

Journal of the American College of Dentists

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Evidence-Based Dentistry

The seal of the American College of Dentists is a circular emblem. The outer ring contains the text "COLLEGE OF DENTISTS" at the top and "CAUSA" at the bottom. Inside the ring, the Latin phrase "CURANDORUM HUMANITATIS" is visible. The central part of the seal depicts two figures, a man and a woman, standing on either side of a large scroll. The scroll contains text in a stylized, possibly cuneiform or ancient script. Below the scroll is a large, detailed illustration of a butterfly or a similar winged insect. The entire seal is rendered in a light, monochromatic style against the dark background of the cover.

Journal of the American College of Dentists

A Publication Presenting Ideas, Advancements, and Opinions in Dentistry

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Mission

THE *JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS* shall identify and place before the Fellows, the profession, and other parties of interest those issues that affect dentistry and oral health. All readers should be challenged by the *Journal* to remain informed, inquire actively, and participate in the formulation of public policy and personal leadership to advance the purposes and objectives of the College. The *Journal* is not a political vehicle and does not intentionally promote specific views at the expense of others. The views and opinions expressed herein do not necessarily represent those of the American College of Dentists or its Fellows.

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THE AMERICAN COLLEGE OF DENTISTS, in order to promote the highest ideals in health care, advance the standards and efficiency of dentistry, develop good human relations and understanding, and extend the benefits of dental health to the greatest number, declares and adopts the following principles and ideals as ways and means for the attainment of these goals.

- A. To urge the extension and improvement of measures for the control and prevention of oral disorders;
- B. To encourage qualified persons to consider a career in dentistry so that dental health services will be available to all and to urge broad preparation for such a career at all educational levels;
- C. To encourage graduate studies and continuing educational efforts by dentists and auxiliaries;
- D. To encourage, stimulate and promote research;
- E. To improve the public understanding and appreciation of oral health service and its importance to the optimum health of the patient;
- F. To encourage the free exchange of ideas and experiences in the interest of better service to the patient;
- G. To cooperate with other groups for the advancement of interprofessional relationships in the interest of the public;
- H. To make visible to professional persons the extent of their responsibilities to the community as well as to the field of health service and to urge the acceptance of them;
- I. To encourage individuals to further these objectives, and to recognize meritorious achievements and the potentials for contributions to dental science, art, education, literature, human relations or other areas which contribute to human welfare—by conferring Fellowship in the College on those persons properly selected for such honor.

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FROM THE EDITOR

Journalism as Inquiry, Public Relations, and Advertising

In October 1998, the American College of Dentists and the American Association of Dental Editors jointly sponsored a workshop on "Ethical Dilemmas for Dental Educators." It soon became apparent that two types of journalism were represented by the editors present. A side-by-side comparison of the ethics codes for dental journalism and for journalism more broadly considered told the story. Publications of the AADE are required to "follow ADA journalism guidelines," which, among many other things "communicate the dental society's policies..., assist the dental society with membership recruitment and retention efforts..., and market to members available benefits and services." In contrast, the Code of Ethics of the Society of Professional Journalists states that "editors should be free of obligation to any interest other than the public's right to know" and that they should "distinguish between advocacy and news reporting."

Component society newsletters fall pretty clearly in the category of public relations journalism. Research publications and the journals of most discipline-based and non-ADA groups are examples of inquiry journalism. Many organizations within dentistry

clearly distinguish between the inquiry and the public relations aspects of journalism by publishing both a journal and a newsletter. Some state associations continue to struggle with this distinction.

There is a third kind of journalism; one that is difficult to distinguish from advertising. Increasingly we are seeing articles and entire publications that mimic the style of inquiry journalism while promoting economic interests.

Dental students at the University of the Pacific are required to take a course where they study product and procedure claims. They express surprise at learning that, in some cases, the five references on a product claim may be five separate publications of a single case report. The idea that a new procedure fails in six patients and only succeeds in the one published in a case report or that sponsors can block the publication of unfavorable clinical trials sow the seeds of cynicism in young professionals.

The rise of journalism as advertisement has multiple sources. One must be the advent of desktop publishing and the Internet which lower costs of entry into the field. Another is the economic success of dentistry and its expanding market for elective alternatives. Part of it is just a change in our

culture—business is the new American pastime.

Journalism as advertising has become sophisticated and easily emulates journalism as public relations. Today there are academies and institutes for virtually every economic self interest. Most of these function on the chain letter principle where professionals are rewarded for bringing their colleagues into the group, and the greatest rewards go to those highest in the self-generating chain.

Journalism as advertising has also emulated the science of inquiry. A colleague of mine recently bragged that her paper had been peer reviewed five times by Benjamin Franklin. My face must have registered surprise because she went on to explain that the journal charges \$500 to have a paper peer reviewed. The appearance of technical research and statistical terminology in papers is no better protection than is peer review. Methodological rigor has always been a necessary condition for sound inquiry-based literature; but it has never been a sufficient one.

There are even growing antagonisms between inquiry journalism and public relations journalism. Recent attempts have been made by dental organizations to both prevent or censor the

publication of an article in the *Journal of the American College of Dentists* and to require republication of another article. Some state journals require ADA membership of dentists authors.

But what are we to do? First, we must distinguish among journalism as

Journals might voluntarily adopt the standard of the *Journal of the American College of Dentists* which annually publishes statistics on the level of consensus achieved in peer review. This journal normally achieves consistency in the .65 to .75 range;

It might be a propitious time for the AADE to develop its own independent code of ethics for dental journalism, a project the ACD would willingly support.

inquiry, public relations, and advertising. Next we should look to Codes of Ethics. For example, the Society of Professional Journalists code states "distinguish news from advertising and shun highbreds that blur the lines between the two." It might be a propitious time for the AADE to develop its own independent code of ethics for dental journalism, a project the ACD would willingly support.

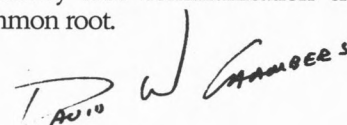
Courses in critical thinking and evaluation of product claims are probably a useful replacement for the traditional dental schools and graduate courses in the rules of doing good science.

compared to .35 or lower where it has been studied in the medical literature.

Up to this point the most vigorously pursued response to the confusion in dental literature is handwringing and censor. As good as it feels to be on the moral high ground, this is not a satisfactory solution. In the first place, the journalism of public relations or the journalism of advertising can easily imitate the journalism of inquiry. This means that no control over form and structure is likely to be effective. And who is to say that the self interests of researchers (who are paid for doing science), the self interests of organizations (that exist so long as their members

prosper), or the self interests of business (individual or small group success) is the self interest by which others should be judged? Besides, a huge number of the most important innovations in oral health care have been developed by individual dentist entrepreneurs and by industry. Any chilling effect on that vital source of creativity would be damaging to the public. Finally, and this is the point where the ethics of journalism seems different from the ethics of certain other aspects of professionalism, journalism has never been improved by censorship.

The emerging confusion in dental journalism can best be handled by simply talking about it. If our literature is vigorous, uncensored, and self critical, and if all professionals are encouraged to be active readers and writers, the community of dental professionals can only grow stronger. It is no coincidence that the words community and communication share a common root.



David W. Chambers, EdM, MBA, PhD, FACD
Editor



Letters to the Editor

Dear Dave,

The Winslr issue of the *Journal* certainly gives the Fellowship and the profession at large something to wonder about. Demographics may not be destiny, as one of the authors noted, but it is certainly hard to swim against the trend. The Northern California Section has been looking at demography because these things seem to become more apparent in California first and because we want to make certain that the College correctly positions itself for a strong future. The following are some facts and observations I have collected about our emerging profession.

California realities in the past seven or eight years:

1. Dental school classes (graduating over 500 per year) are almost 50% women. Many of these women will not practice full-time.
2. The Asian Pacific culture composes approximately 60% of each class, of which Vietnamese are currently the largest segment, with Korean and Chinese representing sizable segments.
3. In the early 1990s the Middle Eastern segment (predominantly Persians) was the largest group and it is still a large portion of the total.
4. In the private schools, indebtedness in the \$170,000 to \$200,000 range is not unusual. This may alter the service profiles of these individuals as practitioners.
5. The traditional composition of the profession has changed due to retirement, relocation, and death of

individuals trained in previous generations who have not replaced themselves due to factors of current composition of graduating classes as noted above.

The California Dental Association placed a focus on cultural diversity in its 1994 Strategic Plan in an effort to curb membership losses (79% to about 74%). The CDA experience seems to support the following observations:

1. The diverse cultural groups are not joining organized dentistry.
2. These individuals are not developing service profiles that will qualify them for ACD nomination.
3. These groups stay within their own communities so are not known by those in traditional organized dental groups.
4. Those in the traditional organized dental groups do not reach out to bring the new professionals into organized dentistry—the barrier is two way.
5. Diverse cultural groups are not becoming part of the “supply system” for recognition of professional service, academic or research contributions, etc. Even if they contribute within their own communities that is not known by those outside the group, such as the Fellows of the College who might nominate them.

The declining number of new Fellows in the Northern and Southern California sections in recent years suggests that these diversity trends may already be affecting the number of individuals qualified for Fellowship consideration.

One must certainly ask what steps the ACD can take that will strengthen the “supply system” of qualified candidates for the College. This is probably not a problem that will “take care of itself,” nor can we wait for others to address it. Perhaps we should open up the design of the nomination process (not the credentials) to make the College more visible and a more attractive career objective for individuals with a strong service profile, no matter what their ethnic background may be.

I would summarize the situation like this. The ethnic composition of dental students is changing to reflect a more diverse population in this country. The future population of dentists will change accordingly. Dentists from the various ethnic groups have not historically participated in organized dentistry at the same rate or levels as has been the case in years past. The College requires membership in the American Dental Association to qualify for Fellowship and relies heavily on service in organized dentistry as a way of gaining recognition for professional contributions. The American College of Dentists may be at risk of missing many dentists who are making contributions to the profession and their communities.

Sincerely,

Kenneth E. Follmar
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Systematic Reviews and the Practice of Evidence-Based Dentistry: Professional and Policy Implications

Amid I. Ismail, BDS, MPH, PH; James D. Bader, DDS, MPH;
and Douglas B. Kamerow, MD, MPH

Abstract

A definition and introduction is provided for evidence-based dentistry and dental practice. The impact of this approach to providing care is traced for quality of care and professionalism. Policy implications are drawn and the impact of evidence-based dentistry for dental education and research are discussed.

