LETTERS

JADA welcomes letters from readers on articles and other information that has appeared in The Journal. The Journal reserves the right to edit all communications and requires that all letters be signed. The views expressed are those of the letter writer and do not necessarily reflect the opinion or official policy of the Association. Brevity is appreciated.

ACCESS TO PREVENTION

I read with dismay the umbrella title, "Access to Care," for the three cover stories[1-3] in September JADA. This focus on access to care by the American Dental Association was further brought home to me after listening to the presentations from [ADA leaders] at our Vermont State Dental Society annual meeting. It appears that organized dentistry has fallen into the political trap of focusing on access to services rather than disease prevention or "access to prevention."

Historically, the profession of dentistry has focused on a health model based on prevention. Early dental research focused on eliminating caries and discovering the etiology of periodontal disease, and continues to do so today. Unlike our brethren in the medical profession, the dental health profession has served the public by teaching—and preaching—healthy lifestyle alternatives in order to prevent dental disease.

I would challenge the ADA, at this critical juncture in health care, to put its resources into examining ways in which the dental health profession can promote disease prevention and healthier lifestyles. Shift the paradigm from how to increase the number of dentists in areas that are underserved to developing a model of utilizing dental health professionals and nurse practitioners to focus on fluoride, diet, flossing, brushing and sealants.

Partner with the American Diabetes Association and American Heart Association in working toward teaching healthy choices to our patients to reduce diabetes and heart disease through healthy eating and healthy habits, such as flossing. Refuse to focus on short-term "solutions," and instead focus on the long-term establishment of healthier lifestyles.

While this position may not result in the "quick fix" that the political and governmental entities may be pushing the ADA towards, no one could possibly suggest that the current medical model, based on treatment of disease, has improved health care and/or decreased costs over the past 20 years. As the organization representing dentists, the ADA needs to stand firm and focus on the health of our nation through access to prevention, not access to care.

LeeAnn Podruch, DDS, Esq.
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1. Ramos-Gomez F, Cruz GD, Watson MR, Canto MT, Boneta AE. Latino oral health: a research agenda toward eliminating oral health disparities. JADA 2005;136:1231-40.
2. Shiboski CH, Cohen M, Weber K, Shansky A, Malvin K, Greenblatt R. Factors associated with use of dental services among HIV-infected and high-risk uninfected women. JADA 2005;136:1242-55.
3. Kobayashi M, Chi D, Coldwell SE, Domoto P, Milgrom P. The effectiveness and estimated costs of the Access to Baby and Child Dentistry Program in Washington state. JADA 2005;136:1257-63.

Editor's note: The ADA's interest in improving access to care has not come at the expense of its long-standing emphasis on prevention as a key factor in maintaining good oral health. Both access to care and prevention are of central importance to the Association, and a number of ADA agencies are devoted to furthering the cause of prevention.

For example, as part of its mission, the Council on Access, Prevention and Interprofessional Relations (CAPIR) commits much of its attention to such diverse preventive issues as community water fluoridation, oral health literacy, early childhood caries, sealants, nutrition, tobacco-use cessation and the early detection of oral cancer, sports dentistry and detecting hypertension. Through CAPIR and the Salable Materials program, the ADA offers a wide range of resources to foster prevention. Much of this material is accessible through ADA.org.

Through the Council on Communications, the Association also is working with its corporate sponsors to highlight the importance of prevention in programs targeting both the public and the profession.

For example, the ADA and Johnson & Johnson have announced a joint initiative, "Flossing Matters," to underscore the importance of flossing and to provide dental team members with the tools they need to better educate patients about the value of this preventive measure.

Another new initiative is "Mouthpower," involving Colgate Palmolive and the Dr. Samuel D. Harris National Musuem of Dentistry. Through this program, dental team members will have free access

to an innovative package of oral health education tools for outreach to schools and other community organizations.

These are just a few examples of what the ADA is doing to promote good oral health through prevention. The Association's total commitment to prevention is too varied and wide-ranging to be described adequately in this space. Readers interested in knowing more about the Association's efforts in the area of prevention can start by visiting the ADA's Web site.

Finally, member dentists wishing to discuss or recommend prevention-related activities are welcome to contact Dr. Robert E. Barsley, CAPIR chair, care of the CAPIR office at ADA headquarters in Chicago.

REPORTING PRODUCT DEFECTS

Regarding Dr. Glick's October editorial, "An Affirmation of Fallibility,"[1] dental manufacturers may, on occasion, be faulted for defective equipment or products that injure our patients. These product defects too often remain uncorrected. Consequently, more patients are harmed until the product defect or product warnings are remediated, since few dentists voluntarily comply with the U.S. Food and Drug Administration's MedWatch to report product defects or inadequate product warnings.

Confidential adverse incident reports by dentists to the FDA can help reverse the present grossly underreported adverse incidents to the FDA, and ultimately notify the manufacturer sooner to remedy any product defects.

Unfortunately, the marketplace too often replaces absent long-term clinical studies in the manufacturer's rush to market new products.

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1. Glick M. An affirmation of fallibility. JADA 2005;136:1356, 8.

DENTAL RADIOGRAPHY

I do not profess to be an expert on radiography, digital or otherwise. And I have long ceased hoping to reach the exceptional, high-quality standards taught and achieved by my Temple University School of Dentistry professor of radiography, the late Dr. William Updegrave. But, as far as I know from personal experience, some of the first charge-coupled device, or CCD, sensors being used intraorally were part of the Xerox Corporation's "Xeroradiography" system.

I know of this early pioneering development because I had the good fortune to present a demonstration table clinic entitled "Introduction to Xeroradiography" at the May 1980 Delaware State Dental Society annual meeting, convened at the University of Delaware.

Using a very large and, at the time, expensive machine the size of a console copying unit, I printed out a strip of positive intraoral images, much as one would receive from a boardwalk automated picture booth. Only not for 25 cents.

Would not this development predate the mid- and late 1980s dates cited for the Kodak effort and the French and Swedish developments credited in the October JADA radiography articles[1,2] as first in the field? And would it not be interesting to learn what machinations might have occurred within the halls of Xerox that caused them to decide not to follow through with Xeroradiography?

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1. van der Stelt PF. Filmless imaging: the uses of digital radiography in dental practice. JADA 2005;136:1379-87.
2. Kantor ML. Dental digital radiography: more than a fad, less than a revolution. JADA 2005;136:1358-62.

Dr. van der Stelt's response: Dr. Stewart's letter is very relevant in the context of new X-ray imaging modalities. Since the discovery of X-rays, film (or glass plate in the early days) has been used as the base of the radiographic image. In this way, the plastic film base is not only carrying the X-ray sensitive emulsion, but also the image after the film is processed.

The introduction of CCD and complementary metal oxide semiconductor sensors, or CMOS, and photo-stimulable phosphor sensor systems in the early 1980s implied a fundamental change in this principle. Image capture and image display are done separately from now on; the sensor and the display device (that is, the computer monitor) are two different components of the imaging chain.

Xeroradiography has characteristics of film-based imaging, as well as the digital sensor technology. It uses a photoconductive insulating medium, which is able to store the latent electrostatic-charge pattern produced by the X-rays. This is very similar to the latent image produced in the X-ray–sensitive emulsion of film.

The second step is the transfer of the latent image onto plastic-coated paper through a process comparable to that of a photocopying-type machine.

That means that the image itself is physically detached from the sensor that was used to capture the image information. This is analogous to what happens in digital imaging when the image is stored in the computer and subsequently displayed on the monitor.

In spite of these similarities, there is also a principal difference. The way a digital radiograph is displayed on the screen can be optimized and changed by means of image processing tools after it has been archived. This is achieved, of course, without actually changing the original image data, which are stored in the image database (when the software is designed the proper way).

This is different from a Xeroradiographic image, which cannot be changed after it is printed. Therefore, it lacks some of the most important features of a real digital image. That is why I did not mention Xeroradiography in my article.

Having said this, I agree completely with Dr. Stewart in reminding us of Xeroradiography because, until the 1980s, it was one of the few technologies, if not the only technology, competing with some success with film-based imaging. As for why it did not succeed as a new imaging modality, I think it was probably too far ahead of its time. Potential users were reluctant to pay a large amount of money for a device that was so much different from common film-based imaging. There are other examples of good technologies that were not adopted in time by enough users to enable further improvements. Fortune was more favorable for digital radiography, as we know now.

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Dr. Kantor's response: Dr. Stewart reminds us that Xeroradiography—which, unlike digital radiography, was a fad—was an early form of filmless imaging. However, Xeroradiography, like film and the original photocopy technology on which it was based, was an analog technique.

It used a charged selenium-coated plate to create a latent image that was then converted to a real image by the deposition of toner particles. These particles then were transferred to an adhesive strip to which a translucent backing was affixed. Xeroradiography did not use solid-state sensors, nor did it store the images as numerical data; therefore, Xeroradiography does not qualify as digital radiography, even though it was a filmless technology.

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MORE ABOUT RADIOGRAPHY

The review article on the fundamentals of digital radiography presented by Dr. Paul van der Stelt is a useful contribution ("Filmless Imaging: The Uses of Digital Radiography in Dental Practice," JADA 2005;136:1379-87). However, there are several areas where clarifications are needed, both for Dr. van der Stelt's article (several of the articles he cited are from my laboratory/clinic) and also for the guest commentary/editorial provided by Dr. Mel Kantor ("Dental Digital Radiography: More Than a Fad, Less Than a Revolution," JADA 2005;136:1358-62).

Shortly after the discovery of X-radiation in Germany by Wilhelm C. Roentgen, the president of the British Physical Society is reputed to have noted: "I do not see how the X-ray can lead to results of any significance." The sentiments expressed in the commentary by Dr. Kantor are, in my mind, similarly blinkered.

The revolutionary component of digital imaging is not simply the display of "filmless" radiographs. It is, in fact, that those images are, for the most part, captured in a computer and displayed almost instantaneously, facilitating operative procedures that now can be image-guided. Digital images do not need to stand apart from film radiographs, as many practitioners use both. There is nothing wrong with this hybrid solution. Francis Mouyen invented his system for operative procedures, rather than as a replacement for film.

As chairman of the International Congress and Exposition of Computed Maxillofacial Imaging, I have noted a rapid transition in the field of dental and maxillofacial digital imaging. Twelve years ago, when the conference began, studies generally concerned simple diagnostic tasks.

Indeed, even the then-quite-primitive digital intraoral X-ray systems were found to have a similar diagnostic yield to film radiography, and that was for the few specific tasks where film radiography is known to

perform well (for example, endodontic measurements and detection of moderately advanced proximal surface dental caries).

The strengths of digital radiography that have emerged have not been limited to "academic glass bead games" of comparing film and digital detectors. Rather, the strength has been greater use of digital imaging for guiding treatment. Often, this is now in three-dimensional applications that are impractical with film.

As a result of the growth in image-guided procedures, the journal Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontology has recently added a subsection on computer-guided treatment within its oral radiology section. And a new international journal on computer-assisted radiology and surgery will be launched by Springer Verlag early in 2006. This journal will include a section dedicated to computed maxillofacial imaging. Nearly all papers presented at the international conference I chair now reflect treatment, rather than simply baseline interpretation.

Francis Mouyen was perceptive, rather than blinkered, in his approach. Change is happening. These are exciting times, as anyone who visited the technical exhibit at the recent ADA annual session in Philadelphia must understand. The computer in general, and digital imaging in particular, are the enabling technologies that have made many new procedures a possibility.

While I endorse almost everything that was presented by Dr. van der Stelt, I would like to comment on one omission and one misleading conclusion. The American Dental Association Standards Committee on Dental Informatics WG 12.1 has been active in working with vendors of digital X-ray systems to ensure image-file interoperability, using the Digital Imaging and Communications in Medicine (DICOM) Standard.

This year, 13 vendors were able to prove conformance in time for the ADA annual session. It should be noted that, while this represents the lion's share of systems presently available, there are still some vendors who have not come forward to have their images tested.

The suggestion that all digital systems are equal is misleading. An image for which there is no assurance of interoperability and maintenance of image integrity and the fidelity of identifying tags should not be considered equal to images from vendors who have achieved conformance in ADA WG 12.1 tests.

Further, digital sensors vary in many respects, and the perceptive dentist needs to carefully review multiple characteristics in order to make the appropriate choice for her or his own practice. Areas of question include, but are not restricted to, DICOM conformity; compatibility with the office's practice management software; speed of operation (CCD and CMOS systems result in an almost instantaneous image, but some photostimulable phosphor systems are as slow as film processing); sensor durability (intraoral phosphor plates are relatively easily scratched); measured spatial resolution; contrast resolution; signal-to-noise ratio; cost, including warranties; and available sensor sizes.

Dr. van der Stelt's article clearly illustrates that there are variations between systems in the range of acceptable radiation doses to obtain diagnostic images. Presumably, this factor is also one that consumers of digital systems might wish to weigh. A wider acceptable exposure range reduces the possibility of exposure error, but can also permit excess radiation dosages to be used.

Dr. Kantor can continue to enjoy his dial-up, land-line telephone and monochrome television. I prefer a touchtone cellular phone and high-definition color television. While I still do use X-ray film for some purposes, my patients are also benefiting from the latest technologies in digital imaging, when these methods are of value. DICOM data sets from my cone-beam CT are beamed to different vendors of guides for dental implant placement, and to make laser-generated models for oral surgery planning.

The future of dentistry is with those who have a desire to move forward. Digital radiographic and visible light images are the building blocks that will eventually take the dentist from the role of free-hand artist to that of an architect of dental care. The computer is the major enabling technology.

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Dr. van der Stelt's response: I am very pleased with the comments of Dr.

Farman, not least because he seems to agree with the general message of my article. I am a bit confused, however, when he talks about an omission and a misleading conclusion.

The misleading conclusion, if I understand Dr. Farman's letter correctly, is that "all digital systems are equal." I have reread my article, and I could not find a statement like this, or even a paragraph suggesting that this is the case. If his comment relates to the fact that not all sensor systems are completely DICOM-compatible, I agree that this is true.

On the other hand, however, I want to emphasize that DICOM is not the ultimate solution for every general practitioner. First of all, DICOM is a comprehensive standard. Not everything described in the standard is always essential. Even the Digital X-ray, or DX, supplement to the DICOM Standard, which specifically pertains to digital radiography in dentistry, is quite extensive. That is one of the reasons why the ADA, by means of the Working Group 12.1, has attached importance to the development of the dental subset of the DICOM standard, which has been published as ADA Technical Report 1023, "Implementation Requirements for DICOM in Dentistry."

It is too easy to say that a sensor should be in conformity with DICOM. The user (that is, the general practitioner) first must define in what context he or she needs to make use of the DICOM connectivity. If he or she is using one or only a few sensors within his or her practice, there are other solutions available to store the image data from different sensor systems together in a single uniform database. Other solutions are easier to implement from a technical point of view and are therefore more user-friendly. Only when the dentist wants to exchange images with colleagues or other clinics is DICOM the most effective solution.

Most sensor software packages, therefore, are able now to read and write so-called DICOM studies on a CD-ROM. If the sensor manufacturer has achieved conformity in ADA WG 12.1 tests, it can be assumed that the software has this functionality. Otherwise, the user has to ask the vendor to prove conformity. It is good that the number of companies that use the WG 12.1 tests to show their conformity is increasing every year.

When sensor systems are used in a large clinic that is DICOM-based, the implementation of DICOM compatibility is much more complicated, exceeding the content of Technical Report 1023. In that case, specialized knowledge is required, which is clearly beyond the scope of my article.

Again, it is not completely clear to me to which section of my article Dr. Farman's comment about an omission refers. He lists nine items that should be considered when choosing a sensor system. All items listed are important. It is a pity, however, that Dr. Farman did not include the most important parameter of all: the diagnostic performance of the sensor system, which encompasses all physical parameters and their interactions as they function in a clinical environment.

Spatial resolution, contrast resolution and signal-to-noise ratio (and there are other parameters as well) can be measured easily, and quite a number of articles have been published comparing sensors based on physical characteristics. However, a sensor that scores well on just a single one of the physical parameters does not always perform well in real life. That is because spatial resolution, noise and contrast interact and need to be described simultaneously. This is something to be aware of when choosing between different sensor systems. I encourage readers to take note of the paragraph on diagnostic-image quality on page 1386 of my article.

When I organized the first Symposium on Digital Imaging in Dental Radiology in 1990, it was just a satellite meeting of the (then) triennial European Congress of Dento-Maxillo-Facial Radiology. A few informal meetings preceded this symposium, and several formal ones would follow.

I remember how excited we were when, during one of these symposiums, we showed that we could transmit a radiograph from one side of the Atlantic to the other. We did this together with Dr. Farman. To prove that the transmission was not faked, a co-worker of Dr. Farman's scanned a newspaper and showed us the date of issue of this newspaper.

Many other exciting things happened in consequence of the continuing evolution of digital radiology, and have been presented during conferences, symposiums and as articles in journals. I hope we will be able to report new developments in this field in JADA in due course.

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Response from Dr. Kantor: It appears as though Dr. Farman has mistaken my mildly contrarian position for hostility to all things technological. I am not opposed to digital technology; I am simply not seduced by it. I readily acknowledged that dental digital radiography "is a welcome incremental advancement" and that it is here to stay; hence, "more than a fad."[1]

Dr. Farman's emphasis on the value of image-guided operative procedures suggests that I ignored this advantage of dental digital radiography. In fact, Dr. Farman and I are in agreement on this issue. Perhaps he overlooked my endorsement of dental digital radiography for endodontics and some surgical procedures.

When Dr. Farman speaks of computer-generated guides for dental implant placement and models for oral surgical planning, he is referring to advanced imaging techniques, such as cone-beam computed tomography, that were not covered in Dr. van der Stelt's article, save one paragraph in his "Conclusions and Future Directions" section. Nor was this covered in my editorial. Conflating advanced imaging techniques with dental digital radiography as commonly used in clinical practice does not contribute to the discussion, but merely confuses the issues.

Although I believe that Dr. Farman intended "blinkered" as a pejorative term, I prefer to think of it differently. Dr. Farman hails from Louisville, home of the Kentucky Derby, in a state famous for breeding horses. Horses are often blinkered during races to prevent them from being distracted and to keep them focused on task. So, yes, in that sense, I am blinkered. I remain focused on what is important about diagnostic imaging, and I am not easily distracted by the digital hoopla in the grandstand. And I encourage others to do the same.

The 11.5 percent of general dentists who have already embraced digital radiography for all of their intraoral applications are the "early adopters" in Everett Rogers' diffusion of innovation model.[1] However, not everyone has to be on the cutting edge of technology; some of us would rather not bleed. "Early majority" and "late majority" adopters[1] may prefer to wait until the kinks have been worked out, and the prices have dropped. In the meantime, we can rely on film to provide us with the diagnostic images that we need to treat patients.

My editorial addressed the current state of dental digital radiography. As Dr. van der Stelt said, "digital radiography is no longer an experimental modality," but it certainly is not a must-have technology for contemporary dental practice.

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1. Diffusion of innovations. Wikipedia 2005. Available at: "en.wikipedia.org/wiki/Diffusion_of_innovation". Accessed Nov. 21, 2005.