

Dr. Newell Sill Jenkins

Initial Plaque Score

Web-based C.E.

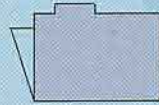
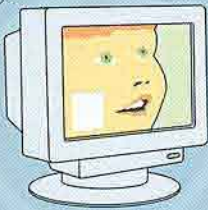
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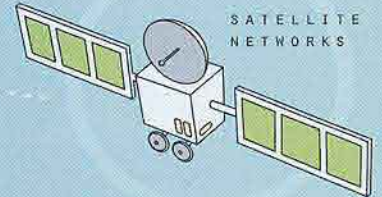
August 2003

Teledentistry

LOCAL CONSULTATION



ELECTRONIC
DATABASES

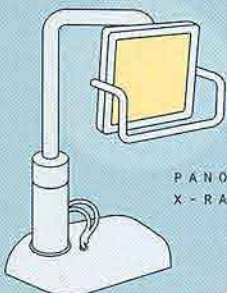


SATELLITE
NETWORKS

INTRA-ORAL DIGITAL PHOTOS



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Harboring Some Ethical Dilemmas

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ith changing times, some of our more important traditional professional institutions acquire and harbor some rather nagging

challenges that must be overcome if the profession is to retain its self-respect. Such an institution is the Dental Board of California clinical examination.

We have seen Dental Boards over the years make many changes in the mechanics of the examination to better reflect the environment of dental practice. However, there have been, and will continue to be, criticisms of aspects of the examination process, such as lack of appropriate protocols for specialists. Our purpose here is neither to criticize nor to examine the structure of the clinical examination itself. As long as the clinical examination continues, the board and its staff will undoubtedly make efforts to improve it. Rather, our major concern comes from an entirely different direction.

Through the board clinical examination, new dental graduates and dentists from outside California seeking to establish practice here are being exposed to an unpleasant and unprofessional snapshot of the dental profession. From our perspective, board applicants “compete” to secure the best examination circumstances they can financially afford to ensure a successful result. The best circumstances include having a dental assistant with good board examination experience who can direct a candidate through the “minefield” that is the examination. These assistants usually require (or demand) significant compensation in the hundreds of dollars. We have heard confirmed reports of \$800 being paid

to dental assistants. Eyewitnesses have also described a “circus” atmosphere at some examination locations involving dental assistants actively marketing themselves.

A tooth or teeth with the condition or conditions that best meet the criteria for the clinical examination are essential for a candidate to feel confident and less stressed. Candidates will exhaust countless efforts and a good deal of money to identify appropriate patients for the exam. We have heard horror stories in which a candidate’s patient has appeared in the waiting area only to be whisked away moments before the exam starts by another candidate who offers more money. We have also received reports of prospective patients standing outside the examination site with signs and placards announcing their availability and price.

Resources to screen and prepare patients — such as facilities, X-rays, and restorative materials — can present a major obstacle for dentists who have not recently graduated from a California school. Some licensed dentists allow these candidates access to their practice to screen and prepare patients so that they will meet the examination criteria. This can lead to a form of unlicensed practice in the absence of the practice owner if the candidate prepares the patient by providing any form of restorative care.

Some of the unethical or unprofessional activities heretofore mentioned can be avoided by “purchasing” a patient from one of at least two companies that provide prescreened patients who suppos-



Board applicants “compete” to secure the best examination circumstances they can financially afford to ensure a successful result.

One candidate from Southern California will spend between \$4,000 and \$5,000 to take the exam.

edly will meet the examination qualifications. Such a service can multiply the cost of finding patients. We have heard of fees ranging from \$700 to \$1,000 or more per prescreened patient. It is our understanding that one candidate from Southern California has arranged to have one service supply three patients for \$3,500. Add to this sum the cost of a dental assistant and travel expense to take the board exam in San Francisco, and the candidate will spend between \$4,000 and \$5,000 to take the exam. If the candidate fails in his attempt, there is a potential to repeat much of that expense. We understand that some candidates believe that removal of the significant stress that they must undergo to find and screen a qualified patient makes these services well worth the money.

If we put these facts and descriptions of the decisions faced by an examination candidate together, an unpleasant scenario unfolds. In addition to the actual board examination fees, some candidates may spend several thousand dollars or more to take the examination. Many of the candidates (if not a majority) already carry significant educational debt. In many cases, it is more than \$200,000. Most of these dentists need a job immediately after the board exams so they can start earning a living and making their loan payments. They need to pass the examination the first time! The fear of a delay either because they cannot find a proper patient or because they attempt to take the exam with a less than "ideal" patient condition and fail are strong incentives for them to pay exorbitant fees to dental assistants, patients, or other agents who offer them services. Other behaviors that the process encourages include unlicensed dental practice and outright theft or purchase of patients by the highest bidder. All parties may be guilty of unethical or unprofessional actions, including the dental assistant and patients, as well as the exam candidates.

Ultimately, there is also the aftermath of the process to face. Some patients may

become victims of the process. Patients who receive treatment that is substandard or who are left in discomfort are usually without arrangements for follow-up care by the candidate. The institution where the examination was held may be contacted to provide follow-up care, usually by individuals who are patients of record at the institution. In some cases, however, the candidate escapes any responsibility, leaving resolution of the problem for an unhappy patient to negotiate. The unsuccessful candidate is unable to practice without a license, so the problem is not entirely a reflection of neglecting individual professional responsibility to the patient. However, patients abused by the examination process are not likely to develop positive attitudes about the dental profession.

The bottom line is one that should be of great concern to the profession. Newly trained dentists, or those transferring from other locales, either observe or are directly forced into making decisions that involve an ethical dilemma. Their decisions make these colleagues-to-be victims not only of the process, but also of future colleagues (who are guilty of taking unethical or unprofessional actions in their effort to succeed) and of dental assistants, patients, and even agencies interested in making rapid dollars.

Continuing the exposure of prospective licentiates to these behaviors — whether observed, experienced as a victim, or committed — will create a very harmful message about the future of the dental profession unless some of the problems can be prevented or eliminated. The newer and emerging generations of licentiates in California will become conditioned to accept unfair monetary demands from patients or others who provide support for their examination efforts. Or some of their colleagues will take unfair advantage of them by outbidding them for dental auxiliaries or better patient cases for the exam. As a result of these initial "professional" experiences, many will not be able to build a level of trust with some of their colleagues — a characteristic

that historically has been important to the dental profession. Colleagues who take advantage of their peers to obtain better patients or gain other advantages during the examination process may very well get used to these behaviors, believing that securing a competitive advantage over their peers at any cost is OK. They will become conditioned to conduct their business in a similar competitive fashion.

We do not believe that there is a single practical solution to the dilemma (such as elimination of the clinical examination). Preventive measures aimed at eliminating some of the ethical dilemmas must be considered. Such measures will require the unified efforts of not only the Dental Board, but also the California Dental Association and the dental schools.

For example, could CDA members and the schools together establish a pool of patients that could be earmarked for clinical examination? Should the board contract with some of these companies to furnish every candidate a patient as part of a regulated application/examination fee? Or could the board place and enforce "caps" on fees for patients or assisting personnel? Such options could reduce or eliminate patient theft or bartering by patients or candidates for higher fees. And can the board establish enforceable guidelines that would prevent the destructive behaviors of some participants? All possibilities and options must be considered.

We believe that contemporary times and economics have created some significant ethical and professional dilemmas in the examination process that confront licensure candidates. Some of these challenges force behaviors that cross the boundary of professional ethics. We believe that the time has come for the organized profession, the Dental Board, and dental school faculty and administrators to collectively study and offer solutions

to this serious problem.

The licensing examination is intended to assess competence. The outrageous expense potential must be controlled. Finally, the process should

not continue to harbor the dilemmas that allow some participants, while engaged in a stressful examination experience, to act in an unprofessional or unethical manner. **CDA**



Illustration: Lee Ann Engle

Collection: How to Ask for Money

Most dentists and their staffs report that the least-liked part of their jobs is collecting past-due accounts, according to Gerald Rosen, DDS, in the May 2003 *Alpha Omegan*, journal of Alpha Omega International Dental Fraternity.

Rosen said that one reason dentists have a problem motivating themselves to collect is because of their own outstanding

debts. Dentists may relate empathetically to patients who owe money, so they don't have the heart to ask for payment.

Another reason for not collecting past-due accounts is that no one likes to hear the reasons patients give for not paying. Rosen also noted that no one likes to be yelled at; and some debtors can become abusive and accusatory, putting staff on the defensive or upsetting them.

Seven Steps to Collecting

1. Set the ground rules before the patient's first visit.
2. Have late charges and finance charges.
3. Set front-desk strategies for collection.
4. Include statement notes about past-due amounts.
5. Send letters when a past-due balance is approaching 45 days.
6. Make telephone calls.
7. Send the account to a collection attorney.

Rosen said one approach to sending past-due notices is to have the name on the letter be that of a third party, an imaginary bill collector who can act as the collection department, allowing the dentist and staff to continue to be the friendly, caring office.

After three statements and two letters,

it's time to make a personal telephone call. Rosen maintains that the most effective person to place the call is the dentist. In making this call, the tone should be more of compassion and surprise at the dilemma rather than confrontation.

According to Rosen, the rate of collection should ideally be no less than 98 percent. At this rate, for every \$1,000 produced, \$20 is uncollectible. He said that although this may sound acceptable, it amounts to assessing an extra 5 percent income tax. Every 2 percent uncollected is actually 5 percent of net profit, Rosen noted.

Rosen wrote that collection is a serious part of a practice, but too few offices pay enough attention to it. He said dentists must have a system to stay on top of accounts receivable, and that someone in the office must be in charge of collections.

Burning Mouth Syndrome Has Varied Responses

Results of a recent study confirm that burning mouth syndrome is a disease affecting predominantly middle-aged women, with multifactorial etiologies and varied response to treatment.

Writing in the March 2003 *New York State Dental Journal*, researchers noted that effective treatments for patients with burning mouth syndrome appear to be awareness, followed by tricyclic antidepressants, multimodal therapy, and benzodiazepines.

Patients with burning mouth syndrome are characterized by a burning sensation of the oral cavity in the absence of physical abnormalities of the mucosa or a detectable underlying medical disorder. Burning mouth syndrome is a multifactorial disorder with unclear etiology, according to the study.

For their study, researchers Andres Pinto, DMD; Thomas P. Solleciti, DMD; and Scott S. Derossi, DMD, constructed a database of 150 consecutive patients diagnosed with burning mouth syndrome and reviewed the charts. Patients were classified according to previously published criteria.

Burning mouth syndrome without any identifiable cause (idiopathic) was diagnosed in 33 patients (46.6 percent). Prevalence of burning mouth syndrome in the United States has been reported at 0.7 percent, with numbers in Europe reaching 7 percent.

Burning mouth syndrome most commonly involves the anterior two-thirds of the tongue, the hard palate, lips, and, to a lesser extent, gingival tissue. On rare occasions, symptoms involve the floor of the mouth or soft palate.

According to the study's authors, their study group consisted of a population of health-seeking patients, which skewed their sampling. They noted that diagnosis and classification of this elusive condition are arbitrary and based on observation and patient feedback during the initial states of the history and exam. They concluded that a controlled, prospective clinical trial is warranted.



Assessing Development of the Facial Profile

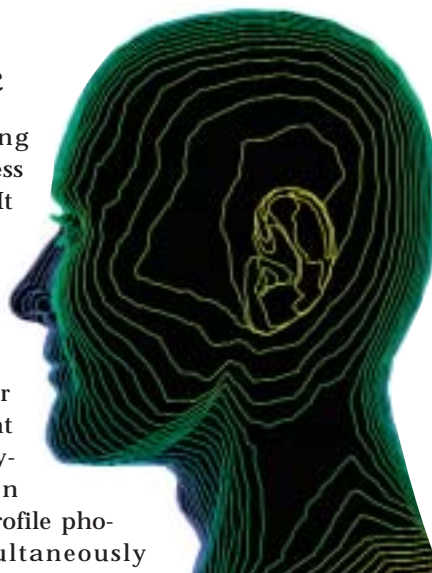
Until recently, craniofacial studies addressed facial growth, facial asymmetry, and gender differences by examining changes in size. Size changes alone do not fully represent the complicated process of craniofacial growth, which also involves changes in shape, wrote researchers in the March/April issue of *Pediatric Dentistry*. According to the article, the shape of the facial profile can now be quantified with Fourier analysis, contributing to a better understanding of growth. The study of growth and development of the facial profile is of interest to clinicians and researchers in pediatric dentistry, orthodontics, and craniofacial surgery.

The researchers noted that a mathematical approach to quantify shape in biological forms has been developed in the form of a Fourier analysis. The analysis was first described by Jean Baptiste Joseph Fourier (1768-1830). It is a development from pure mathematics now applied in fields as diverse as physics, astronomy, optics electrodynamics, and, more recently, pattern recognition, biology, and medicine.

Fourier analysis is a curve-fitting pro-

cedure representing boundaries that address the outline of objects. It is based on the separation of complex waveforms with a mathematical function to form a series of sinusoidal waves, or harmonics, of different frequencies. The analysis is conducted on scanned frontal and profile photographs taken simultaneously using an orthogonal camera system.