The practice of health service in any branch, unless animated by research, is weakened by the complacency of empiricism—William J. Gies, 1926

The objectives of this paper are to define the process for conducting systematic reviews and practicing evidence-based dentistry (EBD) and to discuss their policy implications for dental practice, research, and education. The term evidence-based dentistry encompasses the concept of systematic reviews of the evidence and the practice of evidence-based dentistry. Evidence-based dentistry is part of the initiative referred to as

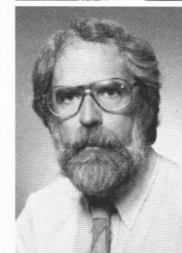
evidence-based health care that includes evidence-based medicine (EBM) and evidence-based nursing (EBN). The development of evidence-based medicine was fueled by findings that the transfer of new scientific information into medical practice was slow and idiosyncratic (Eddy, 1993; Rosenberg & Sackett, 1996). The goal of advocates of evidence-based health care is to assemble and appraise the available evidence and present it in a format that clinicians can use in their daily work.

The process of evidence-based health care has three important and distinct steps. The first is asking a clinically relevant question that, if answered, can help clinicians to provide better care to their patients. The second is a systematic review (for a definition refer to the next section) of all the evidence that may help to answer a clinically focused question. The third step is the transfer of evidence-based conclusions into practice. The practice of evidence-based dentistry incorporates the judicious use of the best evidence available from systematic reviews, when possible, with

knowledge of patients' preferences and clinicians' experiences to make recommendations for the provision of the right care, for the right patient, and at the right time.



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What is a Systematic Review of the Evidence?

A systematic review, according to the Agency for Health Care Policy and Research (AHCPR), is a "summary of available scientific evidence in which studies are collected, evaluated, and synthesized in accordance with an organized, structured methodology" (Woolf, 1996, p. 1). Systematic reviews follow explicit methods to find, appraise, and integrate all published and unpublished evidence that may answer a clinically-focused question. Table 1 presents the steps followed in conducting a systematic review. Systematic reviews are scientific investigations with pre-planned "methods and assembly of original studies as their subjects" (Cook, Mulrow, & Haynes, 1998, p. 7).

The scholarly effort necessary to conduct a systematic review is not different from that used in conducting any other investigation to search for answers to a specific question or test a hypothesis. The "populations" included in systematic reviews, however, are published and unpublished

ods and conduct systematic reviews of health-related questions (Cochrane Collaboration Secretariat, 1998). The Cochrane Collaboration has an "Oral Health Group" that is active in conducting systematic reviews of dental questions.

The evidence included in systematic reviews comes not only from randomized clinical trials but also from well-conducted and controlled patient- or population-based studies that evaluate the "accuracy and precision of diagnostic tests and prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens" (Straus & Sackett, 1998, p. 339). Systematic reviews can include evidence from case-control studies and cross-sectional studies and other research designs. Reviewers, as well as dentists, however, must be cautious in their conclusions regarding cause-and-effect associations when using evidence from sources other than randomized controlled trials.

Practicing evidence-based dentistry does not mean that dentists or dental educators must devote the time or

to conduct a series of systematic reviews of dental questions.

What is Evidence-Based Dental Practice?

A systematic review may reach several conclusions. It may find that there is no relevant evidence to answer a specific clinical question or that the evidence is inconclusive. These findings are useful for dentists and decision-makers because they identify what "we do not know" and, hence, in such cases decisions can at best be based on collective professional judgment until research is carried out to provide relevant scientific answers. In our opinion, the identification of gaps in the scientific knowledge of a profession is a major benefit of the movement of evidence-based health care. Such information will be very useful to funding agencies, such as NIDCR, to plan for clinically relevant research programs.

If a systematic review finds conclusive evidence, then dentists can "conscientiously and judiciously use [the] best evidence from clinical care research in the management of individual patients" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Use of scientifically based evidence to practice dentistry should be a *conscientious* process where a specific decision should be made for application of the evidence for each patient. Dentists practicing EBD are not robots who use cookbooks. Rather they use *judgment* based on clinical expertise and patient factors to balance the risks and benefits of any dental intervention for each patient. Dentists practicing EBD should have access to up-to-date and dependable sources such as review journals (for example, *Evidence-Based Dentistry*), research clubs (for example, the *American College of Physicians Journal Club*), and computerized databases (for example, the National Guideline Clearinghouse organized by AHCPR [<http://www.guideline.gov>], or the Best Evidence CD-ROM (published by the American College of Physicians).

The term evidence-based dentistry encompasses the concept of systematic reviews of the evidence and the practice of evidence-based dentistry.

reports of research studies rather than samples of patients, subjects, animals, or biological materials. Like basic or clinical research, the methods followed in conducting systematic reviews are constantly being developed and tested to reduce bias in the examination of evidence and assure comprehensiveness of the search for it.

The "gold standard" for conducting systematic reviews is now being set by AHCPR (<http://www.ahcpr.gov>), in the U.S., and the Cochrane Collaboration (<http://hiru.mcmaster.ca/cochrane/default.htm>), an international group of health experts who develop meth-

even have the training to conduct systematic reviews of the evidence for each and every clinical problem they encounter in their daily work. Rather, systematic reviews are conducted by multidisciplinary teams of dental and non-dental experts in partnership with professional health organizations. Currently, systematic reviews are prepared by the Cochrane Oral Health Group and academic and government agencies. Beginning in late 1999, the National Institute for Dental and Craniofacial Research (NIDCR) will fund one of the twelve AHCPR Evidence-based Practice Centers (EPCs)

Table 1. Steps in a Systematic Review of the Scientific Evidence

<u>Step</u>	<u>Comments</u>
Research question	Focused and clinically relevant
Methods	
Data sources	Published and unpublished studies Secondary data analysis
Study selection	Inclusion and exclusion criteria
Outcome measures	Relevant to the clinical question
Data extraction	Protocol for summarizing the information from studies
Subgroup comparisons	Are there differences between different groups of patients or different sub-interventions?
Statistical analysis	Quantitative methods: meta analysis or qualitative methods: frequency and size of outcomes
Quality control	Methods to ensure that biases are controlled
Peer review	Process for soliciting independent reviews by experts and organizations Process for incorporation of the comments from the reviews
Results	Included studies Excluded studies
Evidence tables	
Secondary analyses	
Meta analysis	
Conclusions	Limitation and summary
Future research	Questions that are still unanswerable
References	

Adapted from: Heidenreich, P.A., et al (1998). An evaluation of beta-blockers, calcium antagonists, nitrates and alternative therapies for stable angina. Rockville, MD: Agency for Health Care Policy and Research.

Translation can also be actively promoted when professional organizations, such as the American Dental Association or the American College of Dentists or state dental boards, set standards or guidelines to define scientifically validated interventions that have been shown to have positive outcomes for patients. Standards of care are authoritative statements defining minimum levels of acceptable results (Field

In 1951, the focal infection theory was discredited by "critically appraised and accurately documented evidence concerning the association between dental foci of infection and general health" (Easlick, et al, 1951, p. 616). This thorough review was written by a multidisciplinary team of experts under the general direction of the former Council on Dental Health of the American Dental Association

mation on a dental condition, analysis of the collected data, and choosing interventions that have been found most effective in controlled scientific studies (Bader, 1992).

Systematic reviews and the practice of evidence-based dentistry are necessary to provide quality dental care, as defined by the Health Care Financing Administration, for the following reasons: first, systematic reviews can assist dentists in selecting effective and scientifically validated treatments (doing the right thing). Second, systematic reviews provide information on the success and failure of treatments for given patient characteristics (at the right time and for the right person). And third, systematic reviews also provide dentists with information on procedures that have not been scientifically evaluated and, consequently, that will help dentists to communicate the limitations of the available treatments of their decisions.

Good quality care should be based on scientifically good evidence. This is not a new phenomenon in dental practice. For example, dentists who use fluorides and sealants are practicing EBD (Lewis & Ismail, 1994). Dentists who advise their patients to brush and floss their teeth to prevent gingivitis are practicing EBD (Ismail & Lewis, 1993). However, like physicians, dentists are not immune from adopting and following untested interventions or continuing to recommend interventions that have been found to have no benefit to patients. The focal infection era provides a prime example of a treatment approach that was not based on scientific evidence (Easlick, et al, 1951). Other current examples in dental practice are the routine extraction of asymptomatic third molars (Landes, 1998), rubber cup polishing prior to the application of fluoride (Ismail, 1999), and placement of crowns on restored teeth to prevent tooth fracture (Bader, Shugars, & Roberson, 1996).

In our opinion, physicians and dentists can no longer solely rely on opinions of experts or their own practical experiences. Experts and their

Doing the right thing, at the right time, the right way, for the right person—and getting the best possible results...

& Lohr, 1990). No care should be provided that does not meet the standard. Clinical practice guidelines are systematically developed statements that assist practitioners and patients in making decisions about appropriate health care for specific clinical conditions (Field & Lohr, 1990.)

Why Should the Dental Profession Practice Evidence-Based Dentistry?

The demand for following critically appraised scientific knowledge in provision of dental care is not a new phenomenon. Dental care in the early part of the 20th century was described in the landmark report on the status of dental education in the U.S. and Canada, written by W. J. Gies, as "mechanical" rather than scientific, and as heavily based on empirical experiences rather than enquiry and biological knowledge (Gies, 1926). The extraction of teeth to eliminate dental foci of infection, based on the assumption that infections in the mouth may afflict other organs, was widely practiced without any scientific evidence to support its effectiveness in promoting health. As a consequence, a generation of Americans became "devoid of their teeth" (McGhee, 1949) but without gaining any improvement in their health status (Easlick et al, 1951).

(Easlick, et al, 1951). The ADA-sponsored review, which was released to "help the dentist to render more effective health service" (Easlick, et al, 1951, p. 616), raised skepticism about the validity of the focal infection theory and the extraction of teeth to remove these foci.

Evidence-Based Dentistry and the Quality of Dental Care

A major advantage of the EBD initiative for dentists is its contribution toward assuring that high quality dental care is provided. The U.S. Health Care Financing Administration (HCFA) defines good quality health care as "doing the right thing, at the right time, the right way, for the right person—and getting the best possible results" (Health Care Financing Administration: <http://32.97.224.58/comparison/default.asp>). The role of evidence-based dentistry in promoting quality dental care is summarized in Table 2. Dental education and practice have concentrated on doing dentistry the "right way," usually measured with mechanical or clinical criteria such as marginal integrity, color of restorations, and absence of periodontal disease, among others. However, providing "good dentistry" involves more than providing good mechanical care. It includes collecting valid infor-

Table 2. Evidence-based Dentistry and the Quality of Dental Care

<u>Components of good quality health care</u>	<u>Tools for quality health care</u>
Provision of effective interventions	Systematic reviews
At the right time	Patient preferences and professional experience
The right way	Technical skills and experience
For the right patient	Decision making principles and systematic reviews
And getting the best possible results	Patient preferences and outcomes assessment

Adapted from: Health Care Financing Administration. Medicare and You. HCFA's Medicare Compare. Health Plan Comparison Database. <http://32.97.224.58/comparison/default.asp>, 1998.

personal experiences vary widely and they are easily influenced by preferences for certain treatments, biased observations, and the type of patients seen in a dental practice (Bader & Shugars, 1995). In medicine, there is now a clear understanding that reliance on pathological and physiological findings and deductive reasoning rather than findings from clinical outcome studies can result in the provision of ineffective and sometimes harmful services (Chalmers, Enkin, & Keirse, 1989; Rosenberg & Sackett, 1996). The EBD initiative aims to assist clinicians and organizations in making informed decisions based on a critical review of the evidence to provide quality health care.

