical education to dental students and volunteer dentistry for patients at clinics in Phnom Penh. The program will annually solicit six dentist volunteers for assignments lasting a minimum of two weeks.

In January 2003, Health Volunteers Overseas began activities in Cambodia with a public health dentistry certificate program, more than 30 years after the Khmer Rouge regime devastated the country's dental community. Approximately 1.7 million people died as a result of genocide during 1975-79 and the country had no surviving dentists. By 2000, Cambodia had less than 300 dentists, or one dentist for every 38,850 citizens.

The public health dentistry program in Cambodia has strongly been supported by the International College of Dentists USA Section. In June, the ICD donated $10,000, its second grant for the dental public health program.

"The dentists of USA Section of the International College of Dentists think it's very important to reach out to countries that have so few dentists per capita for their population," says Robert E. Brady, DMD, secretary general of the ICD USA Section.

For more information about the volunteer program, call ADA at (800) 621-8099, Ext. 2726.

Dental Informatics Conference Proceedings Available

"We wanted to organize a unique and high-quality scientific conference that focused on the intersection of dental informatics and dental research."

TITUS SCHLEYER, DMD, PHD

The proceedings for the conference "Dental Informatics and Dental Research: Making the Connection," is now available.

The focus of the conference was to develop ways biomedical informatics can contribute to the resolution of dental research problems including identifying dental research issues which might benefit from the application of existing or new informatics methods as well as educating dental researchers about biomedical informatics and its capabilities.

"We were hoping to accomplish three things," said Titus Schleyer, DMD, PhD, director of the Center for Biomedical Informatics at the University of Pittsburgh and organizer of the conference. "First we wanted to organize a unique and high-quality scientific conference that focused on the intersection of dental informatics and dental research.

"Second, we wanted to stimulate the development of collaborative relationships among the participants. Last, we wanted to identify the most important research issues and challenges that dental informatics should address now and in the future. Judging from anecdotal evidence, we may have achieved all three of our objectives," Schleyer said.

The proceedings were published in the series *Advances in Dental Research* in December 2003 by the International and American Associations for Dental Research. It is available on the website www.dentalresearch.org. To obtain printed copies, contact the IADR/AADR, 1619 Duke St., Alexandria, Va., 22314. The archival conference site, including program abstracts, list of participants, photos and resources are available on the website www.dentalinformatics.com.

The conference was held in June 2003 and funded by the National Institute of Dental and Craniofacial Research and the Library of Medicine, as well as the American Dental Association, the American Association for Dental Research, The American Dental Education Association, several dental schools, and the American Medical Informatics Association.

Upcoming Meetings

2004

Nov. 7-13	U.S. Dental Tennis Association Annual Meeting, Palm Desert, (800) 445-2524, www.dentaltennis.org.

2005

April 6-9	Academy of Laser Dentistry 12th annual Conference and Exhibition, New Orleans, (954) 346-3776.
April 12-16	International Dental Show, Cologne, Germany, www.koelnmesse.de
May 12-15	CDA Spring Session, Anaheim, (866) CDA-MEMBER (232-6362).
Aug 17-20	Sixth Annual World Congress of Minimally Invasive Dentistry, San Diego, (800) 973-8003.
Sept. 9-11	CDA Fall Session, San Francisco, (866) CDA-MEMBER (232-6362).

To have an event included on this list of nonprofit association meetings, please send the information to Upcoming Meetings, *CDA Journal,* P.O. Box 13749, Sacramento, CA 95853 or fax the information to (916) 554-5962.

Dr. Jack F. Conley Retires From *CDA Journal*

PATTY REYES

The worst that has been said about Jack F. Conley, DDS, is that he really dislikes rabbits. Not the soft, furry, docile bunnies associated with springtime, but the longer-eared, longer-legged *Lepus* sp. with its razor-sharp incisors and turf-tearing Marquis de "Sod" tendencies.

Away from his beleaguered lawn, Conley has continually excelled in his career at the University of Southern California School of Dentistry, and notably as editor of the *Journal of the California Dental Association*.

This month, after nearly 22 years, 252 issues, and more than 225 editorials, Conley completes his distinguished tenure as *Journal* editor. Alan L. Felsenfeld, DDS, has been chosen as editor-select. His first issue will be published in December.

"Jack's longevity as editor, in my opinion, was to be the editor, not a political force," said J. David Gaynor, DDS. "He has, to a very great extent, stayed away from the political process and served to comment on issues of importance to CDA in his editorials."

Many people count themselves extremely fortunate to have worked with the gracious and genteel Conley, and were eager to share their stories.

FIRST IMPRESSIONS

"My first conversation with the man lasted 1 hour and 20 minutes," recalled Jeanne Marie Tokunaga, who, as managing editor, started working with Conley in 1996.

"My predecessor warned me this would be the case. She said it would not indicate any condescension on his part; he wasn't going to be over explaining because I was new. That's the way he talks to everybody! For a while, I decided I could outtalk him," Tokunaga said. "I'm just the woman for the job, too. But after about a month of trying that, I was exhausted. I bow to the master!"

Dale Redig, DDS, former CDA executive director, knew Conley's father for many years before meeting the younger Conley. "I was conditioned to a degree, I suppose. I noticed that he was also quiet and unassuming, but had very clear ideas about how he would be handling the job of editor, as his father had been with the programs for which he was responsible as a USC faculty member."

Author / Patty Reyes is the editorial coordinator of the *Journal of the California Dental Association.*

"He never places blame on staff, he never expresses disappointment, he never reprimands."

JEANNE MARIE TOKUNAGA

GETTING TO KNOW YOU

Those who know Conley well agree that he prefers to linger over his super-sized portion of humble pie which he, of course, serves himself. (He has on occasion described himself as "bland and forgettable.") They quickly dismiss Conley's self-abasement, which at its essence amounts to Pablum, and instead offered accurate descriptions such as careful, principled, patient and in possession of an understated sense of humor.

"He never places blame on staff, he never expresses disappointment, he never reprimands," Tokunaga said. "He always assumes that staff gave their best effort. It really made you want to rise to the occasion for him and show him that his faith in you was not misplaced. A couple of times, I had to bring to him a problem that I had generated. Instead of taking me to task for the gaffe, he simply said, 'Well, what we should do now is ...' The mistake had been made, let's not dwell on it, let's just fix it. That was his unspoken attitude. That's a great example to me and something I hope to keep in mind as I raise my children. He and his wife, JoAnn, don't have any children, but I think he would have made a great dad."

KEYS TO LONGEVITY

Conley's purposeful approach, coupled with his low-key style and open-mindedness, were hallmarks of his long tenure.

"Jack has a balanced analysis of issues facing the profession, used a writing style that was never self-promotional, and instilled that sense as a guiding principle for *CDA Journal* staff," Redig said.

"He understood budgeting and adherence to budget. Publications were attractive as well as timely. Separating 'news' and the traditional 'grin and grab it' photos from our *Journal* was a major step forward. The ensuing separation satisfied the need to inform membership on a timely basis of events and political issues, while securing the status of a professional, refereed scientific journal. This may seem a small matter at this time — when he took steps to ensure that it would happen, it was not a small matter," Redig said. "He knew that it would work and of course it did, setting a standard for other dental publications in other states."

Dr. Arthur A. Dugoni, dean of the UOP School of Dentistry, installs Dr. Conley for his last year as editor. At his side is his wife, JoAnn.

Dr. Conley takes a moment from video duty at Catalina Island's Bird Park.

Longtime friend, Howard Landesman, DDS, School of Dentistry dean at the University of Colorado Health Sciences Center and former dean of USC School of Dentistry, said Conley's most outstanding quality is his dedication and commitment to the profession. "His key to longevity as editor was that he is the very best at what he does."

Gaynor, Conley's "kingmaker," who encouraged Conley to follow the path into CDA leadership many years before he became *Journal* editor, was immediately struck by "Jack's high personal integrity and commitment to any task he accepts or is assigned to."

That consistency was evident in all aspects of Conley's purview. "He always put the members and the integrity of the *Journal* first," Tokunaga said. "That was always in the forefront of his mind, whether he was making decisions about the *Journal* or interacting with an individual member."

His commitment to thoroughness in reaching a rational conclusion didn't often break land speed records.

"He faces challenges slowly, very slowly looking at all avenues in the decision process. It has been rumored that if he had been in charge of the Apollo mission to the moon, the rocket would be ready to launch in 2005," said Gaynor endearingly. "He does not understand the words 'knee-jerk reaction.'"

THE *JOURNAL*

Conley's No. 1 goal was to publish original, thought-provoking, informational manuscripts, a task easier said than done. Additionally, he welcomed those with differing opinions to voice their views via letters to the editor.

"He planned ahead, then moved ahead, and stayed the course."

DALE REDIG, DDS

"Jack has really enjoyed working with the people of CDA," said Conley's wife, JoAnn. "It has been a good way to give back to a profession that's been good to him, and he really has enjoyed the people."

When it came to his editorial column, Jack Conley was resolute with his well-researched and insightful commentary.

"I never saw him jump to a conclusion," Redig said. "He planned ahead, then moved ahead, and stayed the course."

One editorial that stood out was when Conley wrote on the problems associated with using live patients for the Dental Board exam, particularly surrounding how candidates obtain a patient for the test, Tokunaga recalled.

"The *Journal* received five letters in response to that editorial, the most I have ever seen," she said. "He was really riled on that particular issue, and it made for a strong editorial."

His deft guidance of the *Journal* all these years resulted in numerous awards. Among the cream of the cream: International College of Dentists 2003 Platinum Publication, Western Publications Association 1999 Maggie Award, California Society of Association Executives 2002 and 2003 Award for Communication Excellence, and 2002 Prize for Dental Journalism.

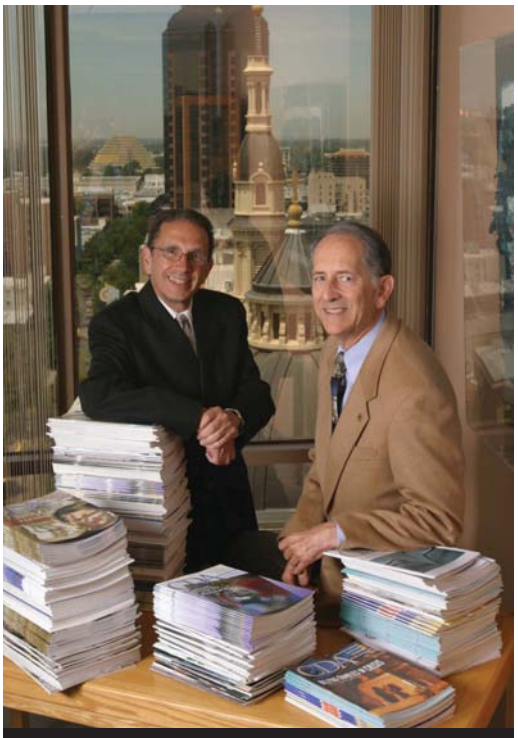
"Jack followed a number of editors who were not as successful," Gaynor said. "I believe he learned from them and then chartered his course, which was well within his thinking of what editors' responsibilities are."

CONLEY'S CONTRIBUTIONS

As editor and a member of CDA's Executive Committee, Conley brought "a voice of reason and calm through some tumultuous times during his tenure in the leadership cadre," Redig said.

"Moreover, he has been a significant force in setting high standards for dental publications. His peers have recognized him for that in various ways, and he will be remembered for it."

Landesman said Conley's contributions to dentistry and CDA were his ability to express himself freely and without fear on a multitude of topics, many of which were highly controversial."



Dr. Alan L. Felsenfeld has been chosen to succeed Dr. Conley as editor.

Before Conley was appointed editor in April 1983, his predecessors averaged a term of two to three years of service.

"All in all, Jack brought stability to the post," Gaynor said. "A fine mind, a fine talent to discern what is important to the profession and a unique ability to put it all into words for the profession. His length of service, in its own way, served as a stabilizing influence on the organization and its leadership. I am proud to count Jack Conley as a friend."

WHAT'S NEXT?

While Conley continues full time at USC, stepping away from the *Journal's* editorship, CDA leadership with its related activities, and his part-time practice, offers him the luxury of more time.

"I keep telling him he needs to figure out what he wants to do when he grows up," Conley's wife, JoAnn, said with a laugh. "Jack loves to take video pictures. Whenever we go on a trip, he takes wonderful videos and adds nice things like music and titles, but I've rarely seen them. He's about five to six years behind."

Landesman recalled one globe-trotting excursion to Japan with the Conleys. "I enjoyed watching the expression on Jack's face when we were treated to some rather exotic raw fish delicacies which of course we had to eat in order to show our respect."

Video organizing and editing, and household to-do lists aside, the couple hope to increase their travel time after Conley downshifts to cruising speed. Some of that time likely will be spent trying solutions for the vexing rabbit issue.

"Jack likes music, museums, and yard work — when the rabbits aren't there," JoAnn Conley said.

"I would guess he's spent $500 and 500 hours in the backyard this year alone" she said. "I used to think they were cute, but I don't anymore. They eat everything down so that nothing comes back. We've tried to get our dog Star to chase them, but the rabbits run and hide behind the fence and come back out again. This is the worst year, I'd say. They've been breeding … and they're very good at it. Now that Jack has some time, we'll keep trying until we find something that works."

Those Glendale-dwelling, grass-snacking rabbits should consider themselves on notice.

Jack F. Conley the Man

Ever since his childhood, Jack F. Conley has held a fondness for Catalina Island, where his parents rented a home every summer. The breathtaking backdrop and pristine beaches made for perfect swimming experiences.

Conley became a competitive swimmer and later a lifeguard. Lifeguarding was lucrative enough to pay for sweetheart JoAnn Willyard's engagement ring. The couple was married in 1962.

Over the years, the Conleys have collected carousel horses made by well-known American carvers. The first one they purchased is a Parker horse named "Beauty," which was carved in Kansas in 1911. "Jack likes to work with wood," JoAnn Conley said. "He sat out on the patio for hours with his dental drill cleaning out all the crevices and restoring some of the carvings that had been rubbed off by the people sitting on them."

The Conleys have purchased three more: "Patriot," an Armitage-Herschell carved in 1899; "Charger," a Spillman; and the bejeweled "Fancy."

"When he first told me he wanted carousel horses, I said that if we're going to have these things in the house, they would have to have nice faces. Some of the carousel horses have angry faces," JoAnn Conley explained. "So of the ones we have, which are mounted on poles in the house, all of them have pleasant faces."

"Jack hasn't had a great deal of time to work on them, but maybe he will now," she said.

Rounding out the Conley's happy home are black-and-white purebred shelties named Cassie, 11½ years-old, and Star, 18 months. The couple started with shelties back in the 1970s.

JoAnn and Dr. Conley at home with their beloved shelties.

"The first dog we had was a collie named Muffet, because of her big white muff," JoAnn Conley said. "We bought her while living at Camp Pendleton. In 1969, we moved to Glendale. The big earthquake in the '70s really affected her. The vet said we'd either have to tranquilize her or get her a puppy. So we got her a sheltie that looked like a miniature collie, that was Heidi, to keep Muffet active. Heidi was a very playful puppy. Muffet's turnaround was amazing in only a couple weeks' time, and that's how we got started with shelties."

"Jack is remarkable in terms of his character and professionalism, and his dedication to the university, to the profession, and to each new generation of students."

DEAN HAROLD SLAVKIN

Jack F. Conley the Dentist

Jack F. Conley earned his DDS degree in 1964 at the University of Southern California School of Dentistry. Upon Conley's dental school graduation, his father presented him with a longhorn steer belt buckle that the elder Conley had cast.

From 1964 to 1966, Conley was on active duty in the Navy Dental Corps Reserve. He earned his master's degree in education in 1970, also at USC.

Since 1990, he has been associate professor, Departments of Restorative Dentistry and Dental Medicine and Public Health at USC. Conley, the Rex Ingraham Professor of Restorative Dentistry, recently retired from his part-time dental practice in Los Angeles.

Among his professional memberships are the American Association of Dental Schools, Pierre Fauchard Academy, International College of Dentists, and the American College of Dentists. His extensive service to dentistry includes: past regent and Southern California section chair of ACD; past president of the Los Angeles Dental Society; former member of CDA Council on Dental Education; past CDA trustee; and ADA delegate.

A few of Conley's numerous administrative appointments at USC's School of Dentistry include assistant dean, Career Planning; assistant dean, Clinical Affairs; and directorships for Clinical Affairs, and Dental Auxiliary Utilization Programs. He presently is chair of the Ethics Committee.

Conley, who began his CDA career as a member of the association's Council on Dental Education in 1972, was honored at the 2000 Fall Session for his years of dedicated service.

In November 2001, the USC Dental Alumni Association named Conley Alumnus of the Year.

"Jack is remarkable in terms of his character and professionalism, and his dedication to the university, to the profession, and to each new generation of students," said Dean Harold Slavkin at the time of the award presentation.

Airborne Spread of Disease — The Implications for Dentistry

STEPHEN K. HARREL, DDS

ABSTRACT

The potential for the airborne spread of disease has been recognized for many years. Recent studies have shown that this mode for disease transmission is capable of spreading a fatal disease such as Severe Acute Respiratory Syndrome over a wide area. Many dental procedures produce extensive aerosols and splatter that are routinely contaminated with bacteria, viruses, and blood. In the past, the potential for these aerosols and splatter to be a vector for disease spread has not been emphasized in dental infection control. Recently published data shows a need to reassess the potential for dental aerosols and splatter to spread disease and the need for their control. Simple and inexpensive methods for the control of dental aerosols and splatter are given. Dental personnel are urged to make the control of aerosols a standard part of their infection control procedures.

The potential for diseases to be spread via an airborne route has long been recognized. Historically, it was felt that diseases could be spread by noxious vapors in the air. This belief is reflected in the name of the disease malaria. In Latin, the word malaria literally means "bad air." As epidemiology progressed, many of the diseases once thought to be spread by an airborne route were found to have other means of transmission. In the case of malaria, it was discovered that the disease was spread by mosquitoes that flew in the night air rather than the night air itself. Possibly due to the fact that many historical diseases were eventually shown to spread primarily through a non-airborne route, the control of airborne infections has not been stressed in many infection control protocols. Recent studies have forced a reassessment of the airborne route of infection and the infection control protocols necessary when airborne contamination is present.

In the recent past, several examples of the airborne spread of disease have been documented in the scientific literature. These include the spread of tuberculosis through the air recirculation system of a commercial airplane[1] and the spread of measles through the air-conditioning system in a pediatrician's

Author / Stephen K. Harrel, DDS, is in private practice and associate professor at Baylor College of Dentistry in Dallas.

office.[2] Despite these well-documented cases, some epidemiologists continued to de-emphasize the airborne spread of disease. The recent Severe Acute Respiratory Syndrome outbreak in Hong Kong has forced a review of the potential dangers represented by the airborne route for the spread of infections.

During the early stages of the SARS outbreak in the Amoy Gardens apartment complex in Hong Kong, the spread of the disease to many of the apartments residents was attributed to multiple possible routes. The theoretical routes varied from personal contacts in the common areas of the apartment complex to disease spread by roof rats, a rodent common in Hong Kong.[3] During the SARS outbreak, the Hong Kong authorities and the American Centers for Disease Control issued several news updates stating there was not evidence for the airborne spread of SARS. However, a recent study evaluating the spread of SARS at the Amoy Gardens has shown conclusive evidence that SARS was not only spread by an airborne route to units within the same building as the original case but also to buildings downwind and as much as 60 meters away.[4] Based on this study, the Harvard School of Public Health issued a press release urging that "…the current thinking on how most communicable respiratory infections are spread … needs to be reconsidered." The press release urged that better measures be taken to control air that "…may at times contain infectious airborne aerosol-acquired diseases and viruses."[5] While the Harvard School of Public Health press release did not specifically discuss dental offices, it did implicate hospitals and patient care facilities.

The production of contaminated aerosols and splatter during dental treatment is well documented.[6-8] Nearly 40 years ago, studies by Micik and others showed conclusive data that many dental procedures produce aerosols highly contaminated with bacteria.[9-12] More recent studies have shown that both live organisms and blood components are routinely present in the aerosols from ultrasonic scalers.[13,14] Despite this large body of data, the control of aerosols during dental procedures has largely been ignored in dental infection control recommendations. The strong data for the airborne spread of SARS and the renewed emphasis on the control of airborne infection by one of the premier schools of public health places pressure on the dental community to control of the ubiquitous contaminated aerosols produced during dental treatment.

Dental Procedures Producing Airborne Contamination

Most dental procedures that use power-driven equipment, water sprays, or compressed air will produce highly contaminated aerosols. The high-speed dental handpiece, air-water syringe, ultrasonic scaler, and air polisher all produce a highly visible cloud made up of aerosols and splatter (**Figure 1**). This visible cloud is composed of droplets from the water spray that is used during the procedure and contaminated material originating in the patient's mouth. While the water droplets are the most visible portion of the aerosol/splatter, if ADA precautions for water quality are followed, this visible spray should not represent a major source of airborne contamination. The greatest risk for the airborne spread of disease comes from the bacteria and viruses originating in the patient's mouth.

The patient's saliva, blood, subgingival fluids, and material from the nasopharynx are the greatest reservoir for potentially pathogenic organisms. Aerosols and splatter from these sources of contamination are virtually invisible but are universally present in the air when dental procedures are performed. The production of this type of aerosol and splatter is clearly demonstrated by a study that evaluated the airborne particles produced by an ultrasonic scaler when no coolant water was used.[15] In this in vitro study, several drops of a fluorescent solution were placed on the anterior teeth of a dental model to represent the patient's saliva and blood. The ultrasonic scaler was used to scale the teeth for three seconds. During the use of the ultrasonic scaler, no coolant water was sprayed on the ultrasonic tip so that all aerosol and splatter that was produced during the ultrasonic scaling came from the fluid around the teeth rather than from the coolant water of the ultrasonic instrument. The extent of the aerosol/splatter was measured by evaluating the amount of fluorescence surrounding the dental model. Despite the total lack of coolant water, there was extensive spray extending up to 18 inches from the site where the ultrasonic had been used. This study demonstrated that any fluid such as saliva or blood present at the area of dental treatment will be aerosolized by the ultrasonic scaler and become airborne in the treatment room. The instruments and procedures that have been shown to cause the most airborne contaminations are shown in **Table 1**.

Figure 1. An ultrasonic scaler using standard 17 ml/minute of coolant water. The ultrasonic scaler has consistently been shown to be the dental device that produces the greatest amount of airborne contamination.

Methods of Reducing or Eliminating Airborne Contamination

To reduce patient source contamination, the CDC recommends the use of a rubber dam, where possible, and the routine use of a High Volume Evacuator (HVE). These are termed "work practices."[16] A work practice is

Table 1

Procedures Shown to Produce Airborne Bacterial Contamination

Ultrasonic and sonic scalers	Shown to be the greatest source of airborne contamination. The use of a high volume evacuator will reduce airborne contamination by greater than 95%.
Air polishing	Bacterial counts show that airborne contamination is nearly equal to ultrasonic scalers. Commercially available suction/ barrier devices will reduce airborne contamination by greater than 95%.
Air-water syringe	Bacterial counts indicate that airborne contamination is slightly less than ultrasonic scalers. High volume evacuator will reduce airborne bacteria by nearly 99%.
Tooth preparation with an air turbine handpiece	Minimal airborne contamination if a rubber dam is used

interpreted to mean practices that should always be performed during any dental treatment producing contaminated aerosols/splatter. Where it is possible to use a rubber dam, the only patient source of contamination will come from material arising directly from the tooth. While undoubtedly there will be some bacteria and other organisms arising from the tooth, it is unlikely that there will be significant amounts of saliva or blood components in the aerosols. The risk of significant airborne contamination is minimized when a rubber dam is used. Unfortunately, there are many dental procedures where a rubber dam can't be utilized. In these situations the only method for minimizing airborne contamination is the HVE.

High Volume Evacuation to Control Airborne Contamination

The use of an HVE during dental procedures has been shown to routinely reduce airborne bacterial contamination by greater than 90 percent (**Figure 2**). The ideal technique for using an HVE is with the help of a dental assistant. A well-trained dental assistant is able to place the HVE close to the source of the aerosol and to closely follow the operator while the procedure progresses. Unfortunately, in many instances an assistant is not always available.

Most procedures performed by a dental hygienist are performed without an assistant. Because of this, dental hygiene procedures potentially carry the greatest risk for the airborne transmission of disease. The ultrasonic scaler is routinely used for dental hygiene procedures and has repeatedly been shown to be the greatest producer of aerosol contamination.[8,13,17,18] The operator using an ultrasonic scaler is at greatest risk for airborne disease transmission due to their close proximity to the patient. However, other members of the dental team and other patients may also be at risk. Because a rubber dam cannot be used for dental hygiene procedures, an HVE must always be utilized with an ultrasonic scaler.

The HVE is a routine piece of equipment in dental operatories. In order for a suction device to be classified as a high volume evacuator, the suction equipment must be capable of removing a large volume of air in a short period of time. Most HVE units will remove 80 cubic feet to 100 cubic feet of air per minute. In order to remove this amount of air in a short period of time, the evacuator tip must have a relatively large inside diameter. HVE tips must have an inside diameter of at least 6 mm to 8 mm. A suction system that is not capable of removing a large volume of air in a short period of time, such as a high vacuum/low volume suction system typically used in a hospital, is not an HVE and is not suitable for reducing dental aerosols. A common mistake is to use a small diameter suction tip, such as a saliva ejector, with a system that is capable of removing a large volume of air (i.e., an HVE suction source). While effective for removing fluid build up in the floor of the mouth, the small diameter of a saliva ejector makes it ineffective for removing aerosols (**Figure 3**).

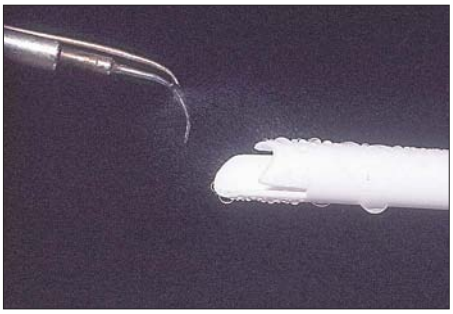


Figure 2. The use of a 6 mm to 8 mm diameter high volume evacuator with an ultrasonic scaler will eliminate almost the entire aerosol. The use of an HVE by an assistant has been shown to reduce airborne contamination by more than 90 percent.

Controlling Aerosols During Dental Procedures

There are three simple and inexpensive procedures that should routinely be utilized to minimize airborne dental contamination during dental procedures. These recommendations are outlined in detail in a recent article in the *Journal of the American Dental Association*.[19] They

Figure 3. The use of a standard small bore saliva ejector is completely ineffective for the removal of the aerosol from an ultrasonic scaler. When placed in its usual position in the floor of the mouth it will be even less effective than shown in the photograph.

are: (1) the routine use of a preprocedural antiseptic rinse, (2) the routine use of standard barrier protection, and (3) the routine use of a large diameter HVE suction. It should be stressed that in order to adequately control aerosol contamination, all three of these procedures must be followed. Using only one or two of these procedures is inadequate. Each of these recommendations is discussed below (**Table 2**).

Step One: Preprocedural Rinses

The use of a preprocedural antiseptic rinse such as chlorhexidine or an essential oil mouthwash have been shown to reduce the number of bacteria that can be cultured from the air during a dental procedure.[20,21] It is unknown to what extent these rinses may affect only the relatively benign free floating bacteria adhering to the mucosa of the mouth and to what extent they will also affect potentially pathogenic bacteria found in the nasopharynx or the periodontal pocket. Due to the fact the mode of action of these rinses is to kill bacteria by direct contact, it is probable that only the superficial bacteria will be affected. It is also likely that the pathogenic bacteria and viruses most likely to spread a serious infection will only be marginally affected by a preprocedural rinse. However, the preprocedural rinse will reduce the number of bacteria, is inexpensive, and easy to use. Rinses are recommended as a part of aerosol contamination control but they should not be relied upon as the only aerosol control.

Step Two: Barriers

The use of basic barrier protection is the standard for all dental procedures. The use of gloves, a well-fitting mask,

Table 2

Methods of Reducing Airborne Contamination

Device	Advantages	Disadvantages
Barrier protection – mask, gloves and eye protection	Routine part of "standard precautions," inexpensive	Masks will only filter out 60% to 95% of airborne contamination, subject to leakage if not well fitted, does not protect when mask is removed after the procedure
Preprocedural rinse with antiseptic mouthwash such as chlorhexidine	Reduces the bacterial count in the mouth, saliva, and air. Inexpensive on a per patient basis.	Tends to be most effective on free-floating organisms. It will not affect (1) biofilm organisms such as plaque (2) subgingival organisms (3) blood from the operative site or (4) organisms from the nasopharynx
High volume evacuator	Will reduce the number of bacteria in the air and remove most of the material generated at the operative site such as bacteria, blood, and viruses. Inexpensive on a per patient basis	When an assistant is not available, it is necessary to use an HVE attached to the instrument or a "dry field" device. A saliva ejector is not an HVE and does not control aerosols.
HEPA room filters and UV treatment of ventilation system	Effective in reducing numbers of airborne organisms	Only effective once the organisms are already in the room air, moderate to extremely expensive, may require engineering changes to the ventilation system

long-sleeve gowns, etc. is a well-established necessity. However, many dental personnel tend to place too great a reliance on the efficacy of barriers. Surgical masks tend to leak around the edges and will only filter out about 60 percent of airborne contamination.[22] An N-95 mask will filter out 95 percent of airborne contamination but is rarely used during dental treatment. Also, dental personnel will frequently remove their mask immediately after treatment has been completed. This exposes them to the smaller particles of contaminated aerosols which have been shown to remain airborne for greater than 30 minutes after the procedure has been completed. These smaller particles are felt to represent the greatest danger for the transmission of disease.[23] Well-fitted masks, gloves, and other barriers, when used with the other recommended measures, are an essential part of protection from droplets and aerosols.

Step Three: High Volume Evacuation

The use of a large bore HVE is the cheapest and most effective method for the removal of airborne contamination but is probably the safeguard that is used least often. This is most often due to the lack of availability of a dental assistant. This is most frequent during dental hygiene procedures where an ultrasonic scaler or an air polisher is used. Several alternatives to the use of an assistant during dental hygiene procedures are readily available. Commercially available are HVE devices that attach to the handpiece of an ultrasonic scaler (**Figure 4**), so-called "dry field" devices that place an HVE in the patient's mouth, and combination barrier and suction devices that attach to air polishers. Other devices have been reported in the literature that consist of an arm that holds a standard disposable HVE suction tip in place during patient treatment.[24] These devices may also be a viable option for aerosol infection control. The use of an HVE is mandatory to the control of aerosol contamination.

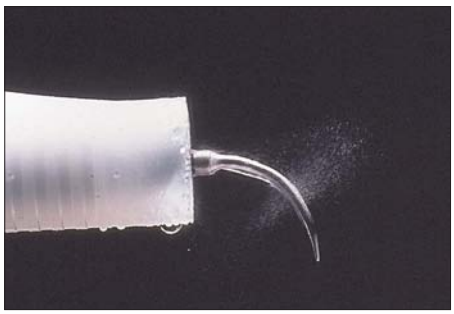


Figure 4. A large-bore high volume evacuator that attaches to the handle of an ultrasonic scaler. This device has been shown to reduce airborne contamination by more than 95 percent.

Air Filters and Air Sanitizers

An additional device to reduce airborne contamination is the use of a high efficiency air filter or a UV "upper room" air sanitizer. The high efficiency particulate air or HEPA filter pulls the air in the room through a filter that is capable of removing most contamination. These are extremely effective in filtering particles from the air of the operatory, but have the disadvantage of requiring a considerable amount of time to circulate the air through the filter and will only remove the contamination that has already entered the air. A UV "upper room" air sanitizer is a unit that is placed in the air-conditioning system. This sanitizer exposes the circulated air to a germicidal ultraviolet light. The installation of this unit usually requires major engineering changes to the air-conditioning system and can be quite expensive.

Filters and sanitizers can both be effective in removing bacteria from the air. The HEPA filter can be placed in an existing operatory with only the expense of the equipment. The UV sanitizer can be considered for new construction or during major remodeling but may be cost prohibitive to retrofit into most existing dental facilities. Both of these devices suffer from the fact that they only remove contamination that has already escaped into the air and are already a risk for dental personnel. The control of airborne contamination at it source, i.e., the patient's mouth, should be the goal of dental infection control. The use of devices that remove existing contamination from the air should not be relied upon as the first line of protection for dental personnel.

Conclusion

The production of contaminated aerosols and splatter during dental procedures is a well-established fact. The control of these contaminated aerosols has not been emphasized in dental infection control. The advent of SARS and the publication of well-designed studies clearly demonstrating the airborne spread of this respiratory disease shows a need for the reassessment of dental infection control procedures for airborne contamination. The use of preprocedural rinses, barriers, and an HVE are three infection control steps that should be standard for all dental procedures that produce aerosols. Routinely following these three steps should reduce or eliminate the possibility for the airborne spread of disease during dental procedures and limit the legal liability of dental clinics. CDA

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Infection Control Compliance Issues and Questions

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ABSTRACT

This article uses the 2003 CDC infection control guidelines for dentistry as a framework for discussing representative questions and issues that continue to be raised by dental health care workers. Where applicable, additional supporting evidence will be incorporated to provide appropriate, useful information, to assist in understanding and complying with updated recommendations.

The most recent guidelines and recommendations for infection control in dentistry were published by the Centers for Disease Control and Prevention in December 2003.[1] The format of the document was modified from previous publications to include an extended introductory section which reviewed the published science related to dental infection control. Inclusion of this information was designed to assist dentists, dental hygienists, dental assistants, and laboratory technicians in better understanding the "why" as well as the "what" of appropriate precautionary measures. This evidence-based approach was utilized in response to requests from clinicians, educators, and scientists responsible for training and managing dental professionals in a variety of patient care settings.

The historical acceptance and application of multiple protocols, practices, and procedures have substantially reduced occupational infectious disease risks in clinical facilities. When taken together, the health care workers' adaptation and adoption of effective aseptic procedures, personal protective barriers, automated instrument decontamination devices, efficient heat sterilization equipment, single-use disposable items, environmental surface barriers and disinfectants, and rational waste management procedures, have created a much safer occupational environment for both health professionals and their patients.[2] While the application of many measures was required to achieve the current level of safety, one related, often unmentioned topic remains an essential component of any infection control program — compliance. A number of published dental and medical surveys have suggested that, although adherence to science- and clinical-based recommended procedures, practices, and products are effective in limiting the potential for accidental occupational exposures, routine compliance by patient care providers continues to be an ongoing issue.[3-7]

While a number of previously unresolved concerns have been addressed by documented scientific and clinical studies, new challenges to established infection control precautions continue to arise as infectious

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disease knowledge expands along with development of more efficient prevention strategies. In addition, misperceptions still occur regarding concerns ranging from perceived procedure and/or product ineffectiveness to unnecessary overkill with redundant practices and protocols. What is unfortunately inherent in these statements is the misplaced belief that each infection control procedure or product is supposed to provide an absolute safeguard against cross-infection.

The following article will use the 2003 CDC infection control guideline for dentistry as a framework for discussing representative questions and issues which continue to be raised by dental health care workers. Where applicable, additional supporting evidence will be incorporated to provide appropriate, useful information, to assist in understanding and complying with updated recommendations.

When I read articles updating infection control information, I now see the term "standard precautions" in place of what I learned as universal precautions. What is the difference?

The rationale for universal precautions is familiar to virtually every health care worker who currently provides patient care. This concept of infection control, introduced in 1985,[8] assumed that any patient is potentially infectious for a number of blood-borne pathogens, such as hepatitis B virus, human immunodeficiency virus, and hepatitis C virus. A key application for dental professionals was inclusion of a statement to consider blood and other body fluids, including saliva, as potentially infectious for occupational pathogens. In 1987, a body substance isolation system was introduced to focus on the reduction of transmission of infectious material from any moist body substance. These included blood, feces, urine, sputum, saliva, wound exudates, and other body fluids.[9,10] Body substance isolation precautions were designed to address procedures that involved all moist, potentially infectious, body substances regardless of their suspected or unsuspected infection status. Unfortunately, many health care workers were confused concerning differences between universal precautions and body substance isolation and so the CDC developed a new set of guidelines for isolation precautions in hospitals, termed standard precautions.[11]

What is unfortunately inherent in these statements is the misplaced belief that each infection control procedure or product is supposed to provide an absolute safeguard against cross-infection.

These are similar to universal precautions in that they are intended to reduce occupational infection risks during the treatment of all patients. In addition, they expand previous recommendations for health care workers' protection by including such measures as immunizations for vaccine-preventable diseases, management of health care workers' exposures from infected persons, and work restrictions for exposed or infected health care workers.[12] The integration and expansion of the universal precautions components into the current standard precautions recommendations have been incorporated in the 2003 CDC dental infection control guideline.[1]

There is a table in the December 2003 CDC document titled "Immunizations Strongly Recommended for Health Care Personnel." Are dental personnel now supposed to be vaccinated against diseases other than hepatitis B?

Medical and dental health care workers' occupational risks from microbial pathogens include exposures to many vaccine-preventable diseases. The major accomplishments of widespread immunization protecting the general population against diseases such as smallpox, poliomyelitis, measles, mumps, rubella, influenza, tetanus, diphtheria, hepatitis B, and varicella-zoster virus infection (chickenpox), have expanded the rationale for clinical vaccination as an attractive, effective alternative to the widespread use of antimicrobial chemotherapy. Since health care workers have an increased risk for acquiring or transmitting hepatitis B, influenza, measles, mumps, rubella, and varicella-zoster virus infection, immunizations against these vaccine-preventable conditions now comprise an essential component of a complete infection control program.[1,13,14]

Are my prescription glasses sufficient protection for treating patients?

While any form of eyewear will provide some level of protection against the splash/spray of blood or body fluids, the style of many of today's frames are quite small and do not afford appropriate ocular protection. Disposable side shields, which are designed to fit all types of frames, provide a certain degree of additional protection.

However, if they are not placed correctly on the arm of the prescription glasses or they are not flush against the side of the lenses, the opportunity

remains for splash/spray to reach the eye. Therefore, specifically designed protective eyewear with solid side shields, or a face shield worn in conjunction with prescription glasses, or a disposable mask with face shield will provide the greatest barrier against aerosols and debris. Protective eyewear should be cleaned and decontaminated between patients.

Do I need to wear a clinic gown over my scrubs or street clothes?

Protective clothing, such as a clinic gown or lab coat, should be worn by the dental health care worker to prevent contamination of clothing and to protect skin during activities which pose a risk of exposure to blood, saliva or other body fluids. Occupational Safety and Health Administration blood-borne pathogen standards require the protective clothing to have long sleeves and a high, closed collar. Ultimately, however, the anticipated degree of exposure will dictate the type of protective clothing needed. Clinic gowns or lab coats made from cotton or a cotton blend should be changed when visibly soiled or as soon as possible if blood or other potentially infective body fluid penetrates the garment. Such attire should be laundered in the dental office/clinic or by a service capable of handling contaminated clothing. Disposable gowns must be discarded daily or when visibly soiled. All protective clothing should be removed prior to leaving the treatment area.

Why is it necessary to wash my hands before and after treating a patient if I was wearing gloves?

Maintaining effective hand hygiene is considered the most crucial measure in reducing the risk of transmitting pathogens between health care workers and their patients.[15] The need for diligent hand hygiene is not eliminated with the use of examination or surgical gloves.

Appropriate performance of hand hygiene also do not diminish the necessity to wear gloves. Human skin harbors both resident and transient bacteria. Resident microorganisms which normally colonize the skin are more difficult to remove but generally are not virulent. Transient microflora, on the other hand, are acquired by health care workers through direct contact with patients and contaminated surfaces. Although they are more easily removed by routine hand hygiene practices, transient microorganisms provide the highest risk of cross-contamination. However, a number of investigations have demonstrated that implementation of proper hand hygiene practices can significantly increase health care workers' compliance and reduce the potential for transmission of such microorganisms.[15,16]

In order to reduce the dental health care workers' exposure to contamination, proper hand hygiene should be performed when hands are visibly soiled, when they have been in contact with a patient's skin, saliva, or other body fluid, immediately prior to donning gloves and again immediately after removal. Donning gloves without adequate cleansing of the hands allows for the remaining transient microflora to flourish in the warm, moist environment created underneath the gloves. Additionally, minute defects or tears in the gloves which are not visible to the

naked eye, can increase the likelihood of microbial transmission during dental procedures.

The type of procedure to be performed, the degree of anticipated contamination, and the extent of persistence of antimicrobial action on the skin dictates the method of hand hygiene indicated (**Table 1**).[1] Routine dental examinations and other nonsurgical procedures require handwashing prior to gloving with either plain or antimicrobial soap and water, or an alcohol-based handrub if the hands are not visibly soiled. However, prior to performing surgical techniques, surgical hand antisepsis is required to eliminate transient microflora and reduce resident microflora. Therefore, an antimicrobial soap or alcohol-based hand rub which contain antiseptics such as chlorhexidine, triclosan, or quaternary ammonium compounds to extend persistent activity should be used preoperatively.

Table 1

Hand Hygiene Methods and Indications

Method	Agent	Purpose	Duration of Action	Indication
Routine handwash	Water and plain nonantimicrobial soap	Remove soil and transient bacteria	15 seconds	Before donning gloves; following removal of gloves; following barehanded contact with contaminated objects; prior to leaving the dental operatory or laboratory; when visibly soiled; before regloving after removing torn, cut or punctured gloves
Antiseptic handwash	Water and antimicrobial soap (chlorhexidine, iodine, iodophors, chloroxylenol, triclosan)	Remove or destroy transient microflora; reduce resident microflora	15 seconds	Before donning gloves; following removal of gloves; following barehanded contact with contaminated objects; prior to leaving the dental operatory or laboratory; when visibly soiled; before regloving after removing torn, cut or punctured gloves
Antiseptic handrub	Alcohol-based handrub	Remove or destroy transient microflora; reduce resident microflora	Rub hands until dry	Before donning gloves; following removal of gloves; following barehanded contact with contaminated objects; prior to leaving the dental operatory or laboratory; when visibly soiled; before regloving after removing torn, cut or punctured gloves
Surgical antisepsis	Water with antimicrobial soap (chlorhexidine, iodine, iodophors, chloroxylenol, triclosan)	Remove or destroy transient microflora; reduce resident microflora (persistent effect)	2-6 minutes	Before donning sterile surgical gloves
	Water and non-antimicrobial soap followed by an alcohol-based hand scrub product with persistent activity		Follow manufacturer instructions for surgical hand scrub products with persistent activity	

Adapted from (1)

Table 2

Glove Types and Indications

Type of Glove	Indication	Comment
Patient examination	Patient care; examinations, nonsurgical procedures involving contact with blood/body fluids, and laboratory procedures	Food and Drug Administration regulated as medical device Nonsterile and sterile; single use
Surgical	Surgical procedures	Food and Drug Administration regulated as medical device Sterile; single use
Nonmedical (utility, general purpose)	Handling contaminated instruments; housekeeping procedures (cleaning/ disinfecting work area)	Not regulated by the Food and Drug Administration as a medical device Puncture-resistant and/or chemical-resistant, depending on the procedure Disinfect after use.

Adapted from (1)

Additional factors which must be considered when choosing a hand hygiene product are accessibility, efficacy, and acceptance of the product. The efficacy of hand hygiene products increases from the use of plain soap and water to antimicrobial soap and water to alcohol-based hand rubs.[17] For most routine procedures, the use of plain soap and water is adequate. However, when conducting more invasive procedures, an antimicrobial soap should be used. Alcohol-based hand rubs have been shown to be most beneficial, due to their rapid and effective antimicrobial action, accessibility for use, reduced time required for appropriate antisepsis, and overall improved skin condition with prolonged use.

How do I know what gloves to wear when treating a patient?

Glove selection should be based on the type of procedure to be performed (**Table 2**).[1] Patient examination gloves are indicated for routine patient care, examinations, nonsurgical and laboratory procedures. As the name implies, surgical gloves are indicated for surgical procedures and therefore are manufactured to meet specific FDA standards for assurance of sterility. Nonmedical or utility gloves are indicated for handling contaminated instruments or for cleaning and disinfecting operatory surfaces and instruments. These gloves are often made of heavier materials which are puncture and chemical resistant. Unlike examination and surgical gloves, nonmedical gloves are not regulated by the FDA and are not meant for use with patient treatment. Patient examination and surgical gloves are to be used for only one patient and then discarded while nonmedical gloves can be disinfected and used repeatedly as long the integrity of the material is not compromised.

In addition, it is necessary to be aware that even when using the appropriate glove, exposure to chemicals/ materials used in the practice of dentistry (bonding agents, restorative resins, impression materials and disinfectants), or mechanical insult as a result of long fingernails or jewelry, can compromise the integrity of the gloves. This holds true whether the composition of the glove is latex, vinyl, nitrile or some other synthetic material. Risk of exposure can be reduced by being familiar with the manufacturers' recommendations regarding the compatibility of their product with specific dental materials, maintaining short fingernails, eliminating hand jewelry, and establishing controls to prevent injuries from sharps. CDA

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2003 CDC Guidelines Offer More Choices for Managing Operatory Surfaces

ORGANIZATION FOR SAFETY AND ASEPSIS PROCEDURES

ABSTRACT

The objective of this article to help dental professionals understand the changes in surface asepsis recommendations, to be able to classify environmental surfaces in the practice setting and successfully prevent or manage their contamination, as well as become familiar with the terminology used in discussing environmental surfaces and related infection control efforts.

While much of the content in the recently published Centers for Disease Control and Prevention (CDC) document *"Guidelines for Infection Control in Dental Health-Care Settings — 2003"* simply expands on the agency's 1993 recommendations, there were some surprises. One major change in the 2003 guideline is evident in the recommendations for managing environmental surfaces.

In the dental operatory, environmental surfaces — that is, surfaces or pieces of equipment that do not directly contact the patient — can become contaminated during the delivery of care. Although they have not been associated directly with disease transmission to either dental workers or patients, when touched with contaminated hands, these surfaces can transfer potential disease agents to instruments, other environmental surfaces, or to patients and dental team members.

Environmental surfaces in dental settings are either clinical contact surfaces or housekeeping surfaces. Clinical contact surfaces are those that are touched by contaminated hands, instruments, devices, or other items while providing health care or performing activities that support the delivery of health care.

Housekeeping surfaces, such as floors and walls, are not involved in the direct delivery of dental care. Because housekeeping surfaces have limited risk of disease transmission, they can be managed using less rigorous methods than those used on clinical contact surfaces.

The 2003 CDC document expands dental health care personnel options for managing clinical contact surfaces in two key areas: by offering the option of using surface barriers, and by expanding choices for chemical disinfectants when managing some environmental surfaces.

Author / *Infection Control In Practice* is a resource prepared for clinicians by the Organization for Safety and Asepsis Procedures with the assistance and expertise of its member-contributors. OSAP is a nonprofit, independent organization providing information and education on infection control and occupational health and safety to dental care settings worldwide.

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Barriers or Chemicals: You Decide

While 1993 recommendations addressed the use of surface covers, the 2003 guidelines strongly encourages their use. Protecting surfaces with clear plastic wrap, bags, sheets, tubing, and plastic-backed paper or other materials impervious to moisture can prevent contamination of clinical contact surfaces, thereby eliminating the need for between-patient disinfection. Barriers are particularly effective for managing difficult to clean surfaces.

Contaminated barriers are simply removed and replaced between patients, saving the work and the wait time required for cleaning and disinfection.

Placing Barriers

Use gloved hands to remove contaminated surface barriers. Because there is no risk of sharps injury or chemical exposure in removing a surface cover, the exam gloves worn during patient treatment provide an acceptable level of protection.

After disposing of the contaminated barrier, remove gloves, perform hand hygiene, and place a clean barrier on the surface. Unless a barrier has been torn or punctured, or the "dirty" side of the barrier contacted the underlying surface when the cover was removed, there is no need for between-patient cleaning and disinfection; general cleaning and disinfection at the end of the clinic day is sufficient.

Expanded Chemical Choices

While CDC's 1993 recommendations called for the use of EPA-registered[a] hospital disinfectants with tuberculocidal activity on clinical contact surfaces, the 2003 guidelines offer clinicians more options.

If barriers are not used, surfaces that are free of visible contamination may now be cleaned and disinfected between patients by using an EPA-registered nontuberculocidal hospital disinfectant as long as the germicide has an HIV and hepatitis B virus (HBV) kill claim. Regardless of this new option, tuberculocidal hospital disinfectants appear to remain the more versatile choice for dental practice settings, which often have limited space for maintaining inventory. After cleaning surfaces according to label instructions, these intermediate-level disinfectants are suitable for disinfecting surfaces with or without visible contamination.

Regardless of which category of disinfectants a dental practice chooses to manage its environmental surfaces, strict adherence to label instructions is an absolute must. Always follow the manufacturer's directions for predisinfection cleaning, appropriate personal protective equipment, and proper storage and disposal.

Chart 1

Categories of Environmental Surfaces

Category	Defined as ...	Examples
Clinical contact surfaces	Surfaces that are directly contacted by contaminated instruments, devices, hands, or gloves	Light handles, switches, dental X-ray equipment, reusable containers of dental materials, drawer handles, countertops, pencils, telephone handles, doorknobs
Housekeeping surfaces	Surfaces that require regular cleaning to remove soil and dust	Floors, walls, sinks

Not Recommended

Another change between 1993 and 2003 recommendations is the use of household bleach as a surface disinfectant. While the earlier document considers a diluted household bleach solution prepared in-office to be an acceptable disinfectant, the more recent guideline clearly states that only commercially available EPA-registered agents should be used on clinical contact surfaces in dental health care facilities.

The 2003 guideline also speaks out against the use of liquid chemical sterilants/high-level disinfectants for disinfecting environmental surfaces. Formulated for "cold sterilizing" heat-sensitive instruments, glutaraldehydes and other high-level disinfectants should never be used outside a closed container. They can irritate skin, mucous membranes, and respiratory tissues and have been implicated in cases of occupational allergies and asthma among health care workers.

Compliance

The CDC's "Guidelines for infection Control in Dental Health-Care Settings — 2003" clearly outline the recommendations, regulations, and responsibilities of various governmental agencies that have an interest in surface disinfectants.

CDC "Follow the manufacturers' instructions for correct use of cleaning and EPA-registered hospital disinfecting products. Use [personal protective equipment], as appropriate, when cleaning and disinfecting environmental surfaces ... Use surface barriers to protect clinical contact surfaces, particularly those that are difficult to clean ... and change surface barriers between patients. Clean and disinfect clinical contact surfaces that are not

barrier-protected, by using an EPA-registered hospital disinfectant with a low- (i.e., HIV and HBV label claims) to intermediate-level (i.e., tuberculocidal claim) activity after each patient. Use an intermediate-level disinfectant if visibly contaminated with blood. Clean housekeeping surfaces (e.g., floors, walls, and sinks) with a detergent and water or an EPA-registered hospital disinfectant/detergent on a routine basis ..."

EPA "To obtain [EPA] registration, a manufacturer must submit ... data regarding the safety and the effectiveness of each product. ...[M]anufacturers [must] test formulations by using accepted methods for microbiocidal activity, stability, and toxicity ... If EPA concludes a product may be used without causing unreasonable adverse effects, the product and its labeling are given an EPA registration number ..."

OSHA "OSHA has interpreted that, to decontaminate contaminated work surfaces, either an EPA-registered hospital tuberculocidal disinfectant or an EPA-registered hospital disinfectant labeled as effective against human immunodeficiency virus (HIV) and hepatitis B virus (HBV) is appropriate. Hospital disinfectants with such HIV and HBV claims can be used, provided surfaces are not contaminated with agents or concentration of agents for which higher level (i.e., intermediate-level) disinfection is recommended. In addition, as with all disinfectants, effectiveness is governed by strict adherence to the label instructions for intended use of the product."

Putting It All Together

Manage contamination of clinical contact surfaces either by covering them with surface barriers — highly recommended for difficult to clean surfaces — or by cleaning and disinfecting them between patients. Either method is effective.

Using Surface Barriers

Apply an appropriate surface barrier to clinical contact surfaces before they have a chance to become contaminated.

If a surface is contaminated:

■ Clean and disinfect them before placing new covers.

At the beginning of the clinic day, surfaces will have been cleaned at the end of the previous work day.

■ Apply an appropriate surface barrier to clinical contact surfaces before seating the first patient. Place each cover so that it protects the entire surface and will not be dislodged when touched.

Between patient visits:

1. Wear gloves when removing surface covers after patient treatment.

■ For simply removing contaminated barriers, the exam gloves worn during treatment are sufficient. Utility gloves also are acceptable.

2. Use care not to contaminate the surface underneath the barrier.

■ If the surface is touched when removing the cover (for example, with a contaminated glove or with the unclean side of the surface barrier), clean and disinfect the surface (see following page for instructions).

■ If the surface has not been touched with contaminated gloves or by the contaminated side of the cover, cleaning/disinfection is unnecessary.

Continued on Page 916

Glossary

Surface barrier: An item that blocks penetration of microorganisms, particles, and fluids to reduce potential contamination of the underlying surface.

Cleaning: The act of removing visible contamination.

Clinical contact surface: Surface that is touched by contaminated hands, instruments, devices, or other items while providing health care or performing activities that support the delivery of health care.

Disinfectant: Chemical agent used on nonliving objects to destroy virtually all recognized pathogens but not necessarily bacterial endospores.

Disinfection: Destruction of pathogenic and other kinds of microorganisms; less lethal than sterilization, it destroys most recognized pathogens but does not necessarily kill bacterial spores.

Environmental surface: Surface within a health care treatment area that is not directly involved in patient care but that may be contaminated during the course of treatment (e.g., countertops, drawer handles, floors, walls, and instrument control panels).

Hospital disinfectant: A germicide registered by the EPA to be effective against the test microorganisms Salmonella choleraesuis, Staphylococ-cus aureus, and Pseudomonas aeruginosa for use on nonliving objects in health care settings.

Housekeeping surface: Environ-mental surface that is not involved in the direct delivery of dental care (e.g., floors, walls).

Intermediate-level disinfectant: A liquid chemical germicide registered with the EPA as a hospital disinfectant with tuberculocidal activity.

Low-level disinfectant: A hospital disinfectant that may also have a label claim for effectiveness against hepatitis B virus and HIV.

Tuberculocidal: Able to destroy or irreversibly inactivate Mycobacterium tuberculosis, which is a test organism for disinfectant effectiveness.

Chart 2

Managing Contamination: Appropriate Disinfectants for Precleaned Surfaces

Contamination	Clinical contact surfaces	Housekeeping surfaces
No blood	Hospital disinfectant plus (a) HBV and HIV kill claim or (b) tuberculocidal activity	Hospital disinfectant or detergent and water
Blood	Hospital disinfectant plus tuberculocial activity	Hospital disinfectant with tuberculocial activity

3. Discard used covers in the regular office trash unless your state or local disposal laws require special handling.

4. Remove and discard contaminated gloves, wash hands, and apply fresh surface covers (as directed above) for the next patient.

At the end of the clinic day:

■ Remove barriers and clean and disinfect all clinical contact surfaces in the operatory per instructions for "Surface Cleaning and Disinfection."

Surface Cleaning and Disinfection

After each patient appointment, use the "spray-wipe-spray technique" — or pre-moistened disinfectant towelettes — to clean and disinfect all clinical contact surfaces in the operatory.

1. Put on utility gloves, mask, protective eyewear, and protective clothing.

2. Determine the degree of cleaning/disinfection required and select an EPA-registered hospital disinfectant that is compatible with the surfaces to be cleaned and disinfected.

■ For clinical contact surfaces not visibly contaminated with blood, select either (a) a hospital disinfectant with HIV and HBV kill claims or (b) a hospital disinfectant with tuberculocidal activity. Follow germicide's label instructions for use.

■ For surfaces contaminated with blood or visibly bloody fluids, select a hospital disinfectant with tuberculocidal activity.

3. Confirm that cleaning/disinfecting products have been prepared correctly and are fresh.

■ Read and follow label instructions regarding dilution, shelf life, use life, and expiration date.

4. Clean the surface.

a. Spray the surface with a cleaner.

b. Vigorously wipe with paper towels.

■ When cleaning large areas, multiple surfaces, or big spills, use several towels to prevent transferring contamination between surfaces.

■ Use a brush on surfaces that do not come visibly clean with wiping.

Alternatively: Clean the clinical

Continued on Page 918

Practice Tip

Meeting the Challenges of High-Tech Equipment

Digital radiography sensors pose special infection control challenges. These devices are semi-critical instruments, yet current incarnations are unable to withstand heat-sterilization or immersion in a sterilant/high-level disinfectant.

"These instruments are used in the mouth — they contact mucous membranes," explains Dr. Linda Basquill, a Columbia, South Carolina-area dentist. "We'd love to be able to sterilize them, but they're just too delicate for high temperatures or strong chemical baths."

Fortunately, most of digital X-ray sensors available today can be barrier-protected and then adequately cleaned and disinfected after use. Consistent with 2003 guidelines from the Centers for Disease Control and Prevention, Dr. Basquill recommends barrier protection of these high-tech intraoral devices, followed by post-treatment cleaning and disinfection.

To limit the degree of contamination you'll have to manage after treatment, cover sensors during patient use. Protective sheaths are commercially available for many intraoral components of high-tech equipment, but Dr. Basquill notes that barriers designed for handpieces and air-water syringes (i.e., those that are closed on one end) also work well on sensors. Digital X-ray sensors with cords can be covered using a longer plastic sleeve that protects both the device and its cord. Adding a finger cot helps hold the barrier in place during use.

After treatment, follow the sensor manufacturer's instructions for cleaning and disinfection. A disinfectant-soaked gauze pad or a disinfectant wipe is preferred over a spray. Follow the germicide manufacturer's instructions for cleaning and disinfectant contact time.

"As with any instrument used in health care, always read the user's manual," she stated. "Following the manufacturer's instructions for infection control — including appropriate barriers and disinfection/sterilization — is the best way to keep your patients safe without compromising your equipment."

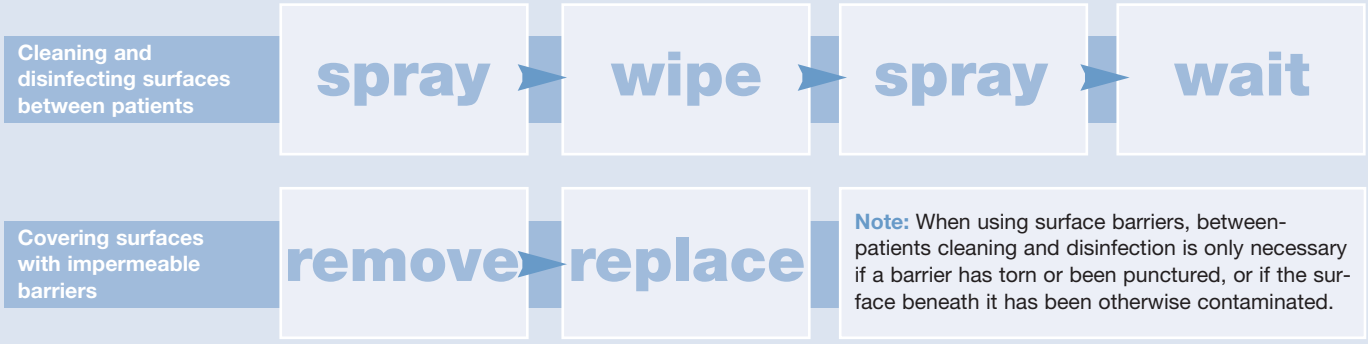
An OSAP member since 2002 and current member of the OSAP Board of Directors, Linda Basquill, DDS, is a private practitioner and the Army Dental Corps' Infection Control Consultant to the U.S. Surgeon General.

Operatory Surface Management: Barriers vs. Between-Patient Cleaning and Disinfection

Dental practice settings can choose to manage clinical contact surface contamination by using either surface barriers or between-patient cleaning and disinfection, but barriers clearly offer some advantages. Surface covers save the time and work required for cleaning and disinfection; they also eliminate the wait for disinfectant contact times to elapse. By saving time and eliminating potentially hazardous chemicals, they can enhance staff safety and efficiency.

Chart 3

Cleaning and Disinfecting vs. Using Surface Barriers



Ask OSAP

Q What surface disinfectants are strong enough to be effective yet gentle enough to prevent damage to dental equipment? — *JT, Asheville, N.C.*

A Because of the variety of disinfectant formulations and the many different materials used to manufacture dental equipment, always contact the dental equipment manufacturer for its recommendations on compatible disinfectant(s).

Using impervious barriers on surfaces that are likely to be touched during dental procedures can reduce the need for chemical disinfectants and prolong the life of equipment. — *OSAP*

Q I read recently that placing disinfectant in a container with 4x4 gauze for use on dental equipment is not recommended. Why not? — *KO, Frankfurt, Ill.*

A In general, cotton fibers contained in gauze may shorten the effectiveness of some disinfecting agents when stored in containers together. Germicides, especially iodophors or chlorines, may be inactivated or absorbed by the gauze.

If using gauze to apply disinfectant to surfaces, saturate the gauze with the disinfecting agent at the time of use. Gauze is acceptable for surface disinfection, but disposable paper towels are usually a more economical choice.

Always wear appropriate personal protective equipment when handling chemicals and managing contamination. — *OSAP*

Q Can we use plastic cling wrap – the kind you can buy at the grocery store — to protect clinical contact surfaces? — *ZI, Portland, Ore.*

A Barriers manufactured and marketed to protect medical and dental surfaces from contamination are regulated devices and require clearance by the U.S. Food and Drug Administration before they can be marketed to health professionals. Products intended for household use have not been tested for clinical use. For the best assurance that infection control products are working as designed, only products intended for use in health care settings should be used in the dental operatory. — *OSAP*

Do you have an inquiry about infection control, occupational health, or practice safety? Ask OSAP. Send your questions to office@osap.org.

contact surface using a commercially available disinfectant-impregnated towelette with the required level of germicidal activity (see chart, Page 917).

a. Check the label to be sure that the wipe is a cleaner (some disinfectant wipes may require a separate cleaner).

b. Wipe a pre-moistened cleaner-disinfectant towelette over the surface to be cleaned.

■ Carefully follow label instructions. Some wipes may be effective only on a limited surface area (approximately 3 square feet).

5. After cleaning, disinfect the surface.

a. Spray the disinfectant over the entire surface, using towels to reduce overspray.

b. Let the surface remain moist for the contact time stated on the disinfectant's label.

Alternatively:

a. Saturate the surface using a pre-moistened disinfectant-impregnated towelette.

6. Let the surface remain moist for the contact time stated on the disinfectant's label.

7. Wipe the surface dry if it is still wet when ready for patient care. CDA

Notes / A. The U.S. Environmental Protection Agency regulates and registers surface disinfectants for health care settings within the United States.

To request a printed copy of this article, please contact / Therese Long at Organization for Safety and Asepsis Procedures, P.O. Box 6297, Annapolis, MD 21401.

Looking Inside the 2003 CDC Dental Infection Control Guidelines

JENNIFER A. HARTE, DDS, MS

ABSTRACT

On Dec. 19, 2003, the Centers for Disease Control and Prevention published updated infection control guidelines for dentistry. The guidelines provide comprehensive information on all aspects of dental infection control. The recommendations are designed to prevent or reduce the potential for disease transmission from patient to dental health care personnel, from dental health care personnel to patient, and from patient to patient. Most recommendations will be familiar and are already practiced routinely. This article highlights major updates and additions in the CDC guidelines and provides additional information to assist readers in applying the latest guidelines.

Almost a year ago, the CDC and Prevention published updated dental infection control guidelines in a supplement to the *Morbidity and Mortality Weekly Report. The Guidelines for Infection Control in Dental Health Care Settings — 2003*[1] represent a collaborative effort between leading experts in infection control from other federal agencies, public health, and hospital epidemiology and infection control. Unlike regulatory agencies such as the Occupational Safety and Health Administration, the U.S. Food and Drug Administration, or the U.S. Environmental Protection Agency, the CDC cannot mandate certain practices; it can only recommend. However, the CDC is recognized as the nation's disease prevention agency and develops a broad range of guidelines intended to improve health care and to inform clinicians and the public. As a result, many dental licensing boards adopt CDC's recommendations, or variations of them, as the infection control standard for dental practice in their states.

In contrast to the 1986 and 1993 CDC dental infection control recommendations, the 2003 CDC publication includes more background information and the scientific rationale for the recommendations. Also, readers will notice that each recommendation has a rank assigned to it categorizing the recommendation on the basis of existing scientific data, theoretical ratio-

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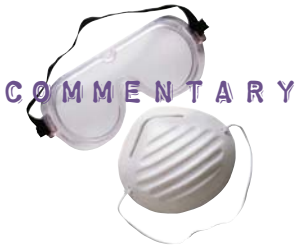
*The opinions expressed in this text are those of the author and do not reflect the official policy of the U.S. Department of Defense or other departments of the U.S. government.



nale, and applicability (**Table 1**). Most recommendations will be familiar and already are practiced routinely. As with previous CDC recommendations, the guidelines are designed to prevent or reduce the potential for disease transmission from patient to dental health care personnel; from dental health care personnel to patient, and from patient to patient.

The following is an overview highlighting major updates and additions in the 2003 CDC guidelines. It is not intended to be a comprehensive review. Readers can access the complete document (**Figure 1**) by visiting www.cdc.gov/oralhealth/infectioncontrol.

Table 1

Evidence-Based Ranking Scheme for the 2003 CDC Dental Infection Control Recommendations

Each recommendation in the *Guidelines for Infection Control for Dental Health Care Settings — 2003* is categorized on the basis of existing scientific data, theoretical rationale, and applicability. Rankings are based on the system used by CDC and the Health care Infection Control Practices Advisory Committee (HICPAC) to categorize recommendations:

Category IA. Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.

Category IB. Strongly recommended for implementation and supported by experimental, clinical, or epidemiologic studies and a strong theoretical rationale.

Category IC. Required for implementation as mandated by federal or state regulation or standard. When IC is used, a second rating can be included to provide the basis of existing scientific data, theoretical rationale, and applicability. Because of state differences, the reader should not assume that the absence of a IC implies the absence of state regulations.

Category II. Suggested for implementation and supported by suggestive clinical or epidemiologic studies or a theoretical rationale.

Unresolved issue. No recommendation. Insufficient evidence or no consensus regarding efficacy exists.

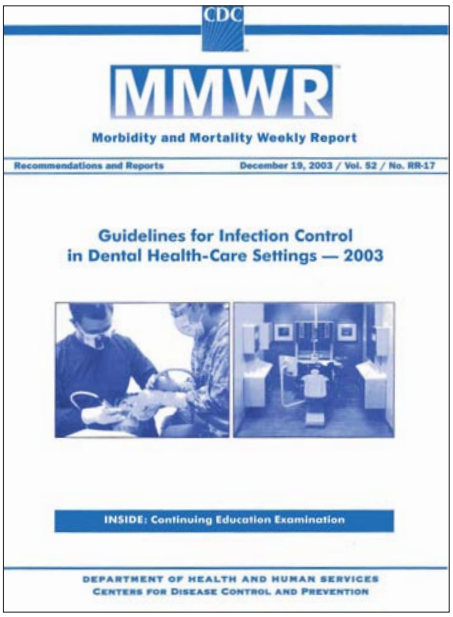


Figure 1. Guidelines for Infection Control in Dental Health Care Settings — 2003. Available online at www.cdc.gov/oralhealth/infectioncontrol.

Initial and ongoing training and education are key elements of a successful infection control program because if staff members understand the rationale behind infection control practices, they are more likely to comply with program policies. After initial training, staff members should receive training when new tasks or procedures affect their occupational exposure, and at a minimum annually. Training should include a description of their exposure risks; a review of prevention strategies and infection control policies and procedures; information on how to manage work-related illness and injuries, including postexposure prophylaxis; and a review of work restrictions for the exposure or infection.

As part of the office infection control program, the new guidelines also recommend dental practices develop a written health program (**Table 2**). This is much broader than the OSHA-mandated exposure control plan. For example, the CDC recommends that dental

Table 2

Elements of a Written Health Program for Dental Health Care Personnel

Include policies, procedures, and guidelines for:

- Education and training;
- Immunizations;
- Exposure prevention and postexposure management (including referral arrangements with qualified health care professionals to ensure prompt and appropriate treatment and follow up);
- Medical conditions, work-related illness, and associated work restrictions;
- Contact dermatitis and latex hypersensitivity; and
- Maintenance of records, data management, and confidentiality.

health care personnel be immunized against vaccine-preventable diseases such as measles, mumps, rubella, influenza, and chickenpox in addition to receiving the hepatitis B vaccination. Also, occasionally dental health care personnel might become ill with diseases requiring them to refrain from patient contact to prevent further transmission of infection (e.g., conjunctivitis, diarrheal diseases, varicella, acute viral respiratory infection) to either patients or other staff members. Dental practice infection control policies should encourage dental health care personnel to report illnesses or exposures without jeopardizing wages, benefits, or job status. To assist practitioners, the 2003 CDC guidelines include a two-page table describing work restrictions for selected diseases.

It's important to note that it's not the CDC's intention for dental offices to begin administering vaccines or diagnosing infectious diseases in staff members. Coordination between the dental practice's infection control coordinator and other qualified health care professionals (e.g., licensed physician) is necessary to provide dental health care personnel with appropriate services such as immunizations and postexposure management. Since the majority of dental practices are in ambulatory, private settings that do not have licensed medical staff and facilities to provide complete on-site health service programs, the infection control coordinator should establish programs that arrange for site-specific infection control services from external health care facilities and providers before dental health care personnel are placed at risk for exposure. Referral arrangements can be made with qualified health care professionals in an occupational health program of a hospital, with educational institutions, or with health care facilities that offer personnel health services.

Standard vs. Universal Precautions

Previous CDC dental infection control recommendations focused primarily on the risk of transmission of bloodborne pathogens among dental health care personnel and patients and use of universal precautions to reduce that risk. Universal precautions were based on the concept that all blood and body fluids that might be contaminated with blood should be treated as infectious because patients with bloodborne infections can be asymptomatic or unaware they are infected. Careful handling of sharp instruments; use of rubber dams to minimize blood spattering; handwashing; and use of personal protective equipment (e.g., gloves, masks, protective eyewear, and gowns) are all examples of preventive practices used to reduce exposure to blood and other potentially infectious materials.

The relevance of universal precautions to other aspects of disease transmission was recognized, and in 1996, CDC expanded the concept and changed the term to standard precautions.[2] Standard precautions apply to contact with 1) blood; 2) all body fluids, secretions, and excretions (except sweat), regardless of whether they contain blood; 3) nonintact skin; and 4) mucous membranes. Since standard precautions include the elements of universal precautions and because saliva has always been considered a potentially infectious material in dentistry, no difference exists in clinical dental practice between universal precautions and standard precautions; only the terminology has changed. As with universal precautions, dental health care personnel should apply standard precautions for all patient encounters.

Preventing Sharps Injury with Safety Devices

The majority of exposures in dentistry are preventable, and methods to reduce the risk of blood contacts have included use of standard precautions. Other strategies to reduce injuries include using devices with features engineered to prevent sharp injuries (e.g., needles with resheathing devices, safety scalpels, IV safety catheters) and modifications of work practices such as using a needle recapping device or restricting the use of fingers during suturing or administration of local anesthesia (**Table 3**). These approaches have contributed to the decrease in percutaneous injuries among dentists during recent years, however, needlesticks and other blood contacts continue to occur, which is a concern because percutaneous injuries pose the greatest risk of transmission.

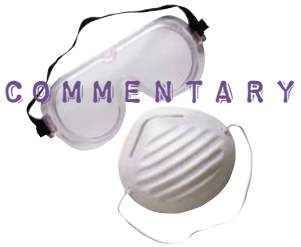


Table 3

Examples of Work Practice Controls to Reduce Percutaneous Injuries

- Using a one-handed scoop technique, a mechanical device designed for holding the needle cap to facilitate one-handed recapping, or an engineered sharps injury protection device (e.g., needles with resheathing mechanisms) for recapping needles between uses and before disposal;
- Not bending or breaking needles before disposal;
- Avoiding passing a syringe with an unsheathed needle;
- Removing burs before disassembling the handpiece from the dental unit;
- Using instruments, rather than fingers, to grasp needles, retract tissue, and load/unload needles and scalpels;
- Placing used disposable syringes and needles, scalpel blades, and other sharp items in appropriate puncture-resistant containers located as close as feasible to where the items were used; and
- Giving verbal announcements when passing sharps.

Table 4

Representative Examples of Safety Devices and Evaluation Resources

Safety Anesthetic Syringes

- 1SHOT Safety Syringe (Sultan Safety, LLC)
- Ultra Safety Plus XL Safety Syringe (Septodont, Inc.)

Safety Scalpels

- BD Bard-Parker Protected Disposable Scalpel (Becton, Dickinson and Company)
- Miltex Disposable Safety Scalpels (Miltex, Inc.)

Screening and Evaluation Tools

- CDC, Division of Oral Health: www.cdc.gov/oralhealth/infectioncontrol/forms.htm
- Training for Development of Innovative Control Technologies (TDICT): www.tdict.org

In 2001, revisions to OSHA's bloodborne pathogens standard as mandated by the Needlestick Safety and Prevention Act of 2000 became effective.[3] These revisions clarify the need for employers to consider safer needle devices as they become available and to involve employees directly responsible for patient care (e.g., dentists, hygienists, and dental assistants) in identifying and choosing such devices. To be in compliance with the OSHA mandate, CDC recommends that dental practices should identify, evaluate, and select devices with engineered safety features at least annually and as they become available on the market (**Table 4**).

Managing Occupational Exposures to Bloodborne Pathogens

Avoiding occupational exposures to blood is the primary way to prevent transmission of hepatitis HBV, hepatitis C virus (HCV), and HIV in health care settings. Occupational exposure incidents occur through needlesticks or cuts with a sharp object, as well as through contact between potentially infectious blood, tissues, or other body fluids and mucous membranes of the eye, nose, mouth, or nonintact skin (e.g., exposed skin that is chapped, abraded, or shows signs of dermatitis).

Although prevention is primary, postexposure management is a vital component of an infection control program to prevent infection after an occupational exposure to blood or other potentially infectious materials. Being prepared before an occupational incident occurs is essential. Therefore, dental practices and laboratories should establish written, comprehensive programs that include the hepatitis B vaccination and postexposure management protocols that 1) describe the types of contact with blood or other potentially infectious materials that can place dental health care personnel at risk for infection; 2) describe procedures for promptly reporting and evaluating such exposures; and 3) identify a health care professional who is qualified to provide counseling and perform all medical evaluations and procedures in accordance with current recommendations of the U.S. Public Health Service, including postexposure prophylaxis with chemotherapeutic drugs when indicated. While the new guidelines provide a protocol for managing occupational exposure incidents in the dental setting, having an arrangement with a qualified health care professional before an occupational exposure incident occurs remains key because certain interventions have to be initiated promptly to be effective.

Hand Hygiene

Hand hygiene refers to handwashing, antiseptic handwash, antiseptic handrub, or surgical hand antisepsis and is most important aseptic procedure in the prevention of health care-associated infections (**Table 5**). Hand hygiene significantly reduces microbes

Table 5

Hand Hygiene Methods and Indications

Methods	Agent	Technique	Duration (minimum)	Indications
Routine handwash	Water and nonantimicrobial detergent (e.g., plain soap*)	• Wet hands and wrists under cool running water. • Dispense handwashing agent sufficient to cover hands and wrists. • Rub the agent into all areas, with particular emphasis around nails and between fingers, before rinsing with cool water. • Dry hands completely with disposable towels before donning gloves. • Use a towel to turn off the faucet if automatic controls are not available.	15 seconds	• When visibly soiled† • After barehanded touching of inanimate objects likely to be contaminated by blood or saliva • Before and after treating each patient (e.g., before glove placement and after glove removal) • Before leaving patient care, laboratory, or instrument processing areas • Before regloving after removing gloves that are torn, cut, or punctured
Antiseptic handwash	Water and antimicrobial agent/detergent (e.g., chlorhexidine, iodine and iodophors, chloroxylenol [PCMX], triclosan)			
Antiseptic handrub	Alcohol-based handrub†	• Apply the product to palm of one hand. • Rub hands together, covering all surfaces of hands and fingers, until hands are dry.† • Follow manufacturer's recommendations regarding volume of product to use.	Rub hands until the agent is dry†	
Surgical antisepsis	Water and antimicrobial agent/detergent (e.g., chlorhexidine, iodine and iodophors, chloroxylenol [PCMX], triclosan)	• Remove rings, watches, and bracelets. • Remove debris from underneath fingernails using a nail cleaner under running water. • Wet hands and wrists under cool running water.	2–6 minutes	• Before donning sterile, surgeon's gloves for oral surgical procedures.
	Water and nonantimicrobial detergent (e.g., plain soap*) followed by an alcohol-based surgical hand-scrub product with persistent activity	• Using an antimicrobial agent, scrub hands and forearms for the length of time recommended by the manufacturer's instructions before rinsing with cool water. • Dry hands completely (using a sterile towel is ideal) before donning sterile surgeon's gloves. Follow manufacturer instructions for surgical handscrub product with persistent activity.	Follow manufacturer instructions for surgical hand-scrub product with persistent activity.	

Adapted from reference # 1.

* Pathogenic organisms have been found on or around bar soap during and after use. Use of liquid soap with hands-free dispensing controls is preferable.

† 60%–95% ethanol or isopropanol. Alcohol-based handrubs **should not** be used in the presence of visible soil or organic material. If using an alcohol-based handrub, apply adequate amount to palm of one hand and rub hands together, covering all surfaces of the hands and fingers, until hands are dry. Follow manufacturer's recommendations regarding the volume of product to use. If hands feel dry after rubbing hands together for 10–15 seconds, an insufficient volume of product likely was applied. The drying effect of alcohol can be reduced or eliminated by adding 1%–3% glycerol or other skin-conditioning agents.

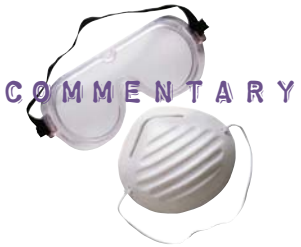


Figure 2. Hand hygiene methods: Handwashing, surgical hand antisepsis, and alcohol-based handrub (from left to right).

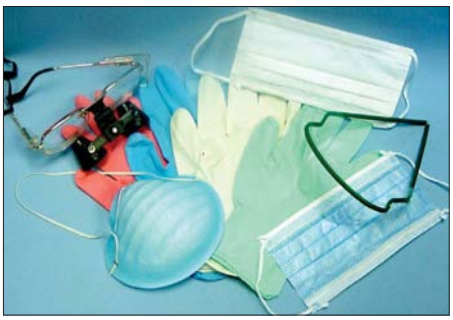


Figure 3. Examples of personal protective equipment.

Table 6

Alcohol-Based Handrubs

Alcohol-based handrubs are alcohol-containing preparations designed for application to the hands for reducing the number of viable microorganisms on the hands. In the United States, these preparations usually contain 60%–95% ethanol or isopropanol. These are waterless antiseptic agents not requiring the use of exogenous water. After applying such an agent, the hands are rubbed together until the agent has dried.

Advantages	Disadvantages
• Fast acting and effective antimicrobial action (if hands are not visibly soiled) • Potential to improve skin condition — causes less dermatitis (if the product contains emollients) • Potential to increase hand hygiene compliance	• Cannot be used when hands are visibly dirty or contaminated • Must carefully follow manufacturer instructions for amount of product to use and time to "rub"* • Flammable • Possible "gritty" feeling on hands when used with powdered gloves or from emollient "build up" after repeated use • May be more expensive than traditional hand-hygiene agents

* If hands feel dry after rubbing hands together for 10–15 seconds, an insufficient volume of product likely was applied.

on the hands and protects both patients and the dental staff (**Figure 2**).

Hand hygiene should be performed with either a nonantimicrobial or antimicrobial soap and water when hands are visibly dirty or contaminated with blood or other potentially infectious material. If hands are not visibly soiled, dental health care personnel now have the option of using a waterless product — an alcohol-based handrub. **Table 6** presents several advantages and disadvantages of using alcohol-based handrubs.

Wearing gloves does not replace the need for handwashing. Likewise, handwashing does not eliminate the need for gloves. Gloves reduce hand contamination by 70 percent to 80 percent, prevent cross-contamination, and protect patients and health care personnel from infection. However, hand contamination may occur as a result of small, undetected holes in gloves and contamination may occur during glove removal. Studies have shown that health care personnel and dental health care personnel are frequently unaware of small tears in gloves that occur during use.[4-7] If the integrity of a glove is compromised (e.g., punctured), it should be changed as promptly as safety permits.

Personal Protective Equipment

The recommendations for personal protective equipment remain unchanged from the 1993 CDC recommendations and OSHA's bloodborne pathogens standard. Personal protective equipment is designed to protect the skin and the mucous membranes of the eyes, nose, and mouth during procedures likely to generate splashing or spattering of blood or other body fluids (e.g., the use of high-speed handpieces, air/water syringes, or ultrasonic scalers). Primary personal protective equipment used in dentistry includes gloves, surgical masks, protective eyewear, and protective clothing (e.g., long-sleeved gowns or jackets that cover the forearms) (**Figure 3**). All personal protective equipment should be removed before dental health care personnel leave patient-care areas. Reusable personal protective equipment (e.g., clinician or patient protective eyewear and face shields) should be cleaned with soap and water, and when visibly soiled, disinfected between patients, according to the manufacturer's directions.

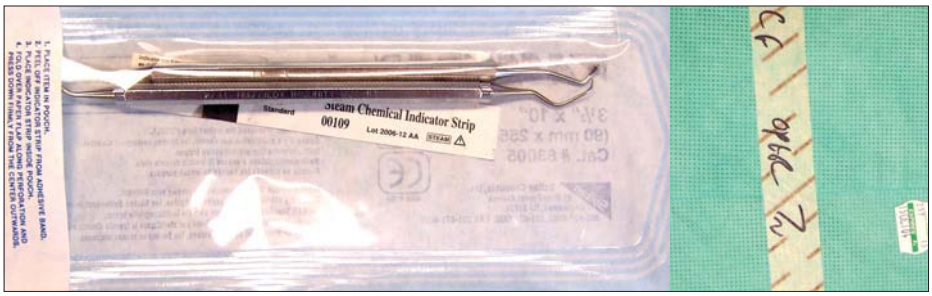


Figure 4. Examples of internal (left) and external (right) indicators used to monitor heat sterilization.

Contact Dermatitis and Latex Hypersensitivity

Occupationally related contact dermatitis can develop from frequent and repeated use of hand hygiene products, exposure to chemicals, and glove use. Less common but more serious, latex allergy (Type I hypersensitivity to latex proteins) is a serious systemic allergic reaction, usually beginning within minutes of exposure but sometimes occurring hours later and producing varied symptoms. More common reactions include runny nose, sneezing, itchy eyes, scratchy throat, hives, and itchy burning skin sensations. More severe symptoms include asthma marked by difficult breathing, coughing spells, and wheezing; cardiovascular and gastrointestinal ailments; and in rare cases, anaphylaxis and death.[8,9] A physician should evaluate dental health care personnel exhibiting symptoms of contact dermatitis or latex allergy. Self-diagnosis and arbitrary changing of glove brands or materials are not advised. A prompt diagnosis made through medical history, physical examination, and diagnostic tests will allow appropriate treatment and preventive measures.

Taking thorough health histories for both patients and dental health care personnel, followed by avoidance of contact with potential allergens can minimize the possibility of adverse reactions. CDC recommends educating dental health care personnel regarding the signs, symptoms, and diagnoses of skin reactions associated with frequent hand hygiene and glove use. Additionally, the guidelines recommend screening all patients for latex allergy and providing a latex-safe environment for patients and dental health care personnel with latex allergy and having emergency treatment kits with latex-free products available at all times.

Sterilization and Disinfection of Patient Care Items

The instrument processing section of the 2003 CDC guidelines is greatly expanded from the 1993 CDC document. Everything from designating a central instrument processing area to procedures to follow in the event of a positive spore test is described. Cleaning prior to sterilization remains critical to remove all blood and other debris that may interfere with the sterilization process. Using automated equipment (e.g., ultrasonic cleaners, instrument washers) to clean instruments is preferable to the more dangerous handscrubbing. Packaging instruments prior to sterilization is necessary to maintain sterility following removal from the sterilizer. A chemical indicator should be placed within each package, and if not visible from the outside, an external indicator should be applied to the package (**Figure 4**). Heat sterilization using steam autoclaves, dry heat sterilizers, or unsaturated chemical vapor remains the standard of care. Manufacturer instructions should always be followed for acceptable packaging materials, operating parameters, and loading procedures for sterilizers. Guidance is offered for using liquid chemical germicides to either high-level disinfect or sterilize those few heat-sensitive semi-critical instruments. Monitoring the sterilization process not only involves use of mechanical, chemical and biological (i.e., spore tests) indicators, but also involves initial and ongoing training of all staff members involved with instrument reprocessing, and the maintenance of sterilization equipment. The CDC recommendation to use mechanical monitors for each sterilization load can be accomplished by either documenting the time, temperature and pressure (if involved) of each load, or by saving the printout from the cycle if you have a printer accessory. CDC continues to recommend at least weekly use of a spore test and a matching control.

Environmental Infection Control

Environmental surfaces can be divided into clinical contact surfaces and housekeeping surfaces (**Table 7**). Clinical contact surfaces or those sur-

Figure 5. Example of a surface barrier on a clinical contact surface.

Table 7

Clinical Contact and Housekeeping Surfaces

Type of Surface	Definition	Examples
Clinical Contact	Surfaces that may touched frequently with gloved hand during patient care or that may become contaminated with blood or other potentially infectious material and subsequently contact instruments, devices, hands, or gloves	Light handles, switches, dental X-ray equipment, chairside computers, reusable containers of dental material, drawer handles, faucet handles, countertops, pen, telephone handle, doorknob
Housekeeping	Surfaces that do not come into contact with devices used in dental procedures	Floors, walls, sinks

faces that are touched can serve as sources of contamination and should be protected with impervious barriers or cleaned and disinfected between patients (**Figure 5**). If barriers are used, they should be changed between patients. Because housekeeping surfaces (e.g., floors, walls, and sinks) have limited risk of disease transmission, most of the time they can be cleaned with detergent and water. If blood or other body fluids are present, housekeeping surfaces should be cleaned and disinfected.

As always, disinfectants should be registered with the EPA. The CDC now recommends either using an EPA-registered hospital disinfectant with a low- (i.e., HIV and HBV label claims) to intermediate-level (i.e., tuberculocidal claim) activity after each patient. However, if the surface is visibly contaminated with blood, an intermediate-level disinfectant is indicated. It's important to note that if a low-level disinfectant is chosen, it must have label claims stating effectiveness against both HIV and HBV. Although the scientific evidence supports the effectiveness of low-level disinfectants under certain conditions, for practical purposes offices may find it more convenient to select a product with a higher degree of potency (intermediate-level disinfectant) to cover all situations.

Dental Unit Waterlines, Biofilm and Water Quality

The American Dental Association and the CDC have addressed dental water quality in the past, primarily with the ADA recommending that dental manufacturers develop dental units and equipment that can deliver treatment water containing no more than 200 colony-forming units (CFU) of bacteria/mL.[10] Standards established by the EPA set limits of ≤500 CFU/mL for drinking water, and the CDC now recommends that dental unit water delivered to patients also meet this standard. The only exception is that during oral surgical procedures, only sterile water should be delivered to patients. Conventional dental units cannot reliably deliver sterile water even when equipped with independent water reservoirs because the water-bearing pathway cannot be reliably sterilized. Delivery devices (e.g., bulb syringe or sterile, single-use disposable products) should be used to deliver sterile water. Oral surgery and implant handpieces, as well as ultrasonic scalers, are commercially available that bypass the dental unit to deliver sterile water or other solutions by using single-use disposable or sterilizable tubing.[11] (**Table 8**)

In 1993, CDC recommended that dental waterlines be flushed at the beginning of the clinic day to reduce the microbial load. However, studies have demonstrated this practice does not affect biofilm in the waterlines or reliably improve the quality of water

Table 8

Selected Devices Available to Deliver Sterile Irrigating Solutions During Oral Surgical Procedures

Implantmed by W & H distributed by A-dec corporation: www.a-dec.com

KaVo INTRAsurg 500 by KaVo America: www.kavousa.com

Osteopower 2i Modular Surgical Handpiece System by Osteomed Corp: www.osteomed-corp.com

Odontoson-M Ultrasonic Scaler by Odonto-Wave: www.Odonto-Wave.com

Various Ultrasonic Scalers providing sterile water delivery by Amadent (Satelec): www.amadent.com

AquaSept (individual autoclavable reservoir units bypassing dental unit waterlines to the handpiece) by Lares Research (Northland Ind.): www.laresdental.com

Table 9

Representative Examples of Waterline Treatment Products

Chemical germicides for periodic waterline treatment
- Dentacide (Frio Technologies Inc.)
- Lines (Micrylium)
- Sterilex Ultra (Sterilex Corporation)

Chemical germicides for continuous waterline treatment
- BioClenz (Frontier Pharmaceutical)
- DentaPure DP40 Cartridge (MRLB International, Inc.)
- ICX (A-dec)

Centralized waterline treatment systems
- PureLine50 (Sterisil, Inc.)
- VistaClear Waterline Treatment System (Pelton and Crane)
- Waterclave Water Purifier (Waterclave, LLC)

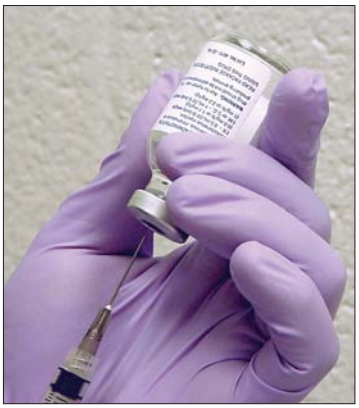


Figure 6. Example of an aseptic technique when handling parenteral medications.

used during dental treatment.[12-14] Because the recommended value of ≤500 CFU/mL cannot be achieved by using this method, other strategies should be employed. Dental unit water that remains untreated or unfiltered is unlikely to meet the drinking water standard.[15-21] Commercial devices and procedures designed to improve the quality of water used in dental treatment are available; methods demonstrated to be effective include self-contained water systems combined with chemical treatment (**Table 9**), in-line microfilters, and combinations of these treatments. Simply using source water containing ≤500 CFU/mL of bacteria (e.g., tap, distilled, or sterile water) in a self-contained water system will not eliminate bacterial contamination in treatment water if biofilms in the water system are not controlled. Removal or inactivation of dental waterline biofilms requires use of chemical germicides.

The CDC advises dentists to consult with the manufacturer of their dental unit or water delivery system to determine the best method for maintaining acceptable water quality (i.e., ≤500 CFU/mL) and the recommended frequency of monitoring. Monitoring of dental water quality can be performed by using commer-

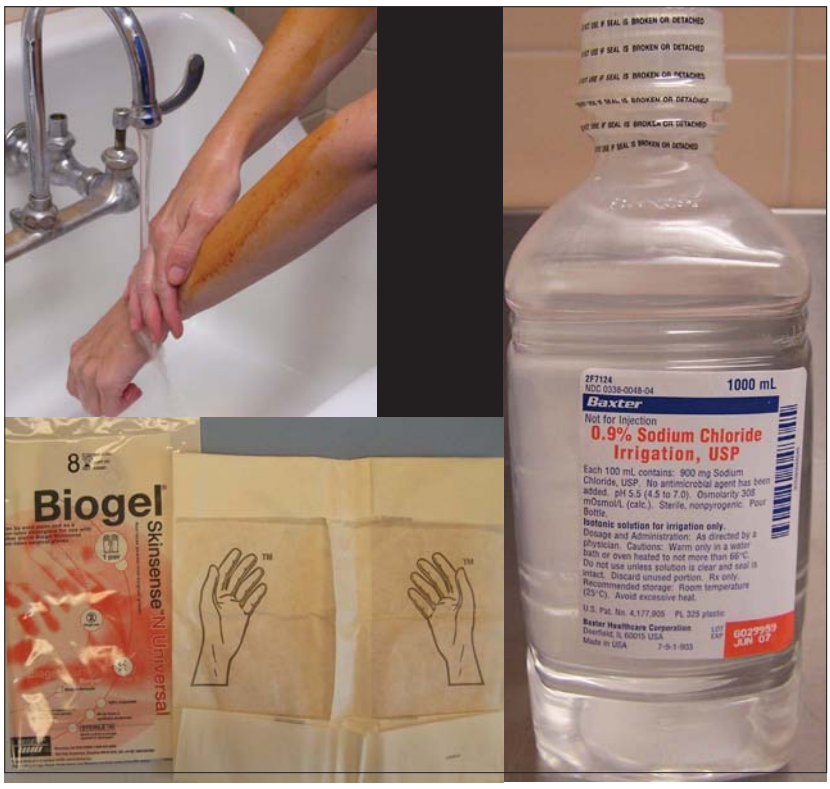


Figure 7. Three elements of infection control during oral surgical procedures — surgical hand antisepsis, wearing sterile surgical gloves, using sterile irrigating solutions.

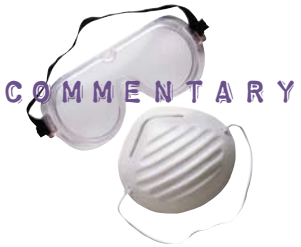


Table 10

Examples of Methods for Evaluating Infection Control Programs[1]

Program Element	Evaluation Example
Appropriate immunization of dental health care personnel	Conduct an annual review of individual personnel records to ensure up-to-date immunizations.
Assessment of occupational exposures to infectious agents	Report occupational exposures to infectious agents. Document the steps that occurred around the exposure and plan how it could be prevented in the future.
Comprehensive postexposure management and medical follow-up program after occupational exposures to infectious agents	Ensure that postexposure management plan is clear, complete, and available at all times to all dental health care personnel. All staff should understand the plan, which should include toll-free phone numbers for questions.
Adherence to hand hygiene before and after patient care	Observe and document circumstances of appropriate or inappropriate handwashing. Review findings in a staff meeting.
Proper use of personal protective equipment to prevent occupational exposures to infectious agents	Observe and document the use of barrier precautions and careful handling of sharps. Review findings in a staff meeting.
Routine and appropriate sterilization of instruments using a biologic monitoring system	Monitor paper log of steam cycle and temperature strip with each sterilization load, and examine results of weekly biologic monitoring. Take appropriate action when failure of sterilization process is noted.
Evaluation and implementation of safer medical devices	Conduct an annual review of the exposure control plan for documentation of new developments in safer medical devices.
Compliance of water in routine dental procedures with current U.S. EPA drinking water standards (fewer than 500 CFU of heterotrophic water bacteria)	Monitor dental water quality as recommended by the equipment manufacturer, using commercial self-contained test kits, or commercial water testing laboratories.
Proper handling and disposal of medical waste	Observe the safe disposal of regulated and nonregulated medical waste and take preventive measures if hazardous situations occur.
Health care associated infections	Assess the unscheduled return of patients after procedures and evaluate them for an infectious process. A trend may require formal evaluation.

cial self-contained test kits or commercial water-testing laboratories.

Special Considerations

Sections on special considerations include a variety of topics: dental handpieces and other devices attached to air and waterlines; saliva ejectors; radiology; parenteral medications; single-use or disposable devices; preprocedural mouth rinses; oral surgical procedures; handling of biopsy specimens and extracted teeth; laser/electrosurgery plumes; *M. tuberculosis*; Creutzfeldt-Jakob disease and other prion diseases; program evaluation; and research considerations.

For those using digital radiology, presently the sensor presents an infection control challenge. They should be cleaned and ideally heat sterilized or high-level disinfected between patients because they contact mucous membranes. However, these items vary by manufacturer or type of device in their ability to be sterilized or high-level disinfected. To minimize the potential for device-associated infections, the CDC recommends barrier protecting the sensor during use, and following removal of the barrier, the sensor should be cleaned and disinfected with an EPA-registered intermediate-level product. Because the sensors are expensive, it is recommended to consult the manufacturer for appropriate disinfection methods and compatible products.

The section on aseptic technique for parenteral medications provides guidance on safe handling of multiple- or single-dose medication vials (**Figure 6**) and fluid infusion sets (e.g., IV bags and tubing) to clinicians performing sedations or administering these types

Table 11

Selected Internet Resources for Dental Infection Control Information and Products

Dental Infection Control

American Dental Association (ADA) Dental Infection Control Issues: www.ada.org/prof/resources/topics/icontrol/index.asp
Centers for Disease Control and Prevention: Dental Infection Control: www.cdc.gov/OralHealth/infectioncontrol/index.htm
Occupational Safety and Health Administration (OSHA)
Dental Safety and Health Topics: www.osha.gov/SLTC/dentistry/index.html
Needlestick Prevention www.osha.gov/SLTC/needlestick/index.html
Organization for Safety and Asepsis Procedures (OSAP) www.osap.org/
USAF Dental Investigation Service (DIS) www.brooks.af.mil/dis/infcontrol.htm

General Infection Control

Centers for Disease Control and Prevention (CDC) www.cdc.gov/
Association for Professionals in Infection Control and Epidemiology www.apic.org
Association for the Advancement of Medical Instrumentation (AAMI) www.aami.org/
Joint Commission for the Accreditation of Health care Organizations (JCAHO) www.jcaho.org/
Society for Health care Epidemiology of America (SHEA) www.shea-online.org/

Dental Infection Control Product Information

American Dental Association (ADA): www.ada.org/ada/seal/index.asp
Clinical Research Associates: www.cranews.org
Dental Products Report: www.dentalproducts.net
Dentistry Today: www.dentistrytoday.com
USAF Dental Investigation Service (DIS): www.brooks.af.mil/dis/infcontrol.htm

of medications to patients. When these solutions and devices are not handled properly, life-threatening infections can occur.

The CDC has always provided infection control recommendations for clinicians performing surgeries, however in the new guidelines the CDC clarifies the definition of an oral surgical procedure: "Oral surgical procedures are defined as any procedure that involves the incision, excision, or reflection of tissue that exposes the normally sterile areas of the oral cavity. Examples include biopsy, periodontal surgery, apical surgery, implant surgery, and surgical extractions of teeth (e.g., removal of erupted or nonerupted tooth requiring elevation of mucoperiosteal flap, removal of bone or section of tooth, and suturing if needed." The recommendations include performing surgical hand antisepsis with an antimicrobial product before donning sterile surgeon's gloves and using sterile irrigating solutions during oral surgical procedures (**Figure 7**).

The guidelines also offer recommendations on how to evaluate your infection control program. A successful infection control program depends on developing standard operating procedures, evaluating practices, routinely documenting adverse outcomes (e.g., occupational exposures to blood) and work-related illnesses in dental health care personnel, and monitoring health care-associated infections in patients. Strategies and tools to evaluate the infection control program can include periodic observational assessments, checklists to document procedures, and routine review of occupational exposures to bloodborne pathogens. **Table 10** provides examples of methods for evaluating infection control programs. Evaluation offers an opportunity to improve the effectiveness of both the infection control program and dental practice protocols. If deficiencies or problems in the implementation of infection control procedures are identified, further evaluation is needed to eliminate the problems. Most practices will find that they are already performing many of the recommended evaluation activities, and if not, they can easily add them to their daily practice.

Conclusions

While the guidelines provide comprehensive information on all aspects of dental infection control, there is some important information that you will not obtain from the updated CDC guidelines. Health care providers desire and need information on specific products — what works and what doesn't — and which products are the most efficient and cost effective. Regulatory and legal issues preclude the CDC from commenting on the efficacy or effectiveness of specific products. Also of interest are specific "how to" techniques and methods used to achieve the recommendations. Because there are usually several ways to achieve the desired end result, CDC refrains from making specific recommendations on protocols or techniques. Resources are available that provide information to help health care providers make informed purchasing decisions and determine how to develop safe and efficient work practices to achieve the recommendations. Current literature reviews, answers to frequently asked questions, and product information and evaluations are just several examples of items individuals may find helpful. Much of this information is available to the general public without a membership requirement (**Table 11**).

CDC's new guidelines for infection control in dental health care settings should provide dental health care personnel with the information needed to make informed and intelligent choices when they select infection control processes, methods, and products. Although most dental practices will find they already are carrying out most of the recommendations in the guidelines, they now have the scientific rationale that underlies these recommendations. The practice of infection control in dentistry has made remarkable progress over the years, and dental offices that follow the latest CDC recommendations will strengthen an already admirable record of safe dental practice. Patients and providers alike can be assured that oral health care can be delivered and received in a safe manner. CDA

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Robert E. Horseman, DDS

Dr. Conley Has Left the Building

It is nearly 22 years ago that Dr. Jack F. Conley signed on as editor of the *CDA Journal*. In 1983, he was a callow youth of 45 summers who had been immersing himself with distinction in various services to the California Dental Association since 1972. Fortified with that much experience, it's a wonder he accepted the editor job. It's like being selected to be the cook on a camping trip. Betray a certain willingness to be exploited, a vague concept at best of what you're getting into and bingo! The job is yours in perpetuity.

The editor job is like being selected to be the cook on a camping trip.

Henry Watterson once said that the definition of a great editor is a man of outstanding talent who owns 51 percent of the company's stock. Conley is owner of nothing of any monetary value, but he has an idea of what he wants, even though he may not know what it is. He does understand that an editor is a man to whom the wastebasket is mightier than the pen. He probably shares the feeling of the late William Allen White who stated he became the editor of a weekly newspaper because he wanted to be "my own particular kind of a damn fool."

Jack's first editorial appeared in September 1983. Ronald Reagan was presi-

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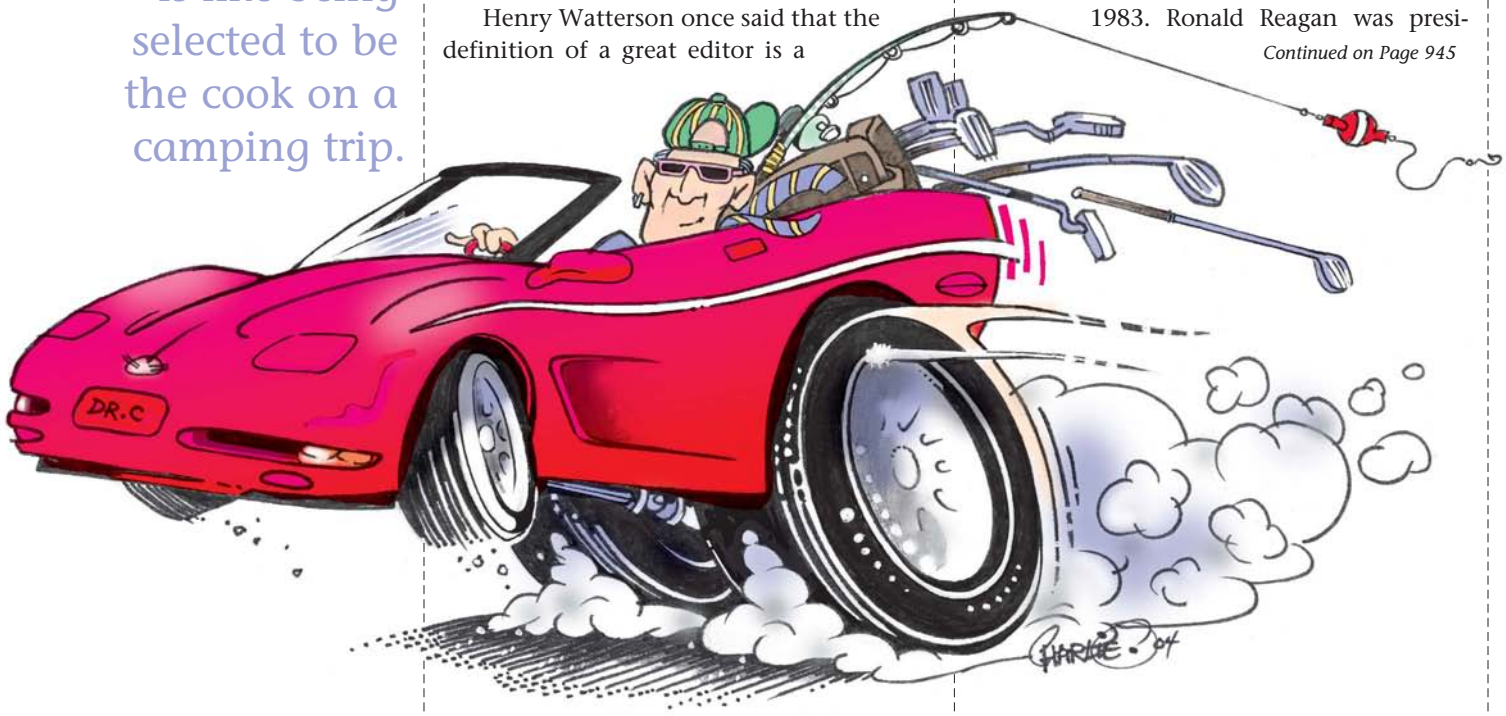

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dent, a first-class stamp cost 20 cents, the U.S. invaded Grenada, and Botox had yet to erase its first wrinkle. Like a duck takes to water, Conley wrote 250 additional editorials over the next 20 years, and in the process began accumulating awards, recognition, and kudos from professionals all over the country. He found himself elected president of the American Association of Dental Editors, and along the way won a special citation for his *Journal* in the International College of Dentists Journalism Competition Awards.

Pretty good for a guy so self-effacing he describes himself as "bland and forgettable." OK, so he's no Billy Sunday "hell and brimstone" type of editorial writer, but with his picture featuring a full head of hair and the requisite number of teeth beaming out from his editor's page each month, he got his messages across in an erudite and professional manner.

Now, two decades later, the only award he hasn't received is the Longevity Cup, held presently by Alan Greenspan of the Federal Reserve Board. So now he wants to retire? After only 22 years? Well, that's the kind of help you get nowadays. Stick around long enough to find their way around the office without bumping into the furniture and they up and quit. Conley could have been the Father Superior of dental editors if he wanted.

So forget the Longevity Cup. Conley will forego that honor because he has what seems to him a valid reason. Jack isn't quitting to tackle something else. Golf and fishing hold no appeal. He already has a full plate with his position at USC Dental School. Conley thinks — rightly or wrongly — that 22 years as editor is long enough, that the right thing to do is pass the mantle on to a younger man. He could be right. After all, he doesn't wear a baseball cap backwards and his pants are not at half-mast most of the time. No piercings or tattoos are visible. He doesn't tool around in a two-seated roadster, and he invariably wears socks with his shoes. Obviously, the real world as aired by MTV is passing him by.

The only award he hasn't received is the Longevity Cup, held presently by Alan Greenspan of the Federal Reserve Board.

Staffers who have worked closely with him for years say he's as close to real gentleman as they've ever met. He doesn't gossip, he doesn't talk out of school, he works a political mine field, and hasn't lost a limb yet. When cooler heads prevail, his will be one of them.

Twenty-two years ago it was Conley's mission to make the CDA *Journal* the best in the nation. Thank you, Jack Conley! Mission accomplished with clarity and grace. CDA