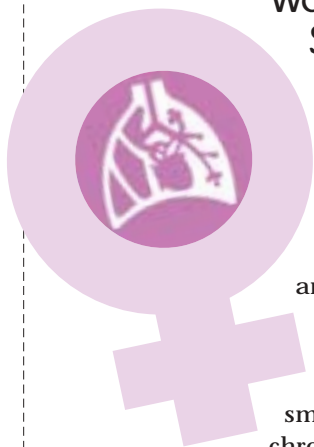
The researchers noted that while metric measurements are sufficient to assess dimensions of craniofacial components and size, they are inadequate to quantify shape and changes in shape that occur with growth and development. Better understanding of genetic and environmental influences during the process of growth and development of craniofacial structures is also required. Advances in the knowledge of craniofacial growth should include both size and shape changes in all dimensions.



Women Benefit More From Quitting Smoking Than Men Do

New findings from the Lung Health Study indicate that, in general, women's lung function improves significantly more than men's after sustained smoking cessation. Lung Health Study researchers previously published results showing that both men and women benefit from smoking cessation; this new analysis indicates that the benefits to the lungs are greater in women. The results were published in the June 1 issue of the *American Journal of Epidemiology*.

Supported by the National Heart, Lung, and Blood Institute, the study followed more than 5,300 middle-aged smokers for five years. All participants had mild or moderate chronic obstructive pulmonary disease. In the first year after quitting, women's lung function improved more than twice that of the men's. Among those who quit, improved lung function remained greater for women than for men throughout the study, although the differences between the genders narrowed over time. The decline in lung function in those who continued to smoke was on average similar for men and women.



Many adults
who complain
of a loss
of taste have
experienced
only a loss
of smell.

Alteration in Taste a Common Oral Disorder

Disorders of taste are usually due to a reduction in the dissolution of solutes into saliva and the transport of solutes to the taste pore of taste buds, according to an article by researchers at the University of Texas-Houston published in the April issue of the *Texas Dental Journal*.

A decrease in taste sensitivity, hypogeusia, has many causes, they wrote. Dentures could cause stomatitis or burning mouth syndrome because of a poor or unsatisfactory fit. A denture covers the hard palate and several taste buds, reducing the sensory tactile input of food during chewing.

According to the article, one study found that Sjögren's syndrome was reported in 55 percent of patients seeking treatment for salivary gland disorders. Acute or chronic xerostomia must be considered in dental patients who complain of a decrease in taste sensitivity, they said.

Treatment results vary among different patients and temporally within each patient, the researchers noted. A distortion or a partial loss in the sense of taste can be inherited. Systemic diseases or disorders —



such as renal disease, untreated diabetes mellitus, or hypothyroidism — produce alteration in taste.

Another important factor in determining the etiology of altered taste sensation is the patient's medication profile. The article noted that both over-the-counter and prescription medications should be investigated for their effects on taste. Some drugs are secreted in the saliva and may affect taste directly.

Antibiotics such as penicillins are reported to cause dysgeusia, the article noted. Penicillins may also cause stomatitis, glossitis, and black furred tongue, all of which affect normal taste sensation.

The authors point out that many adults who complain of a loss of taste have experienced only a loss of smell, often due to upper respiratory infections. A more chronic loss of smell is due to head trauma or exposure to toxic-chemical solvents.

U.S. Birth Rate Reaches Record Low Numbers

The U.S. birth rate fell to the lowest level since national data have been available, according to the latest Centers for Disease Control and Prevention birth statistics. The rate of teen births fell to a new record low, continuing a decline that began in 1991.

The birth rate was 13.9 per 1,000 people in 2002, a decline of 1 percent from the rate of 14.1 per 1,000 in 2001 and down 17 percent from the recent peak in 1990 (16.7 per 1,000),

according to a new CDC report, Births: Preliminary Data for 2002. The current low birth rate primarily reflects the smaller proportion of women of childbearing age in

the U.S. population.

There has also been a recent downturn in the birth rate for women in the peak childbearing ages. Birth rates for women in their 20s and early 30s were generally down while births to older mothers (35-44) were still on the rise. Rates were stable for women over 45.

Birth rates among teenagers were down in 2002, continuing a decline that began in 1991. The birth rate fell to 43 births per 1,000 females 15 to 19 years of age in 2002, a 5 percent decline from 2001 and a 28 percent decline from 1990. The decline in the birth rate for younger teens, 15 to 17 years of age, is even more substantial, dropping 38 percent from 1990 to 2002.

"The reduction in teen pregnancy has clearly been one of the most important public health success stories of the past decade," said Health and Human Services Secretary Tommy G. Thompson.



New Efforts Promote Paperless Health Care System

Two new steps in building a national electronic health care system will allow patients and their doctors to access their complete medical records anytime and anywhere they are needed, leading to reduced medical errors, improved patient care, and reduced health care costs.

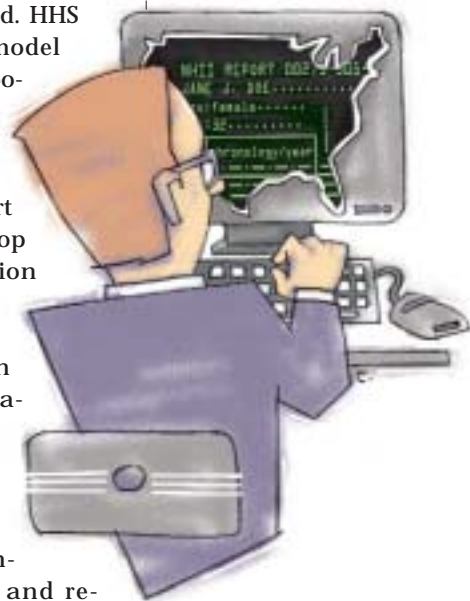
First, Health and Human Services Secretary Tommy G. Thompson announced that the department has signed an agreement with the College of American Pathologists to license the college's standardized medical vocabulary system and make it available without charge throughout the United States. This action opens the door to establishing a common medical language as a key element in building a unified electronic medical records system.

Second, Health and Human Services has commissioned the Institute of Medicine to design a standardized model of an electronic health record. The health care standards development organization known as

HL7 has been asked to evaluate the model once it has been designed. HHS will share the standardized model record at no cost with all components of the U.S. health care system. A model record is expected to be ready in 2004.

The announcements are part of the ongoing effort to develop the national health information infrastructure by encouraging and facilitating the widespread use of modern information technology to improve the nation's health care system.

"Banks and other financial institutions all across the country can talk to each other electronically, which has streamlined customer transactions and reduced errors," Thompson said. "We want to do the same thing for the American health care system."



Honors

Arthur A. Dugoni, DDS, has received the Northern California American College of Dentists Willard Fleming Award for exceptional merit to the profession.

ACD also gave Distinguished Faculty Awards to **Mark Hagge, DMD**, from the University of the Pacific; and **Peter Loomer, DDS, PhD**, from the University of California at San Francisco.

The **Journal of the California Dental Association** has been named Platinum Publication of the Year for 2002 in the International College of Dentists U.S.A. Section Journalism Awards.

Upcoming Meetings 2003

Oct. 23-26	ADA Annual Session, San Francisco, (800) 232-1432.
Nov. 2-7	U.S. Dental Tennis Association Annual Meeting, Palm Desert, Calif., (800) 445-2524.
Nov. 8-9	International Conference on Evidence-Based Dentistry, Chicago, j.ryley@elsevier.com
Nov. 16-22	Annual Meeting of the United States Dental Golf Association, Scottsdale, Ariz, (631) 361-7127, usdga@optonline.net.
Dec. 5-7	California Academy of General Dentistry Annual Meeting, San Diego, (877) 408-0738, www.cagd.org.

2004

March 3-6	Academy of Laser Dentistry 11th Annual Conference, Palm Springs, Calif., (954) 346-3776, www.laserdentistry.org.
April 15-18	CDA Spring Scientific Session, Anaheim, (916) 443-3382, Ext., 4470.
Sept. 8-11	International Federation of Endodontic Associations Sixth Endodontic World Congress, Brisbane, Queensland, Australia, www.ifea2004.im.com.au.
Sept. 10-12	CDA Fall Scientific Session, San Francisco, (916) 443-3382, Ext. 4470.
Sept. 30-Oct. 3	ADA Annual Session, Orlando, Fla., (312) 440-2500.

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) 443-2943.



TELEDENTISTRY IN RURAL CALIFORNIA: A USC INITIATIVE

Su-Wen Chang, DDS; Daniel R. Plotkin; Roseann Mulligan, DDS, MS; José C. Polido, DDS, MS;
James K. Mah, DDS, MSc, DMSc; John G. Meara, MD, DMD, FRACS

ABSTRACT

Dentistry, in a synergistic combination with telecommunications technology and the Internet, has yielded a relatively new and exciting field that has endless potential. "Teledentistry" emerges from the fusion of dental practice and technology and can take on two forms — real-time consultation and "store and forward." The first entity to put teledentistry into practice was the Army, which, in 1994, successfully undertook consultations between dentists and service personnel located more than 100 miles apart. Since then, various institutions and organizations in the United States and farther afield have practiced teledentistry, with varying degrees of success. The Children's Hospital Los Angeles Teledentistry Project, being run in association with the University of Southern California's Mobile Dental Clinic, seeks to increase and enhance the quality of oral health care that is provided to children living in remote rural areas of California, areas often severely underserved by dental health providers. The project has three phases: Phase I involves the establishment and organization of the teledentistry network; Phase II will introduce technologies to provide orthodontic consultation and treatment; and Phase III will expand the network and provide increased specialty care into further areas of California and beyond, providing services to more children in desperate need of dental health care.



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Acknowledgment / The Teledentistry Project is funded, in part, by grants from the Harold McAlister Charitable Foundation and the California Wellness Foundation. Created in 1992 as an independent, private foundation, the Wellness Foundation's mission is to improve the health of the people of California by making grants for health promotion, wellness education, and disease prevention programs.



Teledentistry is a combination of telecommunications and dentistry, involving the exchange of clinical information and images over remote distances¹ for dental consultation and treatment planning. Utilizing state-of-the-art electronic applications and broadband capability, teledentistry seeks to provide and/or support dental care in areas underserved by dental practitioners, transcending social, geographic, and cultural barriers.^{2,3}

Forms of Teledentistry

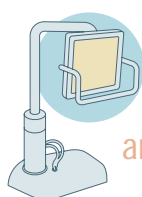
Teledentistry can take two forms: real-time consultation and “store and forward.”²⁻⁵ Real-time consultation involves a videoconference in which dental professionals and their patients, at different locations, may see, hear, and communicate with one another in real time using advanced telecommunication technology and ultra-high-bandwidth network connections. Store and forward, on the other hand, involves the exchange of clinical information and static images collected and stored in the telecommunication equipment. In store and forward, the dental practitioner collects all the required clinical information and digital intraoral and extraoral images and radiographs (or scanned, originally nondigital images) and forwards them for consultation and treatment planning via established networks and/or the Internet. Later, dentists are dispatched to the remote areas and treatment provided in a far more timely, targeted, and cost-effective manner.

Technological Requirements

To practice teledentistry, there are certain hardware, software, and network connection requirements. A desktop or laptop computer with substantial hard drive memory, a significant amount of RAM, and a speedy processor is essential. A digital camera, video camera, and intraoral camera are required for the capture of images. A

panoramic digital X-ray unit, preferably portable, is required to provide consulting dentists with images of maximum clinical value. These radiographic systems interface with charged-coupled devices, complementing metal oxide semiconductors, or storage phosphor plates as image receptors to facilitate the acquisition of images in digital format and to greatly enhance the speed of transmission.³

A comprehensive data/patient management software application capable of image acquisition and storage, as well as



Teledentistry seeks to provide and/or support dental care in areas underserved by dental practitioners, transcending social, geographic, and cultural barriers.

the accumulation of clinical information and subsequent transmission of the gathered information, is highly desirable for the practice of teledentistry, although both images and narrative text may be stored and transmitted as word processing or other basic file types. Digital images for teledentistry transmission should be recorded in DICOM (digital imaging and communications in medicine) format. This is a standard developed by the American College of Radiology and the National Electrical Manufacturers Association. DICOM is a combination of the open systems interface levels developed by

the International Telecommunications Union in medical imaging applications and the transfer control protocol/international protocol developed by the U.S. Department of Defense.⁴ Definitions of acronyms used are presented in **Table 1**.

There is great variation in levels and speeds of connectivity to the Internet; and this is, of course, of major significance to the practice of any of the numerous forms of telehealth. Dial-up connections, though economical, are not sufficient for teledentistry, due to limitations in quality and questionable reliability. Broadband technology, increasingly widespread and available, offers a selection of cutting-edge alternatives well suited to the needs of the teledentist and his staff. DSL (digitally subscribed line), cable and satellite modems, ISDN (integrated service digital networks) and ultrahigh-capacity T1 services, are all available for utilization as the basis of any teledentistry system.

To enable live videoconferencing, one might employ a widely available standalone IP/ISDN videoconferencing solution, or install a PCI codec board into the system. This is a digital signal-processing unit that converts analog input into digital on the sending end, while another codec board reverses the mechanism at the receiving end. If a live group session is desired, a multi-point control unit that bridges three or more parties is required. The codec must be able to accommodate audio and visual functions and be compliant within recommended guidelines.³

Legal Issues

Legal and compliance considerations are significant for all areas and types of telemedicine, including teledentistry. Largely still untested in law, and with significant variation among states, issues such as accountability, licensure, jurisdiction, liability, privacy, consent, and, of course, malpractice, are crucial to consider when attempting to establish sound foundations for telehealth practice.

Table 1

Glossary of Technological Terms in Teledentistry

Cable modem: Connection speed is typically 3-50 Mb/s over a distance of 100 km or more. The cable modem termination system can talk to all the cable modems, but the cable modems can only talk to the system. If two cable modems need to talk to each other, the system will have to relay the messages.

DICOM: The digital imaging and communications in medicine standard was created by the National Electrical Manufacturers Association to aid the distribution and viewing of medical images. A single DICOM file contains both a header (which stores information about the patient's name, type of scan, etc.), as well as all of the image data.

DSL/ADSL: Digital subscriber line/asymmetric DSL. This is a technology that exploits unused frequencies on copper telephone lines to transmit traffic typically at multi-megabit (6,000 kb/s) speeds. ADSL offers differing upload and download speeds and can deliver up to 6 Mb of data per second. This is 120 times faster than dial-up service and 100 times faster than ISDN. ADSL enables voice and high-speed data to be sent simultaneously over the existing telephone line. This service is generally offered in urban areas.

Ethernet/LAN: An Ethernet (local area network) connection is 10 Mb/s or 100 Mb/s and is used to connect many computers that can all "talk" directly to each other. Normally they will all talk with a few servers and printers, but the network is all-to-all. The distance is normally limited to less than 1 km.

ISDN: Integrated services digital network. This is a system of digital phone connections. Voice and data are carried by bearer channels (B channels) occupying a bandwidth of 64 kb/s and data channels (D channels) that handle signaling at 16 kb/s or 64 kb/s, depending on the service type. There are two types of ISDN service: basic rate interface and primary rate interface. BRI consists of two 64 kb/s B channels and one 16 kb/s D channel; this service meets the needs of most individual users. PRI is intended for users with greater capacity requirements. It consists of 23 B channels and one 64 kb/s D channel for a total of 1,536 kb/s. To establish this ISDN service, special adapters and routers are required.

OSI: Open systems interconnection is a standard description or "reference model" for how messages should be transmitted between any two points in a telecommunication network. Its purpose is to guide product implementers so that their products will consistently work with other products.

PCI codec: PCI stands for peripheral component interconnect, which is an interconnection system between a microprocessor and attached devices in which expansion slots are spaced closely for high-speed operation. Codec stands for compression/decompression. It is an algorithm, or specialized computer program, that reduces the number of bytes consumed by large files and programs. To minimize the amount of storage space required for a complicated file, such as video, compression is used; for viewing, a decompression algorithm, which "undoes" the compression, would have to be used.

TCP/IP: Transfer control protocol/international protocol is a set of protocols developed to allow cooperating computers to share sources across a network.

Satellite modem: This is the technology of choice for rural Internet users where DSL and cable services are not available. It uses two-way (upload and download) data communications. Upload speed is about one-tenth of the 500 kb/s download speed. Satellite systems are about 10 times faster than a normal dial-up modem. Cost is a major factor in employing satellite Internet systems.

T1: A T1 line can carry 24 digitized voice channels, or it can carry data at a rate of 1,544 kb/s. T1 lines carry about roughly 60 times more data than a normal dial-up modem.

Licensure

Licensure of teledentistry practice largely depends upon the state's definition of teledentistry and upon its interpretation and perception of the nature of the doctor-patient relationship therein. In 2000, 20 states enforced restrictive licensure laws requiring practitioners to obtain full licenses to practice across state lines. Alabama, Oregon, and California allowed the obtaining of a restrictive license for this practice by reciprocity; and the other 27 states and the District of Columbia had not passed any legislation requiring licensure for telemedicine or teledentistry practice (**Table 2**). Information on telemedicine state licensure today does not appear to be readily available.

Malpractice/Jurisdiction

In the event of malpractice, teledentistry practitioners can be sued in the jurisdiction of the state in which their patients reside. The malpractice issue is a major legal obstacle to overcome. As the law stands, malpractice may only occur if a doctor-patient relationship has been established. The main question is whether a doctor-patient relationship has been established within the scope of teledentistry. It is very likely that legislatures will mandate that a doctor-patient relationship does, indeed, exist in teledentistry because of the advanced technological abilities to have the patient, primary care dentist, and the consulting doctor present at the same time via video conference. Final resolution of this critical issue is likely to happen soon.

Standard of Care

The standard of care is also a key issue to be resolved. A number of issues have been raised by Golder and colleagues:⁵ Is the standard of care the same in teledentistry situations as it is in a traditional person-to-person situation? What are the implications of using different standards of care for insurance reimbursement?



HIPAA

With the enactment of the Health Insurance Portability and Accountability Act, emphasis on the regulatory aspect of the electronic exchange of data has greatly increased.⁶ Measures to maintain security, ensure privacy, guarantee that patient information is safely backed-up, acquire informed consent from patients using teledentistry are all focal points of HIPAA.

There has always been a general concern about the transmission of sensitive patient information over the Internet. It is imperative that practitioners of teledentistry do their utmost to ensure that patient privacy is not compromised by unauthorized entities. Encryption of the data in transit, login and password protection, user logs, and firewalls are all measures that should be employed to protect patient information. Another important aspect of electronic data is the preservation of content integrity. It is in the best interests of all those involved in health care provision — patients, providers, insurance companies, and legislative bodies — to ensure that data remains untainted. The best way to ensure this is to have regular, reliable back-up and storage of the electronic information.

Informed Consent and Teledentistry

Informed consent is an integral part of the doctor-patient relationship in any area of health care. In teledentistry, it should cover everything that would exist in a standard, traditional consent form; in addition, it should advise the patient of the inherent risk of improper diagnosis and/or treatment due to failure of the technology involved. Patients should be made aware that their information is to be transmitted electronically and the possibility exists that the information will be intercepted, despite maximum efforts to maintain security. The form should contain the name of both the referring and consulting practitioners to ensure ade-

quate coverage for malpractice, and the consulting doctor should acquire a copy of the consent before any form of patient contact is established.⁷

Pilot Teledentistry Trials

Teledentistry has been practiced for at least five years,^{3,8-10} most notably by the Department of Defense. Although most projects remain in the experimental stages, the positive outcomes and positive physician-patient experience are very encouraging.

Army

The Army conducted its first pilot study of teledentistry at Fort Gordon, Ga., in July 1994. Fifteen periodontal patients were referred for surgery. One week after surgery, each patient reported to Fort McPherson, Ga., for suture removal and intraoral imaging. At the time of suture removal, color still images were transmitted over a 9,600 baud modem from the dental clinic at Fort McPherson to Fort Gordon, a distance of 120 miles, for examination by the periodontist who performed the surgery. Of 15 patients, 14 avoided the return trip to Fort Gordon. Since then, the U.S. military has expanded teledentistry into a full-time project employed at bases worldwide.

Taiwan

Another feasibility study was undertaken between Chin-Shan group health center and National Taiwan University Hospital.¹⁰ The hospital had originally sent a group of dental residents to Chin-Shan, a township of 17,000 people that lacked dental care resources. However, it was forced to cease operations due to cost-ineffectiveness for the provider. Instead, the hospital dispatched its teledentistry team of one resident equipped with an intraoral camera, a digital radiographic system, and a software application to transfer all the images to the hospital. Videoconferencing systems were also used for the resident to consult super-

Table 2

Legislative Status of Telemedicine Licensure By State⁸

Restrictive

Arizona
Colorado
Connecticut
Florida
Georgia
Hawaii
Illinois
Indiana
Kansas
Mississippi
Missouri
Montana
Nebraska
Nevada
North Carolina
Oklahoma
South Dakota
Tennessee
Texas
Virginia

No Action

Alaska
Arkansas
Delaware
District of Columbia
Idaho
Iowa
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
New Hampshire
New Jersey
New Mexico
New York
North Dakota
Ohio
Pennsylvania
Rhode Island
South Carolina
Utah
Vermont
Washington
West Virginia
Wisconsin
Wyoming

Reciprocal

Alabama
California
Oregon

vising dentists at the hospital for assistance with diagnosis and treatment planning, as well as for the monitoring of treatment procedures performed by the resident. This pilot project served to demonstrate the effectiveness of teledentistry in providing dental care to individuals living in a remote area and the viability of remote specialty consultations when required. At the same time, residents at the teaching institution can readily participate in the consultation at University Hospital, thus having the opportunity to experience cases that may not be commonly observed at educational settings.

Domestic Teledentistry Programs

Baylor College of Dentistry Center for Telehealth is one of the few organized, fully funded institutions pursuing teledentistry. A “grand-round” like setting was described for the teledental consultation.³ University of Pennsylvania and Oregon Health Sciences University have similar programs. University of California at Los Angeles researchers have also conducted a pilot study involving oral medicine consultation via e-mail.¹⁰

Children's Hospital Los Angeles Teledentistry Project and the USC Mobile Dental Clinic

The goal of the Children's Hospital Los Angeles and University of Southern California School of Dentistry Teledentistry Project is to merge successfully with the existing USC Mobile Dental Clinic to use teledentistry technology to increase and enhance dental services for children in rural underserved areas of California. Later, the project will provide orthodontic consultation for these children and specialty consultations from all other areas of dentistry. Currently, the USC Mobile Dental Clinic, in existence since 1965, provides more than \$2 million worth of dental care each year, at no cost, to chil-

dren of low-income families throughout California.^{11,12} It has proved to be a vital resource in addressing the oral health needs of children from areas lacking in dental practitioners, as well as proving to be an invaluable educational tool for

dental and dental hygiene students from USC and UCLA. The mobile dental clinic provides oral examinations, X-rays, dental prophylaxes, nutritional counseling, fluoride treatments, sealants, amalgam and composite



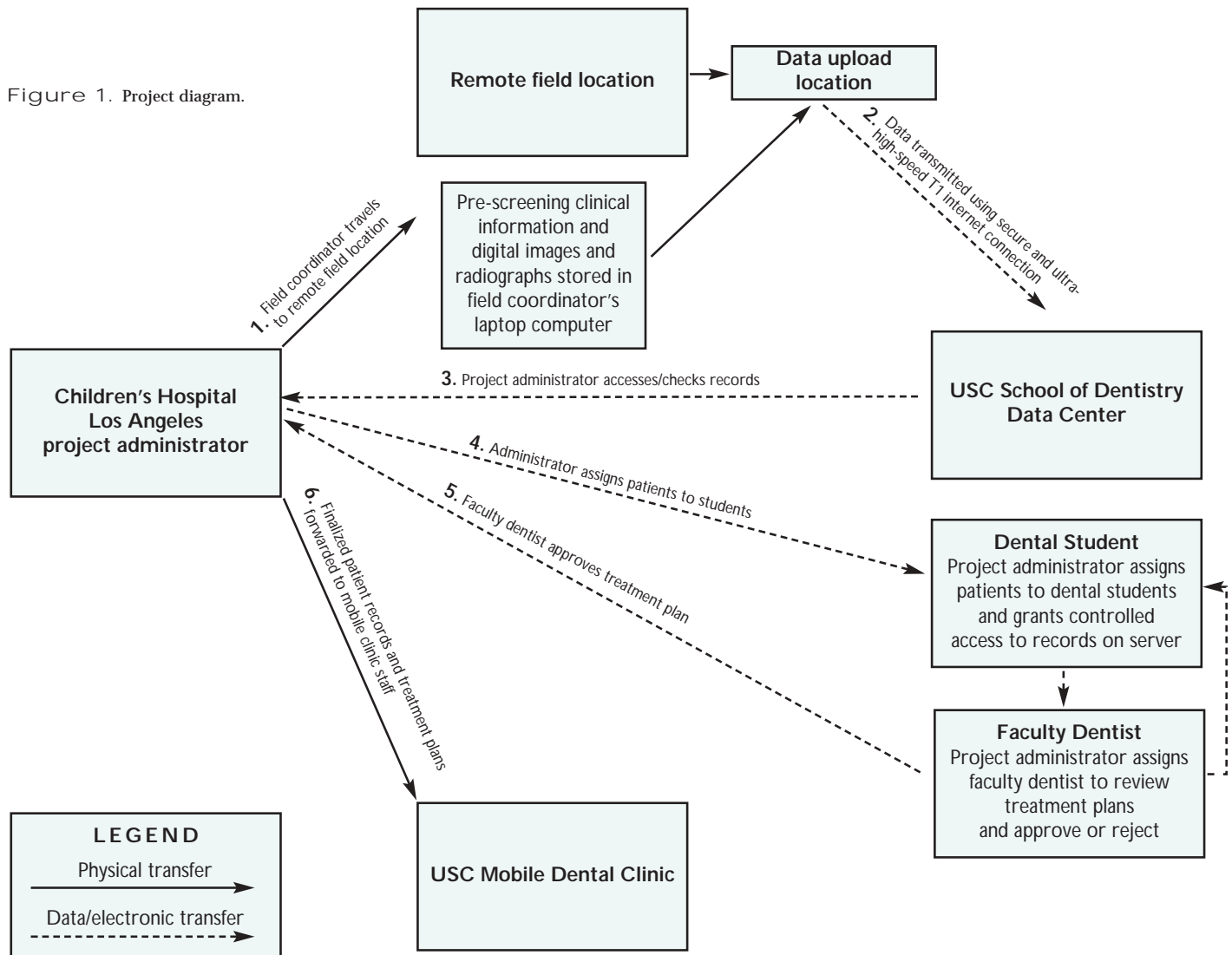
restorations, stainless steel crowns, endodontic treatment for primary teeth, extractions, and minor oral surgery. Currently, the mobile clinic is forced to refer out orthodontic treatment, endodontic treatment on permanent dentition, and other subspecialty treatment to external practitioners in the area. These treatments often do not take place due to financial and cultural reasons. The way in which the teledentistry project will enhance the activities of the mobile clinic is described in the following text and in **Figure 1**.

Project Outline

In Phase I of the project, two to three weeks in advance of the mobile clinic's visit to a particular area, a field coordinator will travel to that location to collect and forward patient's clinical information and digital images, in fully HIPAA compliant manner, to the teledentistry servers that will reside in the data center at USC School of Dentistry. Thereafter, dental students who serve at the mobile clinic, using advanced patient management software, will review the patient informa-

tion, diagnose conditions, and make treatment recommendations. These treatment plans will then be reviewed by faculty dentists, who will either approve the recommended plan or make further treatment suggestions. The finalized treatment plans will be forwarded to the staff of the mobile clinic who can then greatly streamline the patient flow into the clinic in the field, eliminate field screening days, ensure the clinic is fully stocked with required equipment and supplies, and schedule visits from faculty dental specialists.

Figure 1. Project diagram.



All these factors will serve to increase the number of children able to be seen by the clinic and the nature and quality of the treatment provided.

Furthermore, since the equipment and data flow utilized by the project will overlap the systems employed at USCSD, the project will offer previously impossible educational opportunities to dental and dental hygiene students. Clinical consultation aside, HIPAA compliant de-identified patient data may also be used as course material to expose students to various aspects of rural dentistry and increase their knowledge of pediatric oral health care. Currently, the pediatric requirements at teaching institutions are minimal; graduates must gain experience through self-learning and /or postdoctoral residencies. One reason for this is that pediatric patients

are known to be behaviorally challenged, and there is little or no facility to train dental students in this aspect of treatment provision. Through the Children's Hospital Los Angeles/USC Teledentistry Project, students and faculty dentists can focus on assessing the patient's oral needs via the computer without needing to be attentive to behavioral issues. Following clinical consultation, when in the field, the student/faculty team can then devote more attention to the management aspects of the child's behavior, feeling assured that they have thoroughly diagnosed the oral disease and developed an appropriate plan of treatment. Furthermore, the direct student interaction and consultation with faculty dentists, via e-mail and patient management software, is a critical aspect of the project, allowing for

real treatment planning of real patients. Follow-up on patients, currently difficult for the mobile clinic to sustain, will be far easier with the permanent electronic medical record the project will create for each patient. A single field coordinator can return to the area of the original prescreening to monitor changes in the oral health status following mobile clinic treatment, updating the patient records through the teledentistry system. The child can then be referred to local dentists for specific treatment or await the return of the mobile clinic to the area.

In Phase II, the project will introduce technologies to provide orthodontic consultation and treatment through the mobile dental clinic. Orthodontic consultation can point toward the need for preventive measures or actual treatment.



In fact, many orthodontic problems may be prevented or alleviated if the problems are recognized and addressed early enough. For this reason, the American Association of Orthodontists recommends that every child have an orthodontic consultation by the age of 7. The specific details of the plans for orthodontic consultation through the Children's Hospital Los Angeles/USC Teledentistry Project will be discussed in another article.

After the successful implementation of Phases I and II, the foundations will have been firmly laid for the expansion of the Children's Hospital Los Angeles/USC Teledentistry network as well as other specialty services, into more underserved areas in California.

Anticipated Accomplishments

It is anticipated that the Children's Hospital Los Angeles/USC Teledentistry Project will:

1. Improve dental health in underserved communities through education, early diagnosis, treatment, and prevention, all aided by the increased access and operational efficiency made available through the use of teledentistry technology.

2. Reduce oral health disparity. Oral health disparity has been identified by the U.S. surgeon general as a key issue demanding attention by dental health practitioners.¹³ Limited access to care is one of the primary factors leading to the great disparity. Through teledentistry technology, it is hoped that this disparity can be decreased by the provision of comprehensive dental care to areas with a shortage or absence of dentists. Teledentistry can also greatly reduce the distances patients must travel to receive dental care.

3. Expedite the triage process by assigning patients to different treatment categories before the arrival of the USC Mobile Dental Clinic. This will free up significantly more patient contact time for the clinic to provide care on site.

4. Improve inventory and supplies management. Knowledge of the anticipated treatment procedures will greatly assist the stocking, handling, and ordering of dental inventory and supplies. This advanced knowledge will be particularly useful if specific instruments or supplies are required. A key goal of the project is to reduce inventory and supply burden yet improve preparedness.

5. Advance dental education for students. Students will enjoy virtual, "hands-on" experience in the diagnosis and treatment planning of pediatric cases. With advance information on the

Teledentistry
can greatly
reduce
the distances
patients must
travel
to receive
dental care.



procedures to be performed, students can be more prepared by practicing and reviewing relevant course material.

This project will take place within California under the licenses of Children's Hospital Los Angeles and the USC School of Dentistry.

While other organizations are using teledentistry to promote oral health and specialty consultation to those who already have good access to primary dental care, the Children's Hospital Los Angeles/USC Teledentistry Project is unique in that it has the additional component of organized mobile dental clinics, able to travel to remote areas with little or often no access to dental professionals.

The ensuing possibilities are truly enormous. The data and experience to be gleaned from the initial phases of the project will set the stage for more

advanced uses of teledentistry, such as therapeutics and emergency care. Additionally, teledentistry approaches may hold the potential to address many of the problems related to access, cost, efficiency, and the general quality of dental care in California and the United States. A successful outcome of this project will lead to implementation of teledentistry at other USC Mobile Dental Clinic sites and will create an ever-expanding network, with Children's Hospital Los Angeles and USC School of Dentistry as its hub, directed toward improving dental care in underserved communities regionally, nationally, and internationally. **CDA**

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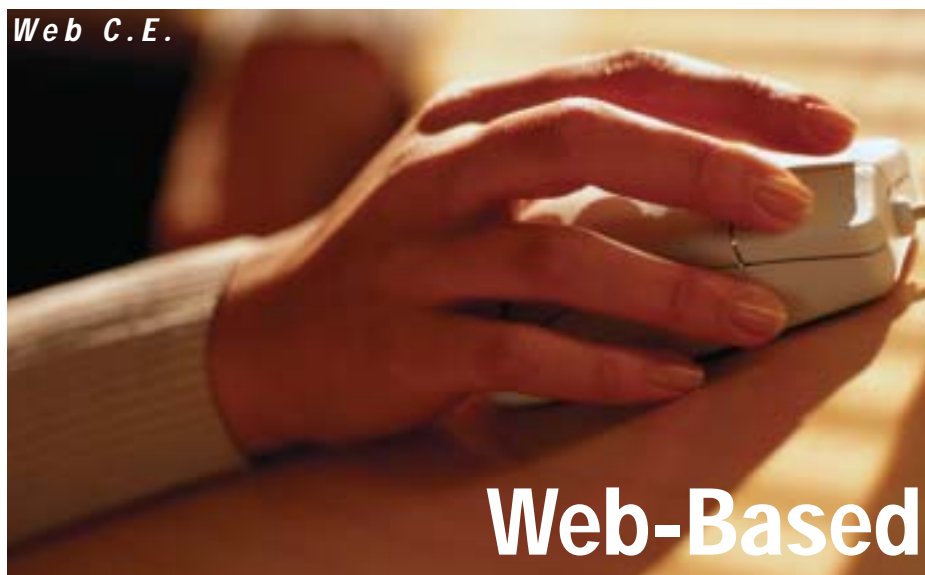
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Web-Based Continuing Dental Education in California

Glenn T. Clark, DDS

ABSTRACT

This article asks and answers a series of questions about Web-based continuing education for dentists. A summary of these answers are: (1) all indicators point to a substantive increase in the number and types of continuing education courses in the next five years; (2) the main reasons to take an online dental C.E. course are that it is available at any time from any location that has an Internet connection and the total cost per unit will be substantially lower compared to traditional C.E. courses; (3) the best type of online C.E. course would be one that has an identified experienced expert instructor, provides a case-based or problem-based approach, and provides an interactivity opportunity between the instructor and student via chat room or e-mail; and (4) online continuing dental education is simply one of many methods that can be used by dental practitioners and will not replace other continuing education methods but rather supplement them. In summary, as more and more online dental C.E. courses become available, it is hoped they will be designed to be more than a series of slides since this method does not take advantage of the unique features and opportunities provided by the Internet.

With the continued invasion of the Internet into many aspects of life, it is inevitable that it will begin to change the way California dentists engage in continuing education. The only questions are, "How soon is this change going to happen, and will it be an improvement?" By simply searching the World Wide Web for online dental C.E. offerings, it is possible to easily find more than 300 courses and eight providers. Based on the expansion of the e-learning field and improvements in technology, it is also highly likely that this number will grow rapidly in the next five years.^{1,2} A partial listing of the online course providers is provided in **Table 1**. What is not known about these companies is the volume of clients that register to take C.E. courses from them or their profitability.

Many educational experts claim that most online courses are not de-



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Table 1

A Partial List of Providers of Online Continuing Dental Education

Internet address	Physical address	Cost per C.E. unit	Courses in catalog
DenTrek.com	LearnHealthSci. Inc. 5786 La Jolla Mesa Drive La Jolla, CA 92037-7720	\$25 to \$35 per unit	64
DentalDidactics.com	Dental Didactics 200 N. La Cumbre Road, Suite L Santa Barbara, CA 93110	\$6 per unit	22
FICE.com	FICE 899 S. College Mall Road, Box 362 Bloomington, IN 47401-6301	\$30 per unit	16
eHealthcareCEU.com	eHealthcareCEU 6330 Brockway Road LeRoy, OH 44086	\$20 per unit	12
marquette.edu/dhforum	DH Forum c/o Marquette University Continuing Education 1918 W. Wisconsin Ave., #250 P.O. Box 1881 Milwaukee, WI 53201-1881	\$10 per unit	4
dentalpro.intelihealth.com	(this is a wholly owned subsidiary of:) Aetna Inc. 151 Farmington Ave. Hartford, CT 06156 (partnered with the University of Pennsylvania Dental School)	\$25 per unit	22
Dentalxchange.com	Dentalxchange 2201 Dupont Drive, Suite 650 Irvine, CA 92612-1515	\$20 per unit	164
ArcMesa.com	ArcMesa Educators 788 Shrewsbury Ave. Tinton Falls, NJ 07724	\$10 to \$15 per unit	45

signed as well as they should be. A recent article³ on the use of the Internet for educating practicing physicians makes the following statement: *“While the Internet offers an educational distribution system accessible to practicing physicians, most CME online programs are text-based and infrequently interactive or guideline-based. It is unlikely that these programs have broad impact on physicians’ practice patterns. Neither the broad capacities of Web technologies nor the evidence of effective methods for influencing physicians’ practice patterns has influenced the design of most CME programs.”*

Of course, although online courses are not yet designed to take full advantage of their educational potential, they are being developed and offered to medical and dental professionals nonetheless. The cautious individual would ask two more questions. “Why take an online C.E. course when you can take a lecture-based C.E. course?” and “If I want to take a dental C.E. course online, what should I look for?” This article examines these two questions by presenting information on what is currently available in the online C.E. arena to California dentists

and dental professionals and by speculating on what will be available in the near future. It makes suggestions about the educational value of courses to potential consumers of online dental C.E. Specifically, this article considers how online courses might be best designed with regard to their instructional strategy (e.g., linear slide-audio presentations versus problem-based learning). Some of the recommendations in this article are based on personal experiences of the author as well as a thorough review of the online educational literature as it relates to



Table 2

Problems With Lecture-Based Continuing Education Instruction

1. Lecture-based instruction is a passive experience for the attendee and while some students do well with this format, many others do not, including those with attention-deficit problems or low long-term retention.
2. Adult learners have different learning characteristics from traditional college or professional students. In general, adult learners are highly motivated; they want content to be relevant and well-organized. Adult learners are self-directed and independent; passive experiences are not preferred.
3. Traveling to and from continuing dental education courses requires substantial time beyond the time for the course itself. This is an unimportant issue if the dentist lives near the dental school or C.E. venue where the course is being provided. Often professionals do not have the extra time needed to access many C.E. courses because of family- and job-related responsibilities.
4. The costs for a C.E. course also will include time away from work, travel (airfare, train, automobile), lodging, and food. These costs may double or triple the cost of the course.

learning effectiveness of Web-based instruction versus traditional lecture-based instruction.

Why Take an Online C.E. Course?

The obvious answer to the above question is that there is an ever-increasing need to keep current with procedures, preventive modalities, legislation, materials, methods, and concepts. Moreover, as increasing numbers of practicing dentists become more knowledgeable about the Internet and have computers with high-speed connections, the potential numbers of distance learners increases. The dentist with a wide curiosity, a high-bandwidth Internet connection, no need for continuing education credits, lots of time, and a willingness to take disparate information and piece it together could use the Internet to surf for information. This surfing would involve three methods: looking at the entire Web using a browser (e.g., www.google.com, www.profusion.com, www.altavista.com); searching the online National Library of Medicine public medical information service called MEDLINE (<http://www.nlm.nih.gov/>), where it is easy to find journal ab-

stracts and online scientific publications; and looking at U.S. dental and medical school Web sites, where much information is posted for current students but is also visible to others without restriction. The problem with these methods of surfing is that the information found is usually not highly organized or focused and often many Web sites with material of questionable integrity are retrieved, thus requiring a significant amount of time spent in sorting through the volume.

On the other hand, if a dentist wants to access organized and focused information using the Internet, and does not mind paying for the time of an expert who has organized the content into a logical learning program, then online courses are logical. It is easy to anticipate that the more savvy dentists become, the more they will begin to expect C.E. to be delivered at the same pace they can get information elsewhere, namely on demand.

Ideally, one should partake of an online course if it provides an educational experience that is evidence-based, well-presented, customized to the needs of the learner, and more convenient and cost-effective than

the alternative (e.g., traditional live C.E. courses). Clearly, there are numerous examples where a live C.E. course is a better choice (e.g., for hands-on training in a specific technique). As a starting point for making the comparison between traditional courses and online courses, it is logical to first identify the difficulties inherent in traditional lecture courses. The summary in **Table 2** provides no comparisons or criticisms of hands-on laboratory courses since lecture-based, linear presentations of content are the predominate way information is transferred from instructor to student in most dental C.E. courses in California.

The main problem associated with a lecture-based course is that it is a passive experience for the attendee. While this is efficient for large groups and probably less time-consuming for the instructor than numerous small-group seminars where problems and cases are discussed, it is ill-suited for most adult learners who typically desire a more active educational experience. Nevertheless, in a traditional, lecture-based, linear-presentation-style course, the lecture occupies 80 percent to 98 percent of the student-instructor time. This is true even though it is a well-established fact that most students do not learn efficiently by this method.⁴⁻⁶ In many courses, student-to-student or student-to-faculty discussion occupies less than 2 percent of class time, on average, even in small-enrollment classes.⁷ Disagreement with the instructor is generally unacceptable, and traditional instruction stresses memorization and recall rather than conceptual understanding.⁸

Another difficulty with traditional C.E. programs is a logistical one, in that travel by the student to the course venue is required. While sometimes this is desirable (when the C.E.

Table 3

The Design Features of an Ideal Online Course†

Factor	Ideal design	Less than ideal
Pre-test	A pretest is used to assess the student's current knowledge and then modify the course content based on his or her existing level.	No pretest is provided.
Preview option	A short preview of the course is available for the potential student to view before enrolling.	Does not have a preview option.
Technology	While some technology is required, it is relatively simple with few associated presentation problems.	The required technology is complex, it requires many downloads, and it hangs up the computer or is slow or fractured in the audio or video. (Obviously, this will be very dependent on the user's computer and expertise.)
Interactivity	The course is faculty proctored; there is ample student-to-faculty discussion (e.g. list-server or faculty e-mail provided); and a student-to-student discussion forum (e.g. chat room) is available and encouraged. A proctored course will, by necessity, have some time limitations associated with it. Thus, while the course can be accessed 24 hours during the time it is offered, the course must have a clear start and stop point.	Course is not proctored and has no discussion forum or no time for Q & A.
Case-based	Case-based or problem-based content with branching presentations that allow the student to progress at his or her own pace according to his or her own expertise and ability. Current courses that earn 1 to 2 C.E. units do not lend themselves to multiple levels of content.	Course is a fact-based presentation of data provided in a linear fashion (e.g. slides with text or audio).
Quiz	Assessment method (e.g., quiz) challenges the student to think and respond and is presented frequently with immediate detailed written feedback.	Quiz is simple regurgitation of facts (e.g. multiple choice) without adequate immediate feedback options.
Credentials of course author	The author is a clear expert* in the field and also an excellent teacher and has had additional training in online education.	The author is not identified or not an expert.*

†For California licensed dentists who need state-authorized C.E. credit, it is also important to make sure the course vendor is registered and the course is approved for C.E. credit in California. This certification is typically evident on the vendor's Web site. Moreover, some of the nonproctored online courses will be considered similar to "correspondence courses," and there are restrictions on the total number of units that can be applied to the 50 C.E. units every two years requirement in California. Other courses, where there is instructor interactivity and proctoring, will not be subject to these restrictions. It is critical for the student to establish these facts with the vendor before registering.

*Defining what constitutes an "expert" is difficult; but in the course author's biosketch, it would be appropriate to see advanced training in the field, membership and a service record in the appropriate professional society that deals with the expert's claimed focus, multiple publications in peer-reviewed journals and invited chapters in textbooks, and a teaching post at a recognized university-level educational institution where they teach the topic of concern.

is offered in a vacation locale), it is always time-consuming; and there are expenses above and beyond the course itself. A full accounting of these costs would result in a figure that would double or triple the cost of the course above that of the course tuition.

Pros and Cons of Online Courses

It is also appropriate to critically look at Web-based instructional issues. First, very few of the Web-based courses offer more than a downloadable or on-line viewing of slides with associated text and/or audio. Very few of the den-

tal C.E. course offerings in the marketplace are proctored by an instructor and offer instructor-student interaction. While a number do offer online testing opportunities in which the student receives automatic and immediate feedback about the correct answer, oth-



ers only instruct the student to e-mail test answers to the provider's address before a certificate is issued. A critical negative point is that most of these currently available online courses do not have any options for instructor question-and-answer periods. Of course, both synchronous chat rooms and asynchronous list-serve discussion groups are readily available options for any course on the Internet; but these are not generally used in dental C.E. programs. **Table 3** presents the pros and cons one can use to judge the quality of an online course.

Spallek and colleagues recently reported on the types and nature of existing courses and discussed the merits of online dental C.E. courses.¹⁰ Specifically, they surveyed 436 past online C.E. course participants who had participated in nine online courses provided by six organizations. They asked questions about the reasons for enrollment, course expectations, and resulting satisfaction. They had only a 39 percent response rate, and data from the nonresponders could have substantially altered the results. Nevertheless, they reported that online dental C.E. courses generally meet the needs and expectations of the course participants. When there were complaints, they were typically of two types: the lack of communication with peers and instructors and courses that appeared to be outdated.

Are Online Courses Important to Medical C.E.?

This question is difficult to answer since the number and variety of medical practitioners is almost as vast as the number and types of online educational opportunities. Recently, however, the use of the Internet by dermatologists in the United Kingdom, Sweden, and Norway was examined.¹¹ Data were collected using questionnaires mailed to 1,291 members of the dermatologi-

cal societies of the United Kingdom, Sweden, and Norway. Approximately 51 percent responded; and 95 percent of those claimed access to the Internet at work (77 percent) and/or at home (83 percent). Moreover, 62 percent found medical databases on the Internet; and 25 percent believed the Internet version of medical journals to be important for their continuing medical education. In contrast, 83 percent believed that medical journals on paper, medical meetings (81 percent), and various forms of contact with peers

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and colleagues (62 percent to 66 percent) were important to continuing medical education. Statistical analysis showed that age and private practice were negative predictors for Internet use ($p < 0.001$). This study shows that although a large proportion of dermatologists, especially younger doctors, use the Internet for medical and educational purposes, Internet use has not yet replaced traditional ways of obtaining medical C.E.

Similar data is not available for dental specialists, and certainly the number of online dental C.E. courses is considerably less than those available in medicine; but some predictions can be made from the above data. First, it is likely that dentists who enroll in on-

line C.E. will tend to be younger than those who take traditional lecture-based live C.E. courses. This prediction is based on the fact that younger practicing dentists are likely to be more familiar with Web-based instruction because they probably experienced this method of teaching during their schooling. Second, it is also easy to predict that online continuing education will, at least in the short term, only supplement other methods of education (e.g., paper-based journal articles, dental meetings, and interaction with colleagues).

Are Some Methods of Teaching Better Than Others?

A recent paper described the issues considered critical to instructional design when attempting an evidence-based online course for medical students.¹² The focus in the paper was on the need to break away from the traditional educational models, which are typically based on acquisition of factual knowledge. It was strongly suggested that if a Web-based course is to take optimum advantage of its technologic potential, it needs to:

- Provide many links to online textbooks, syllabi, and Web-sites with high-quality content that can be accessed as needed in a nonlinear fashion;
- Take a problem-based approach;
- Incorporate student-to-student chat rooms, make e-mail addresses available, or create course list-serve groups for faculty-to-student communication; and
- Utilize frequent online student assessment and feedback tools so that students and faculty can gauge where they are in their educational quest.

Even more important is the work by Casebeer and colleagues³ which suggests that to achieve a substantive behavioral change as a result of a Web-based C.E. course, it is necessary to de-

Figure 1

Suggested content and links for a problem-based, multilevel, Web-based continuing education course

Suggested Online Course Web Page

1. Link to short preview of course.
2. Link to author's biographical sketch.
3. Registration and payment for course.
4. Links to suggested reference materials (e.g., online books, online articles, online syllabi, other Web sites that contain valuable information).
5. Link to student biosketches (optional).
6. Link to pretest to assess level of existing knowledge.
7. Link to problems/cases ready for solution. Ideally, several cases/problems will be available at different levels of difficulty.
8. Link to case/problem posting site. Here, each student or group of students would post their solutions to a problem or case by certain date. After the deadline, answers will be available for viewing by all in class who have access.
9. Link to student-to-student discussion forum. Usually, the student discussion forum is used for a working group of students to formulate their answers to a case/problem or simply to post discussion.
10. Link to student-to-faculty discussion forum. Usually the student and faculty discussion forum is where the faculty answers specific questions posed by the students, and/or comments on the answers posted by the students.
11. Link to quiz(zes) needed to officially pass course. These quizzes are best done after each case/problem closes and allow the students to see what they have or have not learned.

sign learning modules that:

- Possess a precourse assessment of the individual student's knowledge of the topic being taught;

- Result in a customized presentation of a series of short interactive cases/problems that are appropriate to the level of knowledge and skill of the student as established by the initial precourse assessment;

- Determine competency by providing questions about the case or problem to the student, immediate feedback, and a comparison of these answers to those given by peers; and

- Provide reference materials to the student so as to make the newly acquired behavior or knowledge easy to implement into his or her practice.

Casebeer and colleagues go on to suggest that Web-based instruction is

best when it is evidence-based, is problem-based, and allows for student-to-student and student-to-faculty interactions (**Figure 1**). Most current online courses do not utilize these features. If, however, these recommendations made were incorporated into an online course, the student would be much more likely to be an engaged active participant rather than a passive attendee. Student engagement in his or her own learning process is highly associated with better development of the student's full potential.^{13,14} This landmark work by Astin^{13,14} claims that the actions that promote student engagement are in-depth thinking tasks rather than short-term memorization tasks, writing tasks rather than multiple-choice tests, guided independent study opportunities, and courses where different points

of view on a topic are brought to bear.

At present, the best that can be said about online education compared to traditional methods of education is that they are equivalent. Russell performed a thorough review of the educational literature comparing distance educational methods with traditional lecture courses.¹⁵ He concluded that there were no significant differences in the amount of content learned between distance education and traditional teaching methods. Of course, distance learning is a broad term that would incorporate many different methods of distant site education (e.g., video disk, live videoconferences, asynchronous online delivery of materials); and there may indeed be differences when these various methods are contrasted. For example, one paper examined the student ratings for two courses taught in both a traditional and distance format by the same instructor.¹⁶ They found no significant differences in course grade or in the students' ratings of the course or instructor. Moreover, the students were split in their ratings of which course was more organized.

In the field of dentistry, one author compared a slide/audiotape teaching with Web-based teaching methods on 33 first-year dental hygiene students in an intraoral radiographic anatomy course.¹⁷ These students were divided into two groups using a random assignment method. The groups used one method to study the mandibular arch and the other to study the maxillary arch. The order of study was different for each group. A test was taken at the completion of each instructional format. Thirty-one subjects completed the study, and there were no significant group difference in the mean test performance. However, almost 70 percent of all participants reported that they preferred using the Web-based format to the slide/audiotape.

In the field of medicine, one author



conducted a controlled trial of the effect of computer-based nutrition education compared with standard lecture-based nutrition education on 49 first-year general-practice medical residents.¹⁸ Assessment was done with a 79-item pre-post pencil-and-paper examination and three incognito standardized patients' visits to the residents. Statistical analysis showed a significant group difference for both the pencil-and-paper examination ($P = 0.002$) and for the three standardized patients' visits assessment checklists test ($P < 0.001$). While the amount of change was modest at best, the computer-based instruction was found to be more effective.

The e-learning optimist would say the above data are a compelling reason for switching to Web-based methods since the advantages of on-demand education without leaving the office or home are the real factors of importance in choosing to go online. However, once online courses begin to improve in design and take full advantage of the capabilities of the Internet, they have the potential to be substantially better. Most studies have not measured the cost-benefit of distance education from the consumer's point of view. One example of the optimist's view of these data comes from Nettles and colleagues who reported that, while the majority of the 49 studies they examined demonstrated no significant difference between Web-based and traditional classroom education on conventional assessment tests, nearly 30 percent of the studies report that Web-based programs had positive outcomes based on student preference, improved grades, higher cost-effectiveness, and a higher percentage of homework completion.¹⁹

The e-learning pessimist would interpret these data as evidence that we should be wary of distance education since it will create a lot of busy-work,

cost a lot of money, and will not improve the educational outcome. One author found that 50 percent of instructors currently teaching a distance education course indicated that the quality of the distance education course, when compared to a traditional course, was lower.²⁰ It is not clear from this article what caused the lower quality. Perhaps it was due to course directors who were mandated to teach an online course without appropriate technologic support or training in on-line educational instruction design. The one conclusion that is incontro-

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vertible from these data is that it is not the instructional method that makes the difference in student learning, but the design of the course itself. **Table 4** provides an analysis of online C.E. course providers.

Problem-Based Learning and the Web

In the final section of this article, it is appropriate to address the interaction between Web-based learning and problem-based learning. Problem-based learning is currently a highly popular instructional strategy that is increasingly being used to replace tra-

ditional lecture-based learning. It is characterized by self-responsibility for thinking and learning, awareness of social responsibility, and thinking and acting from a scientific perspective.²¹ Problem-based learning has been widely implemented in medical schools, some dental schools, law schools, and other pre-professional programs in both traditional and online instruction.²²⁻²⁴ In medical school courses, students develop strategies for examining intake information, evaluate critical physical and physiological conditions of a simulated patient from multiple perspectives, and propose diagnoses. Problem-based learning is easily adaptable to Web-based instruction. For example, one author concluded that when Web-linked computers are used to support collaborative work, this substantially facilitates discussion between the student group members and the instructor.²⁵ Another author concluded that students using problem-based learning via the Web produce better quality written and oral work, investigate and propose more solutions to presented problems, and are more engaged in learning using Web-based methods than traditionally taught students.²⁶ Not all excursions in Web-based instruction using problem-based learning are as successful. For example, one author reported that if the problem-based-learning student uses the Web as his or her only source and does not collect in-depth information, the information retrieval is often incomplete, superficial, and results in an inaccurate diagnosis.²⁷ In spite of this drawback, problem-based learning via the Web offers significant enhancements to learning.

Conclusion

In this article, five questions were asked and detailed answers were provided. These questions and their answers can be summarized as follows:

An Analysis of Current Online Course Providers

WWW address	Instructors and instructional format Feature: (+) positive; (-) negative	Technical issues and content presentation style	Other
DenTrek.com	(+) Course faculty ARE identified. (-) No student-instructor interaction (+) Available: 24 hr-365 day/yr. Most courses 1-2 hrs long.	Linear lecture style (slides with associated audio). Flash Macromedia software and Flash Player download required.	Dentists and hygienists. 5-10 min preview is available.
DentalDidactics.com	(-) Course faculty NOT identified and appear to be all authored by one person. (-) No student-instructor interaction. (+) Available: 24 hr-365 day/yr. Most courses 1-2 hrs long.	Linear lectures style (text with some images). Format is Adobe PDF, and the file is downloaded for viewing on local computer.	Dentists and hygienists. No previews
FICE.com	(-) Courses authored by one individual. (-) No student-instructor interaction. (+) Available: 24 hr-365 day/yr. Courses from 1-12 hrs long.	Linear lectures style (text and images). Format is PDF, and the file is downloaded for viewing on local computer or mailed.	Dental hygienists only. Entire course can be viewed.
EHealthcareCEU.com	(-) Course faculty NOT identified. (-) No student-instructor interaction. (+) Available: 24 hr-365 day/yr. Most courses 1-2 hrs long.	Linear lecture style (text and images). Format is PDF, and file is downloaded for viewing on local computer. Quiz scored immediately.	Dentists and hygienists. Only short description.
marquette.edu/dhforum	(+) Course faculty ARE identified. (-) No student-instructor interaction. (++) Case-based presentations! (+) Available: 24 hr-365 day/yr. Most courses 1-2 hrs long.	Most are linear presentations (text with images). File is downloaded for viewing on local computer. Can view entire course, but certificate only after paying fee.	Only dental hygienists. Only short description.
dentalpro.intelihealth.com	(+) Course faculty ARE identified. (-) No student-instructor interaction. (+) Available: 24 hr-365 day/yr. Most courses 1-2 hrs long.	Most are linear presentations, which are viewed online. Online quiz and immediate scoring are available with printed certificates.	Courses for dentists and hygienists. Short course description is available.
Dentalxchange.com	(+) Course faculty ARE identified. (-) No student-instructor interaction. (+) Available: 24 hr-365 day/yr. Most courses 1-2 hrs long, but some are longer.	Most are linear presentations, which are viewed online. They also have streaming video-audio lectures by experts. Online quiz and immediate scoring are available with printed certificates.	Short outline of course available. Courses for dentists, hygienists, and assistants.
ArcMesa.com	(+) Course faculty NOT identified. (-) No student-instructor interaction. (+) Available: 24 hr-365 day/yr. Courses 1-6 hrs long.	Linear presentation of content (text and images). File format is either HTML or PDF (which can be downloaded locally). Online quiz with immediate scoring with printed certificate.	Courses for dentists and hygienists. Only short course description available.

1. How soon is this change going to happen and will it be an improvement? Of course no one knows this answer, but all of the indications are that a substantive increase in the number and types of continuing education

courses is likely to occur with a five-year period.

2. Why take an online C.E. course when you can take a lecture-based C.E. course? The main reasons would be that most online dental C.E. courses

can be taken at any time from any location that has an Internet connection. Secondly, while the cost per unit for these courses appears to be similar to live courses, the associated costs are far less (e.g., travel, lost time from work,



hotel, and food). Another reason is that all evidence suggests that for the experienced teacher who has some experience with online education, the course is at least as good as a traditional live lecture course.

3. If I wanted to take a dental C.E. course online, what should I look for? The best type of online C.E. course would be one that:

- Has an identified, experienced instructor who is an expert in the topic;

- Provides a case-based or problem-based approach to the content of the course; and

- Provides an interactivity opportunity between the instructor and student via chat room or e-mail.

4. Are online courses important to medical C.E.? While the future may change this answer, at this time they are simply one of many methods that are used by medical practitioners to gain knowledge about a new topic. It is likely this will be the same for dentistry.

5. Are some methods of teaching better than others? The short answer is that the best online course is well-designed, provides accurate information, and is taught by an expert in the field. The specific course design features suggested for online courses are those that:

- Provide many links to online textbooks, syllabi, and Web-sites with high-quality content that can be accessed as needed;

- Take a problem-based approach;

- Provide a precourse assessment of the individual student's knowledge of the topic being taught and then suggest problems that are appropriate to the students' precourse knowledge level;

- Incorporate student-to-student chat rooms, make faculty e-mail addresses available, or create course listserve groups for faculty-to-student communication;

- Utilize frequent online student assessment and feedback tools so that students and faculty can gauge where they are in their educational quest and the student can rank their own competency compared to the performance of peers; and

- Provide reference materials to the student so as to make the newly acquired behavior or knowledge easy to implement into his or her practice. As more and more dental C.E. courses come online, it is hoped that they will have many, if not all, of these features. **CDA**

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Initial Plaque Score as an Indicator of Patient Appointment Compliance

David J. Crippen; A. Jeffrey Wood, DDS; and David W. Chambers, EdM, MBA, PhD

Abstract

High plaque score is widely recognized as predicting patients' likely restorative needs and future caries risk. This study evaluated high plaque scores as predictors of patient appointment compliance behavior. It was found that high initial plaque scores can predict poor compliance with subsequent recall appointments.

Preventive treatment is a hallmark of the dental profession; however, the efficacy of this prevention lies not only in dentists' ability to educate their patients about preventive measures but also in patients' acceptance and degree of compliance with these measures. Research has shown oral hygiene to be a prime risk indicator of restorative needs.¹ Furthermore, the association between the presence of dental plaque and future caries risk has been clearly shown.²⁻⁴

This study was conducted in a university-based clinic to examine pediatric patient compliance with oral hygiene regimens and to investigate possible correlation between patients' oral hygiene, as measured by plaque score, and appointment compliance levels.

The study was carried out in the University of the Pacific School of Dentistry's Pediatric Dental Clinic in San Francisco. The clinic is an 11-chair facility dedicated solely to patient treatment by undergraduate dental students. Approximately 90 percent of the patients seen in the clinic receive state-funded dental care through the Dental (Medicaid) program or other government-subsidized care (Healthy Families, Healthy Kids, etc.). The remaining patients have private dental insurance or pay for care themselves.

Patient scheduling is managed by a full-time clinic staff member using an established recall system. Patient care is provided by students assigned to the clinic on a rotational basis. All new patients to the clinic receive preventive evaluation and education based upon their preventive needs as determined by students and supervising faculty members. Preventive education is provided at each subsequent recall visit.

Methods and Materials

The data for this project were collected from 50 individual patient charts, which were randomly selected from current active charts filed in the clinic. For each patient, three plaque scores were recorded using the plaque indexing protocol outlined by Loe⁵



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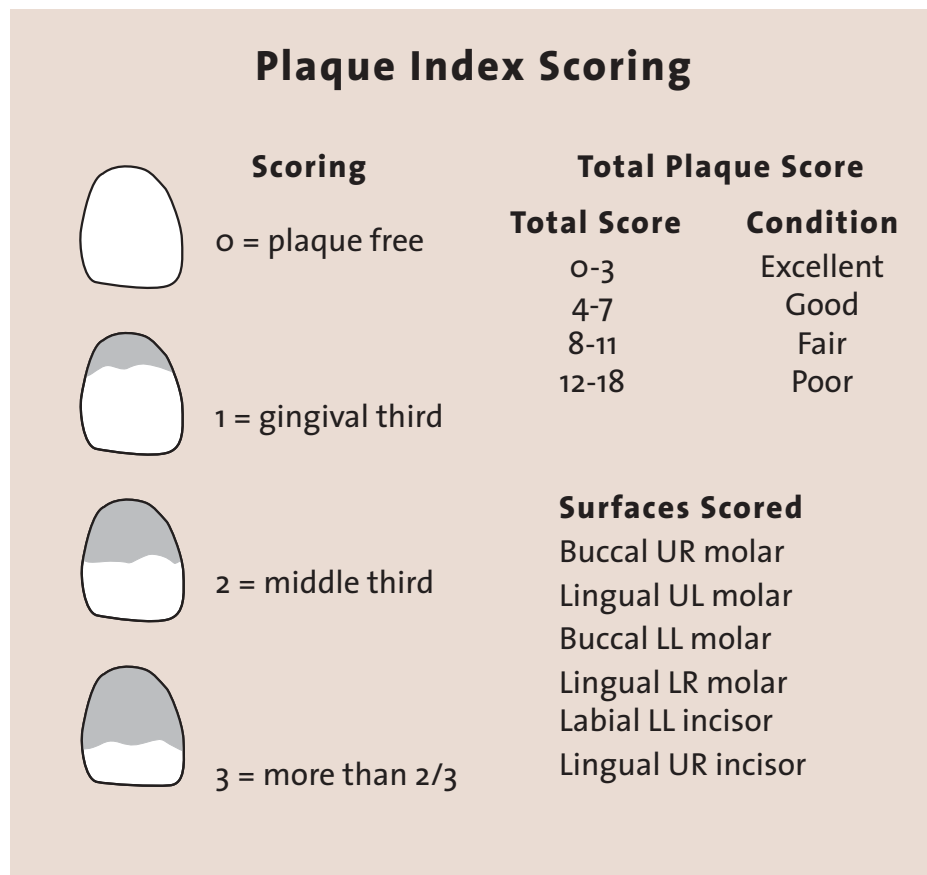
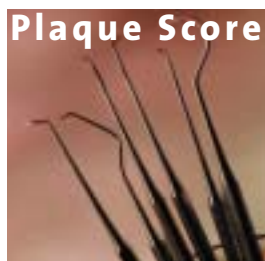


Figure 1. Loe Plaque Index

(Figure 1). The initial plaque score was recorded at the patients' first appointments to the clinic, prior to any oral hygiene instruction by students, faculty, or staff. The second measurement was the plaque score recorded at patients' first six-month recall visits. The third plaque score was recorded at patients' second six-month recalls, which typically occurred approximately one year after patients' initial visits. At all three of these appointments, patients and their parents were shown proper brushing and flossing techniques,⁶ following determination of patients'

plaque indexes.

In addition to plaque scores, the following patient data were collected: date of birth, gender, and number of failed appointments between initial visit and second recall. Time lapsed in days between recall visits was also recorded because the clinic does not document appointments canceled with more than 24 hours notice as "failed" appointments. Lastly, restorative treatment rendered in dollar amount was recorded. This recorded restorative treatment included all fixed intra- and extracoronary restorations (e.g., amal-

gams, composites, stainless steel crowns, and composite strip crowns) while excluding preventive treatment (e.g., sealants), extractions, or elective sedation (e.g. nitrous oxide).

In the event a patient had an active, yet uncompleted treatment plan, restorative work was briefly placed on hold at six-month intervals to allow for a recall appointment and thus a re-assessment of patients' needs. At such recall appointments, patients' plaque indexes were determined; and patients were subsequently given oral hygiene instructions. Thus, recall appointments were not delayed based upon ongoing treatment, but solely because of lack of patient appointment compliance.

Initial descriptive tests were performed to ensure the accuracy of the data input. Means; standard deviations; and two-tailed, zero-order, Pearson correlation coefficients were calculated.

Results

Of the 50 charts reviewed, 54 percent were for female patients ($n = 27$) and 46 percent were for male patients ($n = 23$). The mean age of participants was 6.5 years with a standard deviation of 2.8 years.

The mean initial plaque index was 8.2 (fair) on a scale from 0 to 18 with a standard deviation of 3.0. The mean first and second recall plaque scores were 7.0 and 7.3 respectively, with corresponding standard deviations of 2.9 and 2.8. The mean number of failed appointments per patient between initial visit and second recall was 0.4 with a standard deviation of 0.9. Further analysis of data revealed the mean time between initial visit and first recall (Gap 1) to be 9.4 months with a standard deviation of 5.6 months, while the

Table 1

Means, Standard Deviation and Correlation Among Plaque Scores, Appointment Failures, Time Gaps Between Recall Visits, and Cost of Restorative Needs Among a Group of Pediatric Patients

	Mean	SD	Plaque Scores		Failed appts	Recall (yrs)		Restorative \$
			Recall 1	Recall 2		Gap 1	Gap 2	
Initial plaque	8.24	3.01		.265	.307		.387	.451
Recall 1 plaque	6.96	2.86						
Recall 2 plaque	7.34	2.81			.345			.275
Failed appts	0.42	0.86					.346	
Recall Gap 1	0.78	0.47					.384	
Recall Gap 2	0.77	0.42						.542
Restorative \$	173.44	304.60						

Only correlation coefficients statistically significant at $p < 0.05$ or smaller are shown.

mean time between the first recall and the second recall (Gap 2) was 9.2 months with a standard deviation of 5.0 months.

Positive correlations were found between poor plaque score (12-18) and poor patient compliance (**Table 1**). Incidence of failed appointments showed a strong correlation not only with high initial plaque scores ($r = 0.307$, $p = 0.030$) but also with high second recall plaque scores ($r = 0.345$, $p = 0.014$). An even stronger correlation was found between initial plaque score and time lapsed between first and second recalls (Gap 2) ($r = 0.387$, $p = 0.006$) (**Figure 2**). The data also showed a notable correlation between the length of Gap 1 and the length of Gap 2 ($r = 0.384$, $p = 0.006$), consistent with the chronic nature of patient appointment noncompliance.

The most significant correlation was found between patient noncompliance and restorative dollars spent. High ini-

tial plaque score was predictive of more restorative dollars spent ($r = 0.451$, $p = 0.001$) (**Figure 3**). A longer Gap 2 was also highly correlated with more restorative dollars spent ($r = 0.542$, $p = 0.001$).

Simple and multivariate linear regression models were performed with time between first and second recalls (Gap 2) as the dependent variable. Restorative dollars of dental work required predicts recall gap ($R^2 = 0.293$, $p < 0.001$). The regression equation is $\text{Gap 2} = 0.64 \text{ years} + 740 * \text{Restorative Care Needed}$, or approximately one additional year for each \$740 of care needed. Initial plaque score also predicts recall gap ($R^2 = 0.149$, $p < .05$). The regression equation is $\text{Gap 2} = 0.330 \text{ years} + 0.053 * \text{Initial Plaque Score}$, or approximately 13 additional days for each one-point increase in plaque score. The R^2 for the multiple regression equation with all three significant predictors (Restorative Care

Needed, Initial Plaque Score, and No Shows) was 0.366, or approximately one-third of the total variance.

Discussion

This study indicated positive correlations between patients with poor plaque scores and other patient compliance indicators. Specifically, initial plaque scores can be interpreted predicting other likely compliance behaviors.

Patients with high initial plaque scores showed poor appointment compliance, as indicated by a statistically significant correlation with both failed appointments and longer than optimal time lapses between recall appointments.

Patients with high initial plaque scores also tended to need more restorative care, as indicated by restorative dollars spent between their initial visit and second recall appointments. This relationship would seem logical because plaque is an accepted etiological factor in the dental caries process,²⁻⁴

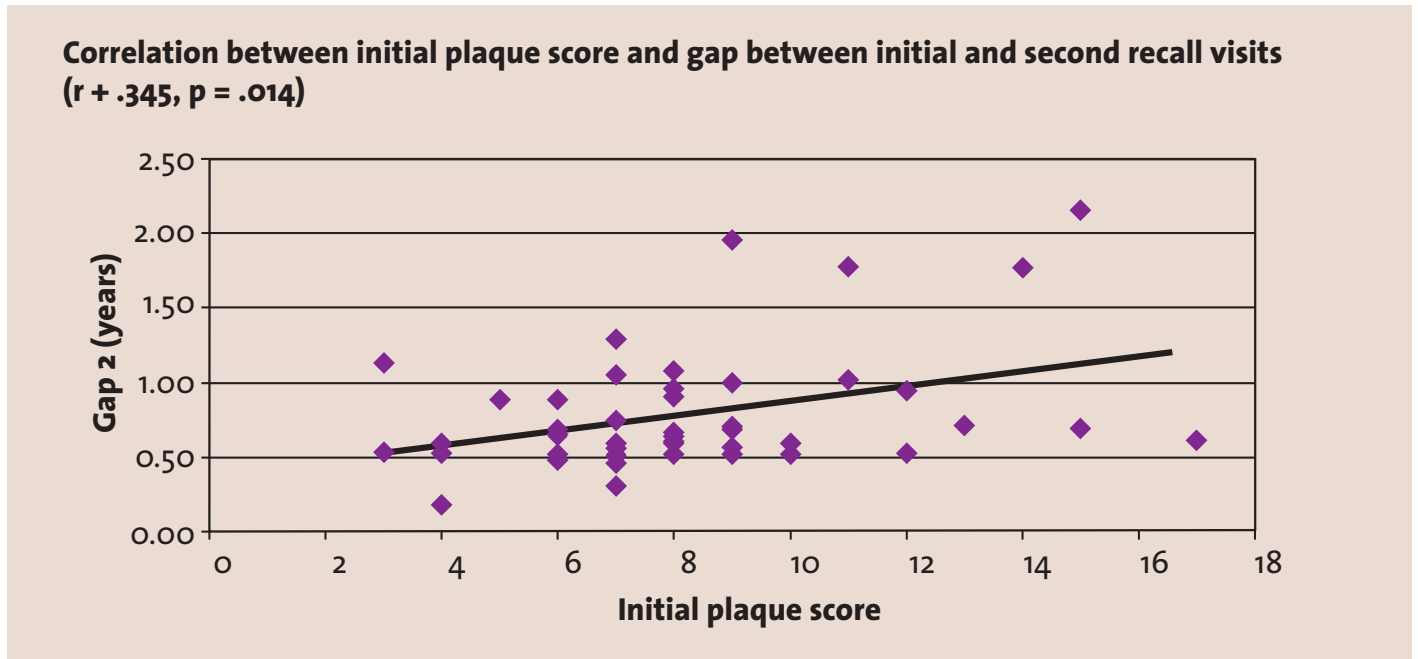
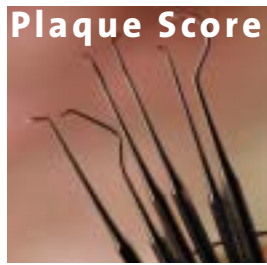
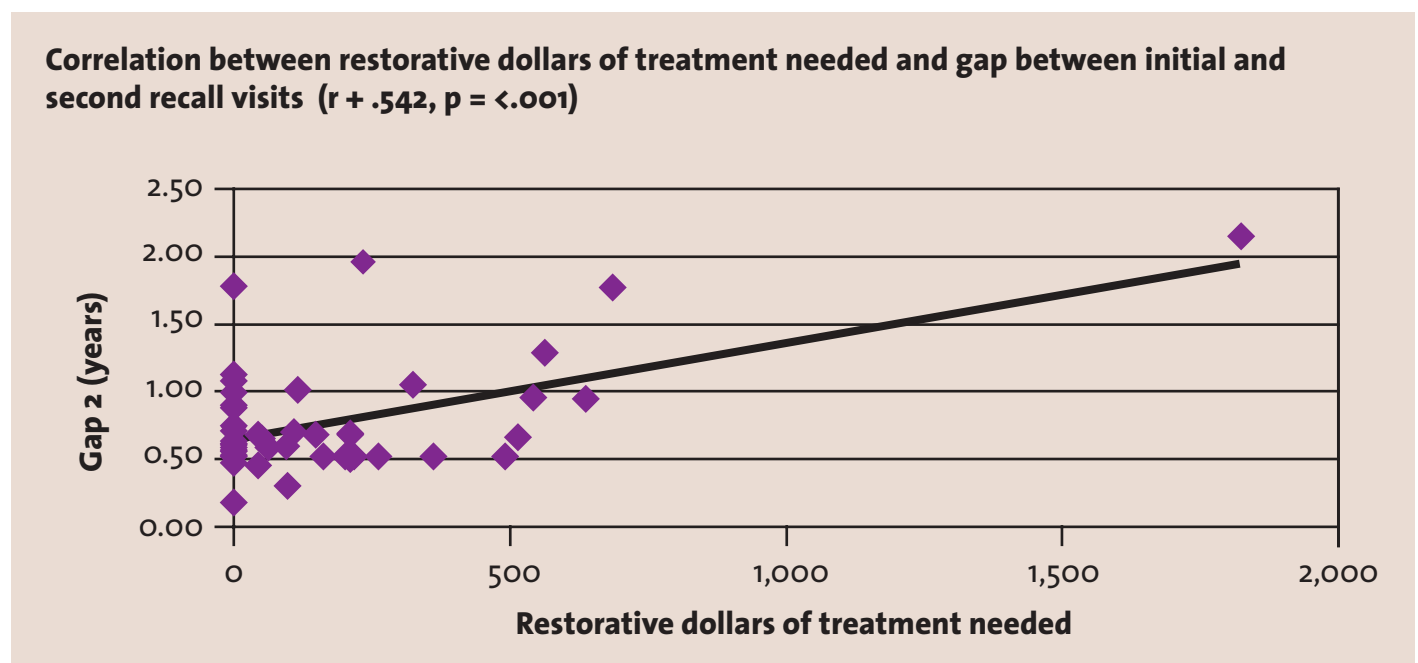


Figure 2.



and the presence of significant amounts of dental plaque would place these patients at high risk of caries¹ requiring restorative care.

Less intuitive are the findings that patients presenting for initial visits with high plaque scores tend to have poorer appointment compliance behaviors. Perhaps such patients or their parents' regard for oral care, as shown by high initial plaque scores, generalizes to overall regard for the oral care process, including the importance of being compliant with dental appointments.

Using initial plaque scores to identify patients who are more likely to be noncompliant may allow the dental practitioner to take additional steps or be more vigilant to improve patient compliance among this group of patients, who are also likely to have the highest oral care needs.

Conclusion

The information presented in this study may be perceived as intuitive knowledge among dental professionals, and perhaps it is. Patients with poor oral hygiene, as shown by their initial plaque scores, are likely to have greater restorative needs than patients with lower initial plaque scores. Additionally, these patients are more likely to show poor patient appointment compliance, including more failed appointments and longer lapsed time between recalls.

Awareness of the correlation between high initial plaque scores and poor appointment compliance may provide the dental practitioner with a predictive tool, allowing proactive encouragement of patient appointment compliance among patients more likely to be noncompliant and likely to have significant oral health care needs.

CDA

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Figure 1. Dr. Newell Sill Jenkins.

Dr. Newell Sill Jenkins: Progenitor of Cosmetic Dentistry

John M. Hyson, Jr., DDS, MS, MA,
and Scott D. Swank, DDS

Abstract

Dr. Newell Sill Jenkins was one of the pioneer American dentists who took "American dentistry" to Europe. Among his patients were composer Richard Wagner, and among his friends, author Mark Twain. He treated some of the crown heads of Europe, and yet found time to participate in organized dentistry and conduct research in cosmetic dentistry. He was the father of the porcelain revival in both Europe and America. Unfortunately, Jenkins' legacy as the chief proponent of cosmetic dentistry in the late 19th and early 20th centuries has been largely ignored by dental historians. In a 20-year period (1896 to 1916), Jenkins published 32 articles in the dental literature on the esthetic advantages of porcelain fillings. It is time to give Jenkins his just recognition.

Newell Sill Jenkins (Figure 1) was born on Dec. 29, 1840, at Falmouth, Mass. His ancestors had arrived in America aboard the Mayflower. His grandfather, Capt. Weston Jenkins, had served in the War of 1812 and distinguished himself by capturing a British privateer that had wreaked much havoc on American commerce. When Jenkins was 5 years old, his family moved to Bangor, Maine. At age 18, Jenkins apprenticed himself to Dr. Philander Evans for a year or two for a fee of \$100 a year. After attending lectures at Jefferson Medical School, he matriculated at the Baltimore College of Dental Surgery and graduated in 1863. After returning home, he temporarily took over the practice of a Dr. Lincoln at Bangor and married in 1865. Long desiring to practice abroad, Jenkins and his wife sailed for Europe aboard the Saxonian on Oct. 7, 1866.¹

Jenkins' Office: Dresden, Germany

Jenkins was greeted in Germany by Dr. Frank P. Abbot of Berlin. Abbot was an 1851 graduate of the Baltimore College of Dental Surgery and one of the most distinguished American dentists in Europe. For several weeks, Jenkins remained in Berlin studying Abbot's methods and being introduced to his patients.² The German dentists were intrigued by Jenkins' demonstration of the rubber dam, which had only recently been invented by S.C. Barnham. In his 1875 article on tin and gold combination

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Figure 2. Jenkins' dental chair.

fillings, Jenkins mentioned using the rubber dam for cavities that extended “deeply under the gum.”³ Jenkins was determined to set up his office in Dresden and specialize in operative dentistry since there were no German dentists at that time who were skilled in that area.⁴ Abbot gave Jenkins letters of introduction to important people in the Saxon capital and wrote to his Dresden patients that they no longer had to come to him in Berlin, but should consult Dr. Jenkins.⁵ Dr. Jenkins set up his office using a wooden dental chair (Figure 2) and soon acquired a large practice. His reputation brought him many patients from among the German nobility and royal families of Germany, Austria, Russia, and Italy during the 45 years he practiced in Dresden. He also practiced for one month each year in Vienna and Warsaw, and in 1874 established a branch office in Leipzig. A prominent member of the American community in Dresden, he never renounced his American citizenship.⁶

In 1886, King Albert of Saxony, in northwest Germany, awarded Dr. Jenkins the Knight of the Albrecht's Order, first class, and the title of *Geheimer Hofrat* (privy counselor).⁷ The king later became a patient. Jenkins had many royal patients, including the Grand Duchess of Mecklenburg, in northeast Germany.⁸

Richard Wagner's Dentist

One of Jenkins' patients and closest friends was composer Richard Wagner (Figure 3). They met after Wagner's wife, Cosima, took their children to Jenkins' office for treatment.⁹ They corresponded frequently and exchanged many gifts.

“I speak not of the tooth of time,
The tooth's own time is drawing nigh.
Is Jenkins then within this clime?
Time and its tooth I will defy”



Figure 3. Composer Richard Wagner.

In 1877, Jenkins was called to Bayreuth, northeast of Nuremberg, to treat Wagner's dental emergency; and, in appreciation, Wagner sent him the piano scores of the opera *Der Ring*, which had successfully opened the year before.¹⁰ On the flyleaf, Wagner inscribed:

*I speak not of the tooth of time,
The tooth's own time is drawing nigh.
Is Jenkins then within this clime?
Time and its tooth I will defy.*¹¹

In February 1880, Wagner was contemplating immigrating to America with his entire family and wrote to Jenkins asking for \$1 million to make the move, which would be a permanent one. He promised to hold up the first performance of his latest opera, *Parsifal*, until he reached the United States. Jenkins found little interest among American musical impresarios for importing Wagner, and so the intriguing venture never materialized. Wagner's *Parsifal* had its first performance in Bayreuth in July 1882, and Wagner died on Feb. 13, 1883, in Venice.¹²

Porcelain Enamel

Although he was living in Europe, Jenkins kept up with the progress of dentistry in America. He noted the increase in the display of gold, even full-shell crowns, in American mouths. At the same time, he recognized his European patients' determination to have tooth-colored fillings even though they were not as durable as gold. In Europe, William Herbst had developed glass fillings, which, “though beautiful to look upon, rapidly disintegrated in the mouth.” Jenkins sought to find a material of a lower fusing point than the porcelain used by Dr. Charles H. Land, but of a higher grade



Figure 4. Jenkins' Porcelain Enamel.

than that of Herbst. In his research, he visited practically all the ceramic works of Austria and Germany. Eventually, he found the formula for "Jenkins' Porcelain Enamel" (Figure 4). In his experiments, which ran into the thousands, he was ably assisted by his wife, who did most of the laboratory work.¹³ In 1895, Jenkins founded a firm to manufacture and distribute his porcelain enamel. It was called the Klewe Company after his technician, Herr Klewe.¹⁴ In 1898, Samuel L. Clemens (Mark Twain) (Figure 5), Jenkins' "personal friend," offered to buy the American rights to his porcelain enamel and manufacture and distribute it in America.¹⁵ It seems that Clemens had had a tooth restored with Jenkins' porcelain enamel in London in which he previously had "worn cement and other kinds of mud." Clemens remarked, "The plug fits like nature, and of course does not endanger the walls with pressure of any sort. I am not aware it is there, and that old snag is as serviceable a tooth as any one has."¹⁶

At the meeting of the National Dental Association in 1899, Jenkins presented a paper on porcelain enamel inlays. In his article, Jenkins described the attributes of a "perfect filling." It had to fill the cavity "so exactly as to exclude moisture"; be a substance which will not "disintegrate nor change its original form either through chemical action or mechanical force"; have a smooth surface easily kept clean; be a poor conductor; must restore the "color and shape" of the teeth; be applicable to difficult cases; must have a technique that is not too strenuous to the operator; and be possible for a "good dentist" to use with "infallible results."¹⁷ The porcelain inlay met these requirements. He had devised a system to make custom-shaded porcelain inlays using an oven heated by a jet of gas and air and using gold foil for the matrix.¹⁸

"The plug fits like nature, and of course does not endanger the walls with pressure of any sort. I am not aware it is there, and that old snag is as serviceable a tooth as any one has."

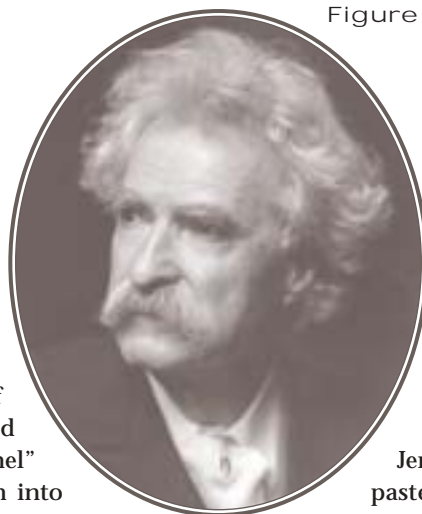


Figure 5. Samuel L. Clemens.

In 1903, he presented a special "Prosthetic Porcelain" designed for crown and bridge-work. He was responsible for the "Porcelain Renaissance" in Europe and America.¹⁹ The same year, the Jenkins Society was organized to promote the use of porcelain in dentistry.²⁰

Kolynos Toothpaste

After 18 years of experimentation, believing that the "mouth and throat must be regarded as a unit in sanitary treatment,"²¹ Jenkins worked out a formula for a new toothpaste that would not only clean and polish the teeth but also destroy oral bacteria. Practicing under the ethical guidelines of the time, he did not sell dentifrices in his office as did his German colleagues, but wrote prescriptions for dentifrices. Various apothecaries in Europe had tried to prepare his formula, but it was too expensive for general use when made in small quantities, and the results were too inconsistent among different pharmacists. That led Jenkins, in his own words, "to consider the practicability of making a dentifrice which would not only thoroughly, yet harmlessly, cleanse the teeth, but through the use of which the soft tissues of the mouth and throat might regularly be placed in a degree of sanitation which would reduce liability to contract infections or disseminate them."²² It seems that his wife had found a neutral soap in Paris suited to his needs. With this key ingredient, he sailed to America during the winter of 1907-1908 to start the first experiments with Professor Harry Ward Foote at Yale University.²³ Jenkins presented his formula for Kolynos toothpaste (Figure 6) to the dental profession at the 1908 meeting of the American Dental Society of Europe in London.²⁴

The name "Kolynos" came from the Greek *Kolyo nosus*, meaning "Disease Preventer."²⁵ The first tubes of Kolynos were sold on April 13, 1908; and the private company was merged into the "Kolynos Company" and later "Kolynos Incorporated." A European branch was established in Berlin, and later a factory was set up in London. The American Dental Association endorsed Kolynos, the only toothpaste at the time so honored.²⁶

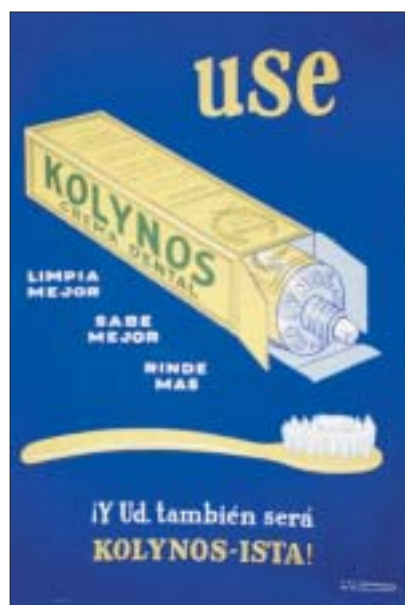


Figure 6. Kolynos toothpaste.

During World War I, the Kolynos Company published a booklet, Parley Voo, for American servicemen, which provided them a brief knowledge of French and German phrases and expressions for use overseas. In July 1928,

Kolynos merged with the American Home Products Corporation,²⁷ which is still in business as a consumer health care holding company called Wyeth. Kolynos today is a subdivision of Colgate Palmolive and is manufactured in Brazil.

Conclusion

Jenkins was president of the American Dental Society of Europe in 1878 and 1908.²⁸ He was also a member of the American Dental Club of Paris and the International Dental Federation. In addition, he was a member of the National Dental Association, and an honorary member of the New York State Dental Society, the Second District Dental Society of New York, the Connecticut State Dental Society, and numerous other societies in America.²⁹ On Dec. 29, 1910, a banquet was held by the American Dental Club of Paris to honor Jenkins on his 70th birthday.³⁰

Five years before World War I, Jenkins retired from practice and moved to Paris, where he spent his time in research and writing.³¹ He even developed his own brand of barbed broaches, which was sold by Claudius Ash of London.³² After the outbreak of World War I, Jenkins was forced to leave Europe and return to America in 1916. He died at age 79 in Havre, France, on Sept. 25, 1919. Jenkins' remains were brought back to the United States; and he was interred in the family plot in Bangor, Maine.³³

Jenkins was one of a group of distinguished American dentists who brought to Europe the "ideals and methods of American dentistry." These early pioneers established standards of excellence and ethical ideals which made the phrase "American dentistry" an "open sesame" to a successful foreign practice.³⁴

CDA

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Swims With Wolves



Witek's job is to clean the teeth of one particular species of fish called the "wolf fish."

oes the name Witek "Swims With Wolves" Mojsiewicz mean anything to you? Can you even pronounce it? How about the Macduff Marine Aquarium? Martha Stewart? Martha has nothing to do with the content of this article, we just wanted to determine how knowledgeable you are about current events. Obviously, if Witek Mojsiewicz and the Macduff Marine Aquarium don't fall within your purview, your wasting time with *Survivor* and *Fear Factor* isn't doing much to broaden your dental horizons.

Update: Witek Mojsiewicz is curator of the Macduff Marine Aquarium, a first-class aquatic operation about 50 miles north of Aberdeen, Scotland. He's a member of the British Marine Life Study Society and as such has been very much in the news lately, specifically in the Ripley's Believe It or

Not! series. Witek has the look of an accountant working out of the Edinburgh branch of H&R Block, but once he pops in a phone booth and dons his 200 pounds of scuba-diving gear, he makes the late Jacques Cousteau look like a member of the YMCA's Tadpole Group.

Witek's self-assigned job at Macduff's is to jump in this huge pool at the aquarium swarming with assorted denizens of the deep and — get this — clean the teeth of one particular species of fish called the "wolf fish." We suppose it is safe to assume you've never heard of a wolf fish up 'til now, and it's just as well. This is one rough-looking customer, the largest fish in the suborder of blennies. Blennies don't get a lot of press in spite of the fact that they date back as far as 50 million years. Wolf fish add a new dimension to the

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Continued from Page 642

word “ugly,” having a gross fat head with a large mouth filled with teeth you wouldn’t believe. Barracudas and piranhas turn green with envy when they see a wolf fish. It looks like that thing that lusted after Sigourney Weaver in the Alien, only not as attractive.

So here’s Witek, all suited up with his tanks and fins right in there with dozens of these maloccluded monsters all undulating around looking for something the size of a cow to reduce to bones. They look meaner than a junkyard dog and twice as hungry. Mojsiewicz, making up in dumb-fool courage what he lacks in common sense, swims right up to one of these odontic horrors. Armed with nothing more than a child’s soft-bristled toothbrush, *he begins to brush its fangs*. Yes! And if fish could purr, that’s what you’d hear emanating from this finned patient. The other members of the wolf pack are jockeying around jostling one another for a chance to get a free prophylaxis from their benefactor. Go figure!

Witek claims he undertook this mission because nobody was crazy enough to volunteer, but mostly because he

knew enough about wolf fish to realize their dentition needed some professional looking after or else they would lose these weapons of mass destruction, spending the balance of their lives in edentulous embarrassment.

We wish Mr. Mojsiewicz well and advise him, besides counting his fingers

The other
members of
the wolf pack
jockey around
for a chance
to get a
free prophylaxis.

each night, to be wary of accepting offers from abroad to reprise his fish schtick routine on the *Ripley* show. The California Board of Veterinary Medicine, for example, takes a dim view of unlicensed personnel performing routine prophylaxis on animals. You will recall the famous “Undercover Cat Sting” of 1988 when animal groomer Cindy Collins suffered arrest and detention for performing a prophylaxis on an undercover kitty sent in by the Department of Consumer Affairs to discourage this sort of thing by nonveterinarians. Although the cat performed its entrapment role with typical feline duplicity and never said a word, the charges against Ms. Collins were eventually dropped. The official message, however, was clear — no tickle, no washee.

You might remember if you are ever tempted to do a little preventive

maintenance on any individual who is not certifiably human, that a dentist is not allowed to perform such without the direct supervision of a licensed veterinarian. So say the provisions of the Dental Act and so says a chastened Ms. Collins. Just who is going to explain this to the wolf fish is not clear. It could turn nasty. **CDA**