Evidence-Based Dentistry and Dental Education

The practice of evidence-based dentistry is a "process of lifelong, self-directed learning in which caring for our own patients creates the need for clinically important information about diagnosis, therapy, and other clinical and health care issues" (Rosenberg & Sackett, 1996, p. 214). The essence of dental education should be the development of life-learning skills in dental students so that they can continue to

evolve professionally after graduation. Unfortunately, current clinical dental education seems to have the same problems identified by Gies in 1926 when he concluded that "there is no imminent danger of any impairment of instruction because of undue absorption in research" (Gies, 1926, p. 155). As was recently found by an Institute of Medicine (IOM) report, dental education

research into clinical teaching and practice. It is a path that permits clinical faculty to become engaged into clinical research or, most importantly, dissemination and translation of findings from clinical research into education and practice. Working in teams that are conducting systematic reviews provides opportunities for clinical and basic science faculty to

Physicians and dentists can no longer solely rely on opinions of experts or their own practical experiences.

still strives to teach students to do mechanical dentistry the right way (Tedesco, 1995). Dental curricula have two distinct sets of courses: basic sciences and clinical courses (Tedesco, 1995). The translation of biological knowledge about oral and dental health into clinical training is weak (Jeffcoat & Clark, 1995), and evaluation studies of outcomes of dental treatments have not yet been widely carried out.

Evidence-based dentistry not only as a process but also as a vision for dental education opens a new path for clinical dental faculty which integrates

break the disciplinary barriers that exist between basic science research and clinical education. The process of conducting systematic reviews and translation of findings into the curriculum in a dental school provides a dynamic learning environment for faculty and students.

Adoption of evidence-based dentistry in schools of dentistry requires an organizational environment that encourages interdisciplinary collaboration. The environment should also be open to feedback and self-criticism. Consequently, implementation

Evidence-Based Dentistry

of EBD in dental education requires organizational changes to promote and reward faculty involvement in evidence-based dentistry projects. Evidence-based dentistry will work best in schools that encourage self-criticism and feedback and active faculty involvement in decision making. And it will work best in schools that have a broad definition of scholarly activity where research represents more than conducting basic science studies.

Evidence-Based Dentistry and Dental Research

Systematic reviews provide a new tool for defining research priorities that are formulated after a detailed evaluation of what is known and not known about the evidence for diagnosis, risk assessment, prevention, and treatment. Systematic reviews could also generate hypotheses for basic science studies. The practice of evidence-based dentistry could also assist in the development of an environment in which research is a tool for solving patient problems and assisting practitioners in their work, rather than one that encourages and rewards "research for researchers" (Chambers, 1998a).

Evidence-Based Dentistry and Ethics and Professionalism

The dental profession has adopted the normative principles of bioethics in its code of ethics: beneficence, nonmaleficence, autonomy, and justice (Kenny, 1998). The practice of evidence-based dentistry assures that the best available evidence is used in patient care. Hence, an evidence-based dentist provides dental care that is least likely to harm his or her patients and more likely to promote good oral health. Evidence-based practicing dentists also respect patient autonomy because they provide valid and tested information to patients to assist them in making their own health care decisions. They also promote the prin-

ciple of justice in that their patients are informed of the evidence, or lack of it, prior to making their decisions.

A health professional is an individual who professes knowledge in an area of learning or science and uses it to promote health through practicing the art and science of health care. Dentists are members of a health profession because they have a specific scientific foundation under the care they provide. The scientific foundation of dental care should be

evidence-based dentistry will require significant policy changes that should be made by schools of dentistry, research funding organizations, dental insurance companies, government agencies, and dental practitioners.

The change must start first in schools of dentistry where there is currently a clear separation between clinical practice and research. Leaders of dental education should develop programs and organizational systems that provide the most current and rel-

Translation of research or findings from evidence-based reviews into practice will require changes in the way dental insurance companies pay for dental care.

systematically assembled, synthesized, and summarized.

Additionally, dentists like other health professionals, have "tacit knowledge," which is defined as information that is learned through practice (Chambers, 1998b). This experiential knowledge is very valuable and complements the mechanical skills that dentists develop during their practice of dentistry. Professional experience is very valuable when applying findings from systematic reviews and when guidelines or standards of care are developed. The practice of evidence-based dentistry does not discount professional experience; rather it integrates it with the use of best evidence from clinical care research.

Policy Implications

The foregoing discussion has highlighted the need for change in dental education, research, and practice, a change that is based on analysis of "what we know and what we do not know" in the scientific foundation of dental care. We contend that adopting

evant evidence to dental students. Systematic reviews can provide a dynamic forum for providing the most current content in the science of dental care. They could also be used to form recommendations for clinical education of dental students. The most important task of dental education is to prepare future dentists with life-long learning skills and with the ability to evaluate and use information to create new knowledge for the benefit of patients and communities. Developing and implementing a cadre of clinical faculty capable of conducting systematic reviews and translating the findings into teaching and practice will require changes in tenure and promotion guidelines, didactic and clinical curricula, and faculty development programs.

The dental research community in the U.S. has focused on finding answers to basic science research questions. Translation of research findings into clinical practice has had a low priority. The approach described in this paper will require diversification of

the focus of dental research to find answers for clinical and patient-relevant questions or problems. This will require developing new methods for identifying research priorities at the National Institute for Dental and Craniofacial Research, review and funding of clinically or patient-oriented questions and proposals, and translation of research into practice.

Translation of research or findings from evidence-based reviews into practice will require changes in the way dental insurance companies pay for dental care. Evidence-based dentistry will introduce a new factor that should be used in deciding on the services to be included in a dental insurance plan: the evidence for effectiveness. Change introduced by practicing evidence-based dentistry may increase the efficiency of dental care and eliminate the need for interference by dental insurance companies into dental practice because the guiding principles for all decisions related to dental care would be based on the "evidence" rather than on financial or professional considerations. If the evidence is inconclusive or non-existent, then collective professional experiences should be used to define the "standard of care" until evidence from controlled scientific studies becomes available.

For the American College of Dentists, evidence-based dentistry provides an opportunity to lead in a new area in health care that most likely will grow in response to public demand, government and political support, and the current wide accessibility of medical information. The College could follow the footsteps of the American College of Physicians (ACP) that has been actively promoting evidence-based medicine in its *ACP Journal Club* and in two new journals entitled *Evidence-Based Medicine* and *Effective Clinical Practice*. The American College of Physicians has also been active in promoting evi-

dence-based medicine by nominating topics for systematic reviews by the twelve Evidence-based Practice Centers sponsored by the Agency for Health Care Policy and Research and has so far submitted twelve clinical practice guidelines to the National Guideline Clearinghouse (NGC), a service developed by AHCPR in partnership with the American Medical Association (AMA) and the American Association of Health Plans (AAHP). (Out of the three hundred and thirty-four guidelines currently included in the NGC only seventeen guidelines are related to oral/dental health).

Given the current activities in evidence-based medicine led by major professional organizations like the American College of Physicians and the financial support provided by AHCPR and soon by NIDCR, we contend that the dental profession and the American College of Dentists is now at a crossroads. Either they join the movement for evidence-based health care or they stay isolated from it. This decision will influence the organization of dental education and dental practice well into the 21st century.

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Conditions and Tools for Evidence-Based Dental Practice

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Abstract

Before evidence-based dentistry becomes a norm in practice, several conditions must be met. These include an attitude of questioning authority and training in how to use the literature, a supportive environment from colleagues and practice-based research. Some new tools—in the form of journals with more user-friendly formats and direct access to databases—are also necessary.

Introduction

“Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means *integrating individual clinical expertise with the best available external clinical evidence* from systematic clinical research” (Sackett, Richardson, Rosenberg, & Haynes, 1997) (emphases added). One could merely substitute “dentistry” for “medicine” in order to define evidence-based dentistry.

I assume that evidence-based dentistry would benefit most patients and, therefore, that evidence-based dentistry would justify the additional effort required of clinical dentists. This additional effort would include the efficient searching of the clinical research literature and the application

of formal rules of evidence in order to evaluate and apply this literature in support of the care of individual patients.

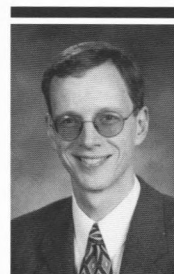
In my opinion, the conditions and tools necessary for an evidence-based dental practice are unavailable to today's typical clinician. These conditions and tools follow from the emphasized phrases above. “Integrating individual clinical expertise” implies that clinicians must possess the skill to find, evaluate, and then apply the results of clinical research appropriately to the needs of individual patients. These skills are not a core part of most dentists' training, and the acquisition of these skills will require clinician training and an environment described in “conditions” below. “Best available external clinical evidence” has been well described by criteria published by the Evidence-Based Medicine Working Group (see sidebar). The section below entitled “tools” identifies the information products and services that should help dentists retrieve and use this “best available” evidence.

The conditions and tools described below are within the current capability of dental predoctoral and postdoctoral education, dental research, publishing, and information technology. Similar conditions and tools are currently available for physicians, and adapting them to dentistry will require only perspiration, not inspiration.

Conditions

Some of the conditions for evidence-based dentistry should exist within individual clinicians. These internal conditions will require a modification in the training of these clinicians.

Dentists should be trained to use their professional development time efficiently. They should learn to assume more personal responsibility for finding, independently evaluating, and using the evidence for their clinical actions. Dentists who take this responsibility will more frequently question traditional authorities such as textbooks, journals, and continuing education speakers. They will more readily avoid not-yet-ready-for-clinical-application study designs such as case reports, case series, noncontrolled prospective therapeutic studies, and most laboratory studies of dental materials and methods. They will seek to reserve some current-awareness reading time for journal articles that meet



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only the most stringent rules of evidence. They will reserve additional reading time to track down the answers to clinical questions generated in their daily practices. Until dentists are willing and equipped to use their time in this way, evidence-based dentistry will be only a goal, not an achievement.

Dentists currently compare and evaluate many aspects of clinical practice, such as dental materials, surgical procedures, instruments, equipment, and medicaments. However, the criteria they use for this comparison may not include the rules of evidence which distinguish evidence-based clinical care. The problem here lies in the preparation of dentists rather than in their motivation. I do not believe that dental schools nor continuing education programs have consistently and adequately prepared dentists independently and efficiently consume the journal literature. Evidence-based dental practice requires dentists to independently judge the strength of evidence upon which a new (or old!) clinical practice is based. This preparation for evidence-based practice would liberate dentists from dependence upon continuing education speakers, famous textbooks, and "how we were trained in school." This preparation would also enable dentists to better evaluate, and very selectively use, the primary journal literature. Such training could build upon the in-

External conditions to support evidence-based dentistry would provide an environment for collegial support. Dentists would need such support in unlearning their reliance on traditional textbooks and in the ways in which they use the journal literature. In few instances would they be able to rely upon the results of randomized controlled trials with true outcomes,

not only to test the generalizability to private practice of research conducted under more "ideal conditions," but could also emphasize to the participating clinicians the usefulness and challenge of the conduct of research.

A final condition that could enhance the evidence-based practice, and encourage the application of research results in an individualized manner,

Practice-based research networks could attempt to replicate institutional clinical research in the setting of private practices.

but in most cases they would have to rely on the "grayer" results of less strong clinical studies. Confident navigation of these waters would be enhanced by a network of professional colleagues. A professional network of colleagues who use the same principles in their own practices would encourage and reinforce the use of evidence-based care. Such networks, in the form of study clubs and e-mail listservs, already exist. These networks could begin to incorporate the evidence-based approach in the selection and evaluation of study topics and materials.

Another external condition that could support the practice of evidence-based dentistry would be prac-

would be a framework for conducting n-of-1 trials. By "framework" I mean a published set of ethical and procedural criteria that would make clear to both dentists and patients the clinical circumstances in which experimentation may be conducted, and the patient-clinician communications and understandings required in advance. Of course dentists and patients experiment already in some circumstances, but a more rigorous n-of-1 setting would make more explicit to all parties the conditions under which such experimentation is acceptable and, significantly, the conditions under which such experimentation is unacceptable, and why.

When these internal and external conditions are in place, the tools described below should have a substantial market.

Tools

Unfortunately, today's journals generally do not provide adequate access to the "best available evidence" in an optimal format. Dentists need a derivative, evidence-based journal to bring to their attention the highest quality evidence relevant to dental practice, regardless of which primary journal originally publishes this evidence. Such a publication would help dentists to stay current with a minimum of reading. This journal would provide third-party-written, struc-

Today's journals generally do not provide adequate access to the "best available evidence" in an optimal format.

dependence of thought which characterizes the typical private practitioner, and channel that independence in a way most advantageous to his or her patients.

In summary, the internal conditions for evidence-based dental practice consist of both authority-questioning attitudes and literature-searching-and-evaluating habits and skills.

tice-based research networks. Practice-based research networks could attempt to replicate institutional clinical research in private practices, when feasible, in order to test the generalizability of such institutional research. These networks could be organized by geographic region or by topical focus. In either case practice-based research networks could serve

tured abstracts of recently published studies that meet evidence-based selection criteria. *Evidence-Based Dentistry*, a supplement to the *British Dental Journal* introduced late in 1998, promises to be such a publication. In medicine such models include *ACP Journal Club* and *Evidence-Based Medicine*. The editors of such a publication could scan many more journals from the dental and medical literature than any single dentist could afford to scan. With the great dispersion of clinical knowledge relevant to dentistry among so many journals, an editorial team casting such a wide net could bring many significant findings to the dentist's attention. Such a secondary publication would save substantial reading time because the editors would abstract and present the

principles. For example, the back issues of several years of an evidence-based secondary journal could begin to meet this criterion. Alternatively, a larger database such as MEDLINE could be filtered for high-yield articles which meet the stringent rules of evidence. Currently this may be pursued using the research methodology filters described by Haynes and colleagues (1994). Perhaps someday the systematic reviews provided by the Oral Health Group of the Cochrane Collaboration will provide such a resource, but this project is currently in its very early stages.

If textbooks are to be used in an evidence-based practice, they should be issued with frequent, at least annual, updates. Furthermore these textbooks should explicitly state the au-

The primary reliance is upon rules of evidence rather than upon the source of any particular piece of evidence.

results of only studies that met evidence-based criteria, distinguishing this publication from traditional secondary dental journals. Expert commentary accompanying each abstract would raise the critical issues in applying the results of the study to individual patients. Such a journal would be relatively slim. Relatively few papers published in dental research, and medical journal articles applicable to dentistry, are sufficiently strong evidence to meet the evidence-based criteria.

A second tool would be an easy-to-search database designed to enable dentists to find answers from the best available evidence, immediately, to clinical questions as they arise in practice. The MEDLINE database, now freely available to any Internet user, contains the "best evidence" but contains so much more than this that it is unwieldy for daily, rapid clinical use. We need a more limited database indexed according to evidence-based

thors' criteria for the inclusion and exclusion of the underlying evidence so that the interested reader could independently consider the authors' decisions and, in so doing, learn more about the topic and also factor in his or her own clinical experience. The rules for assembling a textbook would be the same as the rules for assembling an evidence-based systematic review article.

The Horse Before the Cart

Evidence-based dentistry need not and should not depend upon guidelines developed by organizations. Our government, professional societies, and health funding organizations all offer such guidelines now and are likely to publish more guidelines in the future (see sidebar). For example, the U.S. Agency for Health Care Policy and Research has announced funding for research "related to implementing evidence-based tool and information in diverse health care settings among

Using the Internet to Get Started on Evidence-Based Dentistry

Users Guides to the Medical Literature: <http://hiru.mcmaster.ca/ebm/userguid/>

Evidence-Based Dentistry home page: <http://www.ihs.ox.ac.uk/ced/ebdj.htm>

ACP Journal Club overview: <http://hiru.mcmaster.ca/acpj/>

Evidence-Based Medicine overview: <http://hiru.mcmaster.ca/ebmj/>

Filters available for online use with the PubMed database: <http://www.ncbi.nlm.nih.gov/PubMed/clinical.html>

The Cochrane Collaboration: <http://www.hiru.mcmaster.ca/cochrane/>

How to Use an Overview: http://hiru.mcmaster.ca/ebm/userguid/6_over.htm

U.S. Agency for Health Care Policy and Research; Translating Research into Practice: <http://www.ahrpr.gov/fund/hs990003.htm>

National Guideline Clearinghouse: <http://www.guidelines.gov/>

practitioners.” This same AHCPR has posted evidence-based clinical practice guidelines at the National Guideline Clearinghouse site. Although such guidelines could be useful for evidence-based practice, I doubt that the typical independent-minded dentist will routinely seek guidance from them. Furthermore, I believe it will be detrimental to the goal of attaining widespread evidence-based practice to equate evidence-based practice with the application of practice guidelines, for two reasons. First, “practice guidelines” carry negative connotations for some practitioners. Second, dentists should be trained in independent evaluation of all evidence—including the independent evaluation of guidelines—so that

the primary reliance is upon rules of evidence rather than upon the source of any particular piece of evidence.

Dentists who are motivated and trained to independently find, evaluate, select, and apply the best evidence on behalf of their patients, and who possess appropriate information access tools, will ultimately prove or disprove my assumption that evidence-based practice is worth the extra effort.

“And further, my son, be admonished by these. Of making many books there is no end, and much study is wearisome to the flesh”—Ecclesiastes 12:12. Certainly dental research has resulted in the making of “many books.” Fortunately, evidence-based dentistry offers the con-

scientious dentist a release from “much study” by giving him or her responsibility for only the relatively small amount of “best evidence” from among the abundance of the dental literature.

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Evidence-Based Dentistry: A Practitioner's Perspective

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Abstract

Basing practice decisions on evidence is neither contestable nor new. There are some concerns, however, that must be addressed. First, all published "evidence" is not of equal quality. Second, the practical experience of dentists must be recognized as constituting evidence. Additionally, third parties should not be allowed to use evidence if that use interferes with practitioners' judgment. Fourth, the call for more evidence may place a burden on dental schools already struggling to keep up with their demands of teaching basic dental skills. The Dental Practice Parameters developed by the ADA may provide a more realistic alternative because they preserve practitioner discretion.

Evidence-Based Dentistry. What is it and what does it mean to the practitioner of the dental arts and science? Evidence-based dentistry is the "new" concept being bandied about in academia and in dental literature. The basic tenet of evidence-based dentistry is valid: dentistry should be able to justify, scientifically, the treatment rendered for a given condition. Evidence-based dentistry is a call for the profession to do just that. Presently many healthcare decisions are based principally on values and resources-opinion-

based decision-making; little attention has been given or is paid to evidence derived from research—the scientific factor (Muir, 1996). It is the goal of evidence-based dentistry that every decision one makes in practice is supported in scientific literature. A lofty goal indeed. Evidence-based dentistry is "The conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (Lawrence, 1998, p. 2).

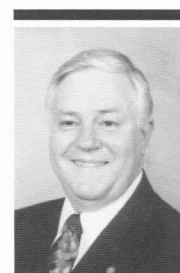
Evidence-based dentistry is not new. Evidence-based practice is not unlike the way we practice today. Each of us in deciding what is the best treatment for a given situation relies on the experience that we have received didactically and in clinical situations. The criticism of this method is the "quality of the evidence" on which those decisions are based. The techniques will vary somewhat because of the variety of methods and the biases found within the educational system. Individual faculty members at the same institution may have developed a personal technique for accomplishing a given procedure and this technique may vary from the technique taught in the pre-clinical course. Much of the information pertaining to dental materials from which decisions are made is obtained from dental manufacturers who promote techniques that use their products. The reliability of such information is biased and therefore would not neces-

sarily be the best "evidence" on which to make a treatment decision. The same would be true for the information that is distributed by the supply company representatives.

Strict adherence to evidence-based dentistry does not take into consideration the experience of the dentist delivering the treatment. In reality, every procedure that an individual dentist has performed, every patient that the dentist has encountered, every lecture the dentist has attended, every conversation with a colleague about a technique or a diagnosis is a part of the individual dentist's bank of evidence. Even the techniques or therapies that didn't work are a part of the evidence bank from which the dentist can withdraw knowledge.

How Practical is Evidence-Based Dentistry?

Graduation from a dental school is only the beginning of the dental education. Dentists must be committed to the continual improvement of skills and knowledge through lifelong



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learning. Continuing education courses abound. Currently over two million biomedical articles are published in approximately twenty thousand journals. About five hundred of those journals are related to dentistry (Lawrence, 1998). "To read all of the available dental journals would take one hundred seventy-five days if we spent fifteen minutes (the shortest time *British Dental Journal* readers said they spent reading the journal),

A major difficulty is getting dentists to read.

per journal and one hour per day reading them. Fifteen minutes per journal is sufficient time to find [and] identify any important paper but whether it is sufficient to understand them is quite another matter" (Richards, 1998, p. 22). The recommendation then is that abstracts of the articles be printed accompanied by an expert commentary. This would allow the dentists to peruse multiple articles in a short period of time. One difficulty in reading some of the journals is that they are so research oriented that the practical application of the research is lost in the language of research.

A major difficulty is getting dentists to read. However, if the dentist should take the time to search for the "evidence" that is only the beginning. "A number of publications that are widely read in dentistry are not subject to peer review and even where they are there is the tendency for publication bias. This bias may not be explicit but there is a tendency both by the researchers and editors to publish positive reviews. Negative trials can be equally valuable, and concerns have been raised that increasing sponsorship of medical trials by commercial concerns could result in non-publication of negative or unhelpful findings" (Lawrence & Richards, 1998, p. 7).

Other than journals, evidence can be obtained from a textbook, a colleague, or in a bibliographical database such as MEDLINE or the Cochrane Database of Systematic Reviews. When a colleague is asked, or the literature has been searched, one will find that experts often disagree. The colleague may not be up to date in that particular area of the subject, or may not agree with the latest evidence. Textbooks are only as current as the most recent reference contained therein; one can usually find another text written by another expert that has a different opinion. Databases must be updated regularly to ensure that the content is current.

There are some sources of information which the practicing dentist can readily use. *Dental Abstracts*, and *The Yearbook of Dentistry* are sources that print abstracts of articles related to dentistry. Should the dentist then want more information, the entire article can be obtained. Two widely known sources are the *Newsletter* from Clinical Research Associates and *Reality*. Both of these publications give practical, useful information about dental materials and some techniques. The presentations are relatively short and without prejudice for or against manufacturers. The information is presented in an easy-to-read format that does not overwhelm the

from the front line health workers and not from bureaucrats, physicists or statisticians. This implies further that the ideal environment for producing evidence-based research is the general dental practice, not in the dental schools, not in the laboratories, and not in institutions...Evidence-based dentistry is much more than randomized controlled trials, and must always be regarded as an adjunct to, and not as a substitute for, sound clinical judgment and patient preferences" (Jokstad, 1998). This methodology follows closely the recommended protocol for evidence-based dentistry (Lawrence, 1998).

Dental specialty groups and groups with special areas of interest have one or more journals that focus on specific areas of dentistry. Another source of information is a thorough search of the literature by the staff of the American Dental Association Library. The ADA Library provides literature searches at a very reasonable cost for members of the American Dental Association. ADA members can also access the ADA web page to conduct their own searches.

Even though the information base in dentistry is not adequate to support a strict application of evidence-based dentistry, there is an abundance of information available. The information is accessible, but it is up to the

It is difficult to document the need for evidence-based dentistry.

practitioner with the language of research. These publications are different but they both present the research, the findings, the practical application and a commentary on the article. Both publications use members of the practicing community to help conduct their research. "The experts on clinical dentistry are, and have always been the clinical practitioners. Basic problem formulations and identification of gray areas should come

individual dentist to determine whether or not the evidence is current and valid. The dentist needs to apply the information collected during the search for evidence. What were the results of the studies? Were the studies valid? Are the likely treatment benefits worth the potential harm and costs? While this may sound like a challenging route to deciding on treatment; it is what clinicians implicitly do each time they administer therapy

(Guyatt, Sackett, & Cook, 1994). After a review of the literature, the information processed and the expected outcomes have been weighed, it must all be considered in the context of the patient's values and concerns.

The move toward evidence-based practice, if it follows the medical model, will further complicate the already crowded academic schedule found in dental schools. Strategies being used in medicine include a weekly, formal academic half-day for residents, devoted to learning the necessary skills (Evidence-Based Medicine Working Group, 1992). There is already an outcry from the dental schools that they can't teach everything they need to teach in the four year curriculum (Field, 1995). That's strange, I remember that I was taught in both undergraduate school and in dental school how to use the resource material available in the texts and in the libraries. I was taught to consult with a colleague when I had an unusual situation. When did the schools stop teaching this? There may be more sources for evidence today but most of today's students have enough knowledge of computers so that the addition of the electronic base of information should not be a difficult barrier for obtaining "evidence."

Potential Abuses of Evidence-Based Dentistry

It is difficult to document the need for evidence-based dentistry. In reality we implicitly use the concept of evidence-based dentistry in every procedure we do. The concept is good and noble. As professionals we have an obligation to remain current and informed. As one of my mentors has said, "Who can be against evidence-based care? What alternative do we have; whimsically-based care?" The problem lies in the potential abuse of the concept by third parties. The model from which evidence-based dentistry is derived is found in medicine. And, surprise of surprises, the impetus is coming from the National Health Service of England, the bas-

tion of socialized medicine. It disturbs me greatly that we in dentistry are not learning from the mistakes made by our colleagues in medicine. I'm beginning to believe that dentists do not have or talk with physician friends. It is my opinion that medicine is a profession in crisis, as it has sold its soul to the socialized programs and third parties. Certainly we should be aware of the failure of socialized medicine throughout the world. Every country that has it is trying to get away from it; yet we in the United States seem to be heading exactly in that direction. A select group of tax-exempt foundations, such as Carnegie, Ford, Rockefeller, and as of late, Pew, have acted in concert to produce the crisis

employee dentists which techniques and treatments will be "acceptable" in their clinics or offices. Evidence-based dentistry then becomes a method of cost containment for the benefit of someone other than the patient. Evidence-based dentistry used in this manner is an abuse of the concept for it eliminates the professional judgment of the attending dentist and the desires of the patient.

With such a potential for abuse, the ownership and the validity of the "evidence" becomes very important. Who will be the anointed one or group that determines which evidence is valid? Who will set the research agenda and determine where the results will be maintained. Who will

It is being done in response to the third parties that have invaded the profession of dentistry.

of which only some form of socialized health-care will remedy.

So what does socialized health-care have to do with evidence based medicine and dentistry? The concept is being promoted, not as a care issue but an issue to contain costs. A further indication that there will likely be abuses of evidence-based dentistry: "With the ever increasing pressure for efficient and cost effective care there is a need to move the process of evidence-based dentistry into all aspects of dental care. This is particularly important with the increasing role that insurance companies are playing in the provision of dental care. They will feel much happier at buying dental procedures which are supported by evidence and likely to produce a good long-term outcome" (Lawrence & Richards, 1998, p. 10). If history is any indication, then insurance companies and government agencies that pay for any portion of a treatment will use "evidence" to determine which procedures they will pay for and which procedures they will not cover. Management groups may dictate to

validate the research? Who will maintain the data base to insure that it is up to date? How will the results be used? Will third parties, "the payers" manipulate their constituent "providers" so that the patients receive only the care that corresponds with the "evidence" the third party chooses to use in order to be "cost effective?"

The dental schools are under great pressure from their parent institutions to justify their existence, both academically and financially. This struggle for survival leaves the dental schools with poor self-esteem and vulnerable to the influences of the foundations that fund research and the parent institution. There are those who believe that a closer alliance with medicine will solve dentistry's problems (Nash, 1995; 1998). It is ironic that this is being called for in academic circles when "In Europe, dentistry was often a specialty of medicine, and all dentists had medical degrees, but the recent trend has been toward separate programs and degrees as found in the United States" (Field, 1995, pp. 106-107). In my opinion,

seeking to integrate dentistry with medicine compounds our problems, it does not solve them. The dental schools may be looking to evidence-based dentistry and outcomes to seek the research funds in order to gain recognition from the parent institution. The "gold-rush" for research funding will result in another path by which the dental education system can and will be controlled by outside influences. If this rush to receive grants for research takes the focus from the true mission of the school, then the quality of dental education may suf-

Finding a Way to Do It Right

The American Dental Association over a period of four years developed a set of Dental Practice Parameters. This document provides professional consensus on appropriate oral health care. These parameters describe the range of acceptable treatment modalities for a given oral condition. The Dental Practice Parameters document could well be referred to as the "Bill of Rights" for the dentist and patient. The parameters are not subject to "standards" of payers and regulatory agencies that may address the narrow

The decision by the attending dentist of what to treat and how to treat is "evidence-based" either implicitly or explicitly.

fer. The American Dental Association policy states that research is important to the mission of a dental school; however there is great truth in the old adage, "He who has the gold, makes the rules." A "research alliance" between a dental school and a foundation to bring forth "evidence" may cause one to question the validity of the research outcome (Lawrence & Richards, 1998).

I feel the profession of dentistry has long embraced evidence-based dentistry. Perhaps we have not had a name for it but it has always been a responsibility of a professional to be a lifelong student. This wave of "evidenced-based" dentistry is being promoted as a new concept and it is being done in response to the third parties that have invaded the profession of dentistry. This is truly the right thing for the wrong reason. If the profession accepts this as a "new concept," it is imperative that the evidence be based on clinical considerations only and not areas of special interest dictated by a third party. In other words, there needs to be a practical application of the concept, not driven by costs.

concerns of financial objectives or the contractual agreement of a benefit plan. The purpose of the ADA parameters is to explicitly present the profession's statement on appropriate oral health care. This has never been more critical than it is in today's health care environment, where a multitude of changes in the delivery and financing of care have the potential to either expand the access to quality care for more people or jeopardize the quality of care for all. The key element throughout this document is the professional judgment of the attending dentist, for a specific patient at a specific time. Since almost every dental condition has a "range" of possible treatment modalities, it remains the professional responsibility of the attending dentist to carefully weigh the unique clinical circumstances, and individual patient preferences in the final decision as to the best treatment for a specific patient at a specific time. The professional judgment of the attending dentist as to the type of treatment, the type of materials used, and the techniques to be used must not be violated or restricted by any third party groups. The decision

by the attending dentist of what to treat and how to treat is "evidence-based" either implicitly or explicitly. Balancing individual patient needs with scientific soundness is a necessary step in providing care.

Evidence-based dentistry must be used to enhance, not interfere with the professional judgment of the attending dentist.

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Evidence-Based Dental Plans: Dentistry's Future is Now

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Abstract

Evidence-based dental practice is defined in terms of systematically collected and analyzed data on treatment outcome. By making this the common ground among dentists, patients, insurers, and others, it is possible to improve both the effectiveness and cost-efficiency of oral health care.

Throughout the past decade, the health care professions have been inundated by a variety of mandates. Government and third-party agencies have raised the bar of medical economics to heights unimagined fifteen years ago. The common denominator of this decade's mandate is, cost containment—almost at any expense. Thus, the establishment of managed care, HMOs, PPOs, and IPAs—society's answer to “run away health costs and spiraling inflation.”

The fee-for-service medical model, a model which has served the nation's health care recipients well for over a century, has come under severe scrutiny and various permutations have been abruptly substituted. Throughout most of the seemingly endless series of modifications to traditional medical practice, the health care practitioners have been forced into prac-

tice modes which oftentimes are foreign to them. Because of the manner by which they were taught while in professional school, many of today's practitioners find great difficulty coping with outside intrusion into the intimacy of their practices. Some fear that their practices are not theirs any longer. Most of them are correct.

The dentist was the center of the universe within the provider and care recipient scenario. The care providers were the wellness advocates for their patients and clients. Health care and service providers have been challenged as to the legitimacy of their advocacy for patients. Their motives for pursuing certain courses of treatment have been challenged, and often treatment plans have been reversed or denied reimbursement by third parties.

The provider community has decried these practices, and suggested that the quality of care being provided was being eroded due to the many restrictions placed upon practitioners. Bottom-line considerations being placed ahead of a patient's legitimate needs have become the mantra of many dentists. Health care providers, quick to criticize the current state of affairs, are nonetheless silent on suggesting viable alternatives to these perceived intrusions.

One reasonable alternative to the burdens which are imposed through managed care plans is the adoption of

evidence-based practice as a practice philosophy. This paper will attempt to answer the questions “What is evidence-based medicine/dentistry?” and “Why haven't we heard about this topic before?” The paper will also explore the influence that evidence-based dental practice is having on reimbursement mechanisms and dental plan purchasers.

Defining Evidence-Based Dental Practice

A working definition of evidence based medicine or dentistry was developed by the Cochrane Collaboration, a group of representatives from nine countries including, seventy-seven investigators, whose aim was to facilitate randomized trials in several areas of health care. Their purpose was to eventually help people to make well-informed decisions about health care. This would be made possible by capturing data on treatment outcomes, and making that information available and accessible to all.



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Evidence-Based Dentistry

The Oxford, England based Cochrane Centre describes evidence based medicine as follows:

"Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. By individual clinical expertise we mean the proficiency and judgment that individual

the evidence based practice of dentistry. Through APHA's position statement, #9706, it has proposed the following:

"The American Public Health Association,

- being aware of the overall changes in prevalence, incidence, and rate of progression of dental caries in the U.S. and other developing countries, and with enhanced understanding of its biology, behavioral associations, diagnosis, and reversal by re-mineralization, and

Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about care of individual patients.

clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in more thoughtful identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care. By best available external clinical evidence we mean clinically relevant research, often from the basic sciences of medicine, but especially patient centered clinical research into the accuracy and precision of diagnostic tests (including the clinical exam), the power of prognostic markers, and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. External clinical evidence both invalidates previously accepted diagnostic tests and treatments and replaces them with new ones that are more powerful, accurate, efficacious and safe" (Chalmers, 1993).

Evidence-based dentistry fits nicely into this definition. Given the relative lack of complexity that dental diagnostics exhibits, the evidence-based practice of dentistry should soon capture many more enthusiastic participants. The American Public Health Association has expressed its views on

- recognizing that in adults most treatment for caries is for re-treatment, and being aware that periodontal disease does not inevitably lead to tooth loss, and is amenable to simpler non-surgical treatments, and
- foreseeing that maintaining greatest integrity of the dentition through minimal treatment intervention enhances tooth retention and oral function over the lifespan, and
- aware of the need for health education of the public to support and utilize community water fluoridation, community oral health services, and personal preventive measures including other fluoride products, dental sealants, diet in accordance with the U.S. Department of Agriculture "food pyramid" guidelines including sugar moderation, personal oral hygiene measures for control of dental plaque as well as limitation of alcohol intake and cessation of tobacco-use to reduce risks of oral, pharyngeal and other cancer, and of periodontal disease, and
- realizing that misapplied fee-for-service systems may promote over-treatment and that poorly designed

capitated systems may lead to under-prevention, and

- realizing that insufficient scientific and professional attention has been given to justification for dental treatments and their health outcomes, despite a growing public awareness of this deficiency, and
- knowing that under-prevention and overtreatment of oral disease involves retreatment and cost escalation throughout the lifetime, to maintain functions of chewing, speech, facial expressive communication, and appearance, and
- realizing that the burden of oral diseases and consequent pain and infection remains significantly higher in those without access to care, and
- concluding that 40% of U.S. adults and children who have inadequate access could improve their accessibility and oral health outcome under more effective public health programs, and that the quality of oral health care generally would benefit from systematic, evidence based review; which is an evaluative process that objectively applies scientific evidence on oral health practices to treatment guidelines and standards, and therefore;
 1. Supports the principle and application of evidence based dental services.
 2. Encourages the collection, review, dissemination, and policy applications of knowledge supporting or negating the efficiency and cost-effectiveness of specific forms of dental care.
 3. Supports the federal agencies such as Health Resources and Services Administration, National Institute for Dental Research, Agency for Health Care Policy And Research, the Centers for Disease Control and Prevention, the Health Care Financing Administration, the Veterans Administration, as well as state health agencies and the health insurance industry in adequately funding systematic

reviews and research projects which provide further evidence of efficiency and cost effectiveness of oral health care,

4. Encourages dental professionals, consumers, private and public health care financing agencies, and state licensing authorities to adopt an evidence-based approach to dental services in order to rationally control costs, help assure quality and favorable outcomes, and extend more affordable dental care to a wider public, and
5. Supports dental care programs for under-served populations and urges their inclusion in evidence based care research and development" (American Public Health Association, 1997).

Magic Bullets

APHA's recommendation, #3, puts forth a challenge to federal agencies, state agencies, the insurance industry, and to dentists through organized dentistry to come together to help make a somewhat flawed system better.

It is obvious that unilateral action on the part of any one of these agencies, without the support of the others, would be and has been doomed to failure. State and federal fiat, industry mandates, and provider obstinacy have been met with dissatisfaction on the part of the health care consumers. All too often, changes in the status-quo, recommended by one of the third- or fourth-party participants, is looked upon as threatening by one or more of the others. The level of distrust that exists, legitimately or illegitimately, among the important participants in this matter has partially paralyzed the process of providing access to appropriately timed and affordable health care to those who most need it. What can be done about this situation? Perhaps adopting the recommendations and plan designs put forth by the American Public Health Association or the Cochrane Collaboration is an answer. Evidence-based-practice could be the answer.

A new-wave of dental plans is on the horizon—plans having evidence-based practice at their core. Given the negative environment which surrounds managed care, alternatives to the traditional managed care plans are now being requested by plan purchasers. No longer is cost the sole motivating factor in dental plan selection. Employers are demanding value-added plans.

A value-added plan might be one which, along with cost reduction, provides evidence of measurable health benefits to the plan participants. Treatment outcome measurement is the "sizzle" that many plan purchasers are demanding these days. Purchasers have begun to shift the quality of care paradigm from NCQA's indicators, practice accessibility, liability insurance, CDC and OSHA compliance, to that provided by evidence-based practice, measurable clinical evidence. Along with concerns about increased premium costs, plan purchasers have begun to voice their demands in the area of cost-to-health-benefit ratios. Employers are interested in seeing proof that their employee health dollar is providing a

benefit whenever they demonstrate a positive attitude about their dental care. Insured members are expected to participate in their return to a "maintenance level" of dental health before they can enjoy proportionately higher insurance benefits for premium dental services, usually with lower co-payments.

Accountability also filters down to the employer/purchaser level. Plan purchasers are expected to promote the concept of wellness amongst their employees. Management must commit to a multi-year contract when evidence-based practice is the mode through which insured members are treated. The reason for a multi-year contract—usually at least three-years at the outset—is the fact that adverse selection would be anticipated and the longer time period compensates for this. A value-added plan based around evidence-based practice permits dental premiums to be reduced, and as a consequence insured members, perhaps with "stockpiled" dental needs, will have increased opportunities for accessing dental care. The initial year could involve higher utilization rates,

Health care providers, quick to criticize the current state of affairs, are nonetheless silent on suggesting viable alternatives to these perceived intrusions.

positive health benefit to the employee, and they want statistically valid evidence.

Another factor that must be considered in the value-added dental insurance plan scenario is that of accountability. Employees are expected to assume more of the risk in the new value-added dental insurance plan. Often, that risk assumption centers on greater premium cost sharing on the part of the employee. The new accountability paradigm also involves employees' increased role in prevention and healthy lifestyle practices. Employees are promised richer insur-

and consequently higher cost profiles. Subsequent years would demonstrate a lessening of adverse selection costs as dental health maintenance levels are reached by the insured members. A leveling-off of utilization rates can be anticipated in years two and three, and a subsequent moderation of costs to the contract. Employer/purchasers must assume the burden of continuing with the plan while enjoying the benefits of a healthy and happy workforce.

Dentists are also held accountable through dental insurance plans characterized by evidence-based practices.

Dentists are responsible for identifying legitimate and valid dental needs of their patients. Using a standardized diagnostic regimen, dentists collect diagnostic data from the individual patient. That data is used to determine a numerical "score" which indicates a patient's level of wellness at that point in time. Along with the score, negative dental health conditions have been identified which must be addressed in a priority fashion. Dental treatments, proposed to be performed out of priority sequence would be discouraged. Outright denial of benefits or severely reduced benefits would be a consequence of

collection and tabulation of clinical data can mitigate the necessity of intensive claim review. The numbers of professional review staff can be made more efficient. Subsequent reduction of related administrative overhead costs will be realized. Scientifically designed reimbursement plans will have more realistic premiums.

While evidence-based practice is essentially an evolutionary process in medical/dental care delivery, it is viewed by some as revolutionary, and consequently, something to be feared. There is a palpable feeling of mistrust between plan purchasers, insurers, providers, and regulators of care. Most feel

able to gather large volumes of practice related data, including diagnostic findings, treatment plan development, treatments performed, treatment timeframe, and treatment outcome. Costs and practice efficiencies can be calculated and projected on the individual basis as well as for a given population.

Merely collecting and recording data is not enough. Collection of data without a refined protocol directing its digestion and analysis can be and is a fruitless endeavor. Misdirected use of collected data can diminish the value of plans which associate themselves with evidence-based practice.

Wellness Scoring: There are programs today which establish "wellness scores" for individual patients. These scores relate, on a gross scale, to the relative level of dental wellness which a given patient enjoys as it relates to an arbitrarily designated score of 100. Observed dental maladies are given a number, and that number is subtracted from the 100, or ideal wellness score. Some programs catalogue the dental maladies as to degrees of severity and numbers of instances. The collection of these data, in this format, requires that data collection personnel be trained in a uniform manner. Without uniformity, inaccuracies and operator prejudices can go unnoticed. Shoddy examination practices which diminish the value of the process must be prevented at the design stage. Those using uniform examination and reporting practices in an evidence-based practice environment could experience some economic burden as they attempt to preclude these shoddy practices. It costs more to adequately train personnel at the outset, but the rewards for appropriate training practices are manifold.

Using Indices: Another health status assessment program produces indices, or indicators of wellness. Within this program, factors contributing to an individual patient's level of "dental-unwellness" are chronicled. In one version, eight components of a person's dental health profile have been determined. Oral pathology, habits,

*P*lan purchasers have begun to voice their demands in the area of cost-to-health-benefit ratios.

out-of-sequence or inappropriate treatments by the dentists. The dentist would be responsible for collecting clinical data—procedure codes and perhaps even diagnostic codes—and specific techniques and materials used in patient treatment for subsequent clinical practice profiling purposes. This permits the identification of clinically effective and cost efficient practices used in the individual patient's treatment history. While some fee-for-service plans entice over-treatment, DHMOs and PPOs often are accused of fostering under-treatment. Practicing to the standard of care in an evidence-based practice reduces both of these excesses, whichever practice mode is being used, fee-for-service or managed care variations.

The insurance carrier also has a stake in this rearrangement of accountability. The carrier will enjoy the value of collecting clinical data at the individual insured's level. Treatment frequency guidelines and utilization guidelines, collected on a population basis, rather than on the individual level, will be deemed arbitrary and clinically meaningless and will be discarded. The methods used in the

that their own method for leveling the playing field is best where health care cost containment is concerned.

Individual Group Data: Evidence-based dental practice has health care data collection as its life-source. The collection and evaluation of health care related data, on an individual patient basis, is what makes evidence-based dental practice unique and most effective. Collection of data on an individual basis seems to fly in the face of traditional wisdom, since guidelines for healthcare delivery have been drawn along the lines of general good versus individual good. In other words, treatment that is generally best does not translate into its being best for every individual patient. Are treatment decisions, made along generally accepted treatment guidelines, fair and appropriate for every person? Some would say not.

Use of Technology: Another factor that must be considered is advanced technology in data collection and analysis. The age of medical/dental informatics is upon us. We have the capacity to collect and digest enormous quantities of data because of high-end computer technology. Presently, we are

tempero-mandibular disfunction, cosmetics, occlusion, restorative, and periodontal status are the main areas which comprise an individual's dental health status. Each of the eight components have been weighted against one another for purposes of assigning an order of importance or merit.

It is assumed that negative dental health factors would be addressed in a priority fashion based on the order of merit theory—treat the most health-threatening disorders first. Given the development and availability of an index such as this, inappropriate and out-of-sequence treatment plans can be identified. Costs for unnecessary or inappropriate treatments, for the dental health status being reported, would be eliminated. This program supports evidence-based dental practice in its purest form.

Implementing Evidence-Based Dental Practice

Beyond the tabulation of specific dental maladies, such an index permits the collection and analysis of treatment plans and utilization patterns reported in patient treatment episodes. Length of time for return to "optimal health status" can be calculated on an individual and a population basis. It is obvious that treatment efficiencies and cost efficiencies are readily identified within a program which has a wellness index format. When integral to a dental reimbursement plan, the index plan promotes insurance premium development in a scientific manner.

An index plan is used primarily in an infomatics atmosphere, where high speed data transmission and analysis has proven its value. The individual patient's health status data collection process can be performed manually, as well, using hard copy diagnostic and clinical records.

Proprietary companies have produced dental office management systems for many years. One important adjunct to the office management software package has been the computer-based patient record. There are more than two hundred and fifty

companies that produce some form of dental office management system. Few connect a computer-based patient record to their base product. Fewer still provide a computer-based clinical record to their clients. Those who do have a computer-based clinical record as part of their system, enjoy a significant time advantage in satisfying the demands of industry, as in giving us concise reports which show the cost-efficiencies in a program, and show us the cost-to-health-benefit ratio as well.

It must be recognized that the dental model of health care delivery is very different from the medical model. Yet the same questions swirl about both. How can I be sure that I am getting health value for my health dollar? Given the adoption of evidence-based practice, as a practice philosophy, and the use of precise measurement indicators of individual's health needs, those questions can be answered right now.

Dentistry is more amenable to health status assessment and data collection than is medicine because of its relative lack of complexity and the fact

A Message for Tomorrow's Practitioners

With the coming of age of medical infomatics the use of electronic media for the collection and transmission of medical data, many more things are possible in medical and dental care. The collective and collected wisdom of many practitioners, detailing thousands of patient treatment episodes is literally right at our fingertips. There are computer-based patient clinical record software programs which enable hundreds of participating dentists and health care practitioners to chronicle their daily experiences for sharing with other practitioners. Through this medium of communication and data collection, it is possible to identify certain practice options which are more health-effective and cost-efficient than others. With a high degree of probability, certain diagnostic tests and elective treatments can be determined as redundant or inappropriate for the disorder being treated.

Given appropriate programming direction, the collected data can be digested and specific information can be extracted from the data base. Doctors

Are treatment decisions, made along generally accepted treatment guidelines, fair and appropriate for every person?

that dentists have been reporting data to payment agencies for decades. Dentists have been blessed with fewer procedure codes to be used in reporting services rendered and performed than have our medical colleagues.

Surveys indicate that over 70% of dental offices have modem capacity and CD-Rom capability. Dentists, due to their practice modes and ability to alter their delivery systems without diminishing the quality of their end product, are uniquely positioned to adopt evidence-based dental practice as their professional way of life.

of medicine and dentistry, having been inured to the numerical coding of disease entities, fall comfortably into the role of electronic data exchangers. Data analysts, viewing raw numerical data, obviate the concern about operator prejudice when drawing observations from the collected data.

Reducing the incidences of inappropriate diagnostic testing and patient treatment permits an insurance based program to be more cost efficient. The resultant ability to safely reduce premiums can make comprehensive health plans more affordable and accessible to many more persons re-

quiring care. Dentists and other health care practitioners can accurately document the health efficiencies that their treatment has caused and can demonstrate positive cost-to-health-care-benefit ratios.

The dental disease as a procedure code model is approached from a technique-based learning experience. A diagnosed dental condition is most often afforded several treatment options. Occasionally, the treatment option chosen is the one with which the dentist has had the most success and trouble-free experience. Post-operative sequella are minimal when this technique has been employed, therefore it enjoys favored-technique status. Another technique or choice of materials might be equally beneficial to the patient's treatment regimen or the patient's dental needs.

Given the fact that general dentists routinely perform procedures for which specialists have been extensively trained, it is often the complexity of the treatment or technique rather than severity of the disease that causes the dentist to refer the patient elsewhere for specialist treatment. Operator

preference can have a significant effect on dental health care costs and treatment outcomes when evidence-based dental practice is not employed. Mis-sequenced treatment is also identified as being causative in instances of negative treatment outcomes.

The American Public Health Association's assertion that, "insufficient scientific and professional attention has been given to justification for dental treatments and their health outcomes" falls short of observing that poorly sequenced treatment of dental disease conditions should be held culpable as well. The finger-pointing that has become commonplace in the heated debate between the dental professional, the insurance company, the patient/consumer, and sometimes the government, is a time-consuming waste. These players need to come together if the solution to scientifically provided health care is to be realized. It is to everyone's advantage that they do so.

The patient/consumer can realize more effective and cost-efficient oral health care. The dentists can rest assured that the treatments performed

are scientifically sound and proven to be efficacious. The insurers can reward the elimination of redundant and inappropriate treatments by lowering premiums. And the government can direct more under-insured citizens toward accessible and affordable dental health care.

Not once in the preceding paragraphs was the term quality care mentioned. A positive or beneficial treatment outcome might appear to some to equate with quality care. A positive or beneficial treatment outcome, derived by means of an evidence-based practice, where statistical and scientific evidence corroborates its delivery, is truly quality managed dental care.

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Practical Approach to Evidence-Based Management of Caries

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Abstract

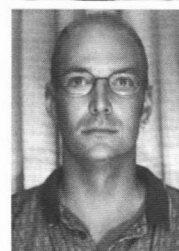
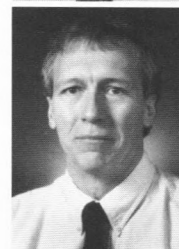
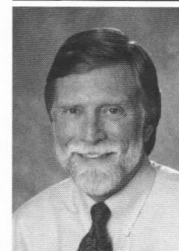
This paper discusses evidence-based management of dental caries with regard to: (1) need to adopt new office methods, (2) potential barriers to change, and (3) possible practical solutions to aid change. The need for classifying individual patients into low-, medium-, and high-risk caries groups is justified from a review of the epidemiological characteristics of caries. In addition, a deficiency is identified in traditional caries recording methods since they are unable to grade the severity and activity of individual lesions. The traditional basis of six-monthly recall examinations for all patients is shown from the literature to have no scientific support. It is suggested a three-twelve month recall interval be used, depending on a patient's risk group classification. Some barriers to change are identified as: (1) the collection of more comprehensive history and clinical caries data, (2) the complexity of evidence-based decision-making, and (3) dentists' difficulty in standardizing decision-making. A new pictorial classification for caries severity and activity is described. A demonstration decision-support system is presented in terms of assisting collection of data, automatic identification of risk factors, patient risk classification, and generation of a suggested treatment plan. Evidence-based management may result in change of professional manpower levels.

The accompanying papers have discussed the need for the use of evidence-based methods for improving oral health care. The purpose of this paper is to discuss: (1) the changes which are needed to adopt evidence-based methods, (2) barriers to change, and (3) possible solutions to assist in changing work practices. To limit the scope of the paper, we will concentrate on the application of evidence-based methods to caries management.

Changes Needed in Work Practices

Despite the significant decline in caries during the last twenty-five years (Petersson, & Bratthall, 1996), the disease should not be thought of as having been conquered (Bowen, 1999). Although 50% of children aged twelve in the USA have caries-free adult teeth (National Institute of Dental Research, 1989), by the age of seventeen this decreases to 33% of adolescents (Kaste, Selwitz, Oldakowski, et al, 1996). With increasing age, almost 95% of adults have experienced one or more carious lesions (National Institute of Dental Research, 1989). However, most people develop few lesions over a lifetime. Only 25% of the children and adolescents aged five to seventeen account for 80% of caries in permanent teeth. To put it another way, the majority of people suffer

from very few lesions during their lives. Even the development of a smooth surface lesion does not mean



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the disease will definitely progress since in one study, 40% of smooth surface lesions in seven-to-nine-year-olds remineralized to sound (Ismail, Brodeur, Gagnon, et al, 1992). If the lesion does not repair itself, then progression is usually slow. In a group of adult teeth radiographically surveyed over ten years, only 20% of the interproximal lesions at the baseline examination would reach the junction between the outer and middle one thirds of dentin, requiring restoration

in one year, or for an adult over three years, would be **none** for the **low** risk group (approximately 70% of population), **one** for the **medium** risk group (10% of population), or **two or more** for the **high** risk group (20% of population) (American Dental Association, 1995). Therefore, for low risk individuals who form the majority of our patients, there is no scientific support for their six-monthly attendance and a yearly recall would provide the same out-

compliance (American Dental Association, 1995; Dodds & Suddick, 1995; Hausen, 1997; Pitts, 1998). The collection of risk factor data is simple to perform and could be delegated to a hygienist.

Some dental schools still provide traditional teaching that enamel lesions or shallow dentin radiolucencies should be restored (American Association of Dental Schools, 1995). However, the scientific literature has shown that non-cavitated enamel lesions and outer one third dentin radiolucencies have the potential to remineralize and should not be restored in low or medium risk people (Benn & Meltzer, 1996; Burke & Wilson, 1998). Indeed, an eleven-year longitudinal study of seventy-five large occlusal cavitated lesions showed that soft dentin caries, with a caries free enamel margin, can be safely sealed in preventing lesion progression (Mertz-Fairhurst, Curtis, Ergle, Rueggeberg, & Adair, 1998). The evidence is demonstrating that conventional early operative treatment is wrong (Benn & Meltzer, 1996; Burke & Wilson, 1998; Mertz-Fairhurst, Curtis, Ergle, Rueggeberg, & Adair, 1998). The emphasis should now change in dental offices from immediate surgical removal of carious tissue to risk assess-

The evidence is demonstrating that conventional early operative treatment is wrong .

(Berkey, Douglass, Valechovic, & Chauncey, 1988; Schwartz, Grondahl, Pliskin, & Boffa, 1984; Wikner, 1993).

From the preceding paragraph, there is evidence in the literature to show that individuals experience different degrees of caries attack (incidence) and progression rates. As a consequence, the population can be divided into three different groups for risk of developing new or recurrent caries: low, medium, and high (Table 1). The expected incidence of new lesions for a child or adolescent

come (American Dental Association, 1995; Sheiham, 1977).

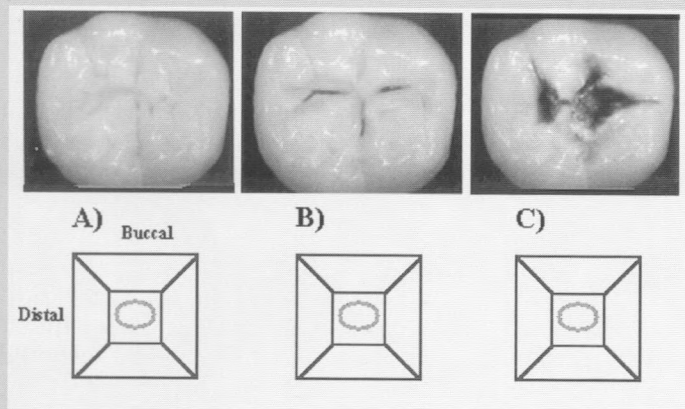
To classify a patient into one of the risk categories, it is necessary to identify certain risk factors such as the presence of existing lesions, their depth and change over time, high DMFT index, a restoration placed in the last year, frequent sugar intake, poor oral hygiene, reduced saliva production, inadequate exposure to fluoride, plaque traps around restorations, high *S. mutans* saliva count, and a lack of patient

Table 1. Caries risk group, expected incidence of new lesions, and examination intervals.

Risk Group	Child/Adolescent			Adult		
	New lesions (per year)	Exam intervals		New lesions (per 3 years)	Exam intervals	
		Clinical (months)	X-ray (months)		Clinical (months)	X-ray (months)
LOW	0	12	12-24*	0	12	12-36*
MEDIUM	1	6	6	1	6	6
HIGH	>1	3	6	>1	3	6

* For low risk children the radiographic intervals extend from 12 to 18 to 24 months; for adults, 12, 24, and 36 months.

Figure 1. Caries lesion severity and conventional chart representation.



The photographs show a mandibular molar with: (a) early non-cavitated enamel fissure caries, (b) enamel cavitation with probable dentin involvement, and (c) gross cavitation involving enamel, dentin, and probably pulp. The conventional tooth chart representation is a circle for an occlusal lesion. Notice how the same circle is used to represent the different degrees of tooth destruction, since there is no method for distinguishing between lesions of different severity. (Clinical photographs courtesy of professors Ivar Espelid, Anne Bjög, and Ivar Mjör © 1994 Bergen, Norway).

ment, lesion detection, and monitoring of lesion depth and activity over time. Treatment plans should be devised which vary according to risk estimates. High-risk patients should have their caries infection controlled through modification of their lifestyle and the use of chlorhexidine.

To summarize, the new evidence-based method of working will require patients to have a caries risk assessment producing a risk classification, the recording of lesion severity and activity, a treatment plan with clinical/radiographic intervals which will vary by risk group. The evidence-based management strategy is very different compared to conventional dental practice. What are the practical barriers to adopting these new practices?

Barriers to Change

The barriers can be considered as: (1) collection of data, (2) consistent deci-

sion-making, and (3) the complexity of the decisions.

Collection of data. There is a broad agreement amongst researchers regarding the need to collect a wide range of risk indicators (listed above), from the patient demographics, medi-

Such complex decision-making would be too great for a dentist or supporting staff to perform in a consistent and comfortable manner using a paper system.

cal-, dental-, social-histories, as well as from the clinical examination (American Dental Association, 1995; Brown, 1997; Pitts, 1998). However, there has been little consideration given to the extra time required to collect the data, whose role it should be to collect it, and the validity of the data collected.

To prevent increased staff costs, it may be necessary to develop automated methods. A patient could telephone an office and engage in a computer dialogue, to provide as much as possible of their history directly into a digital chart using speech recognition technology. Current natural language recognition accuracy is approximately 95%, which may reduce receptionist time, even though more data is collected (Brems, Rabin, & Waggett, 1995).

Existing caries charting methods do not record in a systematic way the severity or activity of individual caries lesions (Boozer, 1993; Davis, 1996; Shugars & Shugars, 1995). Usually a lesion is recorded as new or recurrent with the surfaces involved. Ideally a chart record for a single lesion should give you the following information:

- Cavitated or non-cavitated—essential if remineralization is to be attempted.
- The depth of the lesion judged clinically as enamel only, enamel and dentin, or enamel, dentin, and pulp—the depth is one factor in determining whether monitoring alone, fissure sealants, restorations, or endodontic therapy is needed.
- The lesion activity as progressing, static, or remineralizing—superficial static/remineralizing lesions may be monitored while deeper progressing lesions will require restoration (Benn, Dankel, Clark, Lesser, & Bridgwater, 1997).

- The radiographic depth divided into outer and inner halves of enamel and the dentin into thirds (Benn, Dankel, Kostewicz, Evan, & Blaser, 1999; Benn & Meltzer, 1996)—to allow monitoring of lesion activity so that shallow lesions can remain unrestored (Benn, 1993) preventing

Figure 2. Clinical Caries Classification.

CLINICAL CARIES CLASSIFICATION
Click on an icon that matches the observed caries

Sound: No visible caries	White/Brown Spots: Spot - hard/glossy Spot - soft/rough	Non-Cavitated Pits and Fissures: Stained hard/glossy pits and fissures Stained soft/rough pits and fissures								
Cavitation: Small involving enamel only - hard/glossy Small involving enamel only - soft/rough Medium involving dentin - hard/glossy Medium involving dentin - soft Large involving pulp		Non-cavitated Dentin Caries: Non-cavitated dentin - hard surface Non-cavitated dentin - rough surface								
		Root Caries: <table border="1"> <tr> <td>Non-cavitated</td> <td>Cavitated</td> </tr> <tr> <td> Root caries, dentin only - hard</td> <td></td> </tr> <tr> <td> Root caries, dentin only - soft</td> <td></td> </tr> <tr> <td> Root caries, involving pulp</td> <td></td> </tr> </table>	Non-cavitated	Cavitated	Root caries, dentin only - hard		Root caries, dentin only - soft		Root caries, involving pulp	
Non-cavitated	Cavitated									
Root caries, dentin only - hard										
Root caries, dentin only - soft										
Root caries, involving pulp										

A set of pictorial computer icons is shown to represent different stages of lesion severity and activity from various anatomical sites. The icons for coronal lesions show a thin white horizontal band for the oral cavity, a thicker light gray band for enamel, and a darker band for dentin. Root caries lesions have only a thin white band for the oral cavity and a large darker gray region for dentin. For all sites, if a lesion extends into the pulp, it penetrates the dentin and spreads laterally (on the screen, it is colored red). Lesions can be non-cavitated, cavitated, involve only enamel, or enamel and dentin, or enamel dentin and pulp, with activity recorded as remineralizing (green), or demineralizing (red).

the creation of a repair destruction cycle (Benn, 1997; Brantley, Bader, Shugars, Nesbit, 1995).

The importance of the limitations of the current charting representations is shown in Figure 1, where there are three occlusal lesions. The lesion severity varies from a stained non-cavitated enamel-only lesion, to a small cavitated enamel lesion, and lastly to a large cavity in enamel and dentin with probable pulpal involvement. However, the conventional chart symbol is a circle, which is the same for all three lesions despite the clinical differences.

As a possible solution to the problem of inadequate lesion detail, we

have developed at the University of Florida a new pictorial classification of lesion severity and activity. Figure 2 shows a series of pictorial icons for non-cavitated or cavitated lesions involving the crowns or roots. The lesions are colored green for stasis or remineralization are red for progression. The lesion depth varies from enamel only; enamel and dentin; or enamel, dentin, and pulp.

For radiographic lesions, Figure 3 shows the pictorial icons, and Figure 4 radiographic examples of lesions in the outer or inner halves of enamel (E1, E2), and thirds of dentin (D1, D2, and D3). Unlike the clinical caries, where the operator selects the le-

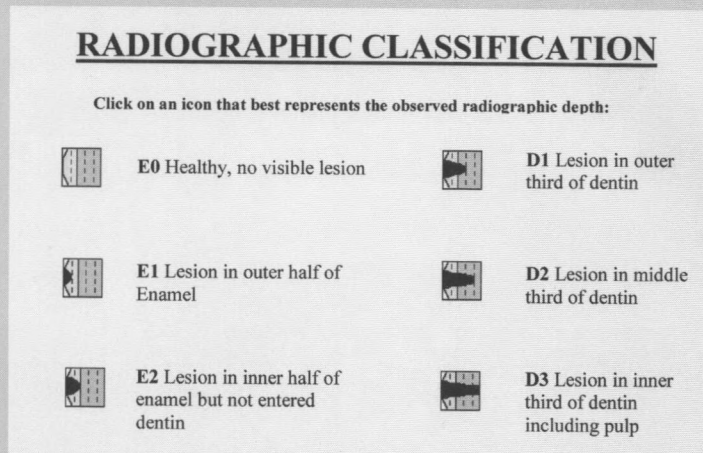
sion activity as red or green, the software automatically chooses this by looking for previous radiographic information. If a lesion has been recorded currently as D1 and it was previously E2, the lucency is colored red, indicating progression. No change or decrease in depth is shown in green. If no previous radiographs are available, the lucency has small red and green blocks to show that we do not know what the lesion activity is, since we have nothing to compare over time.

The conventional one-row tooth chart per jaw would not be able to display sufficient data, so we designed a four-row chart (Figure 5). The first row shows the **Existing Condition** with either new lesions, restorations, or restorations with recurrent caries. The crowns are shown as four or five surface structures. The second row, **Clinical Data**, contains the icons for the clinical severity and activity of caries. The smiley faces are an attempt to communicate that healthy teeth without caries or fillings are the ideal to aim for. You lose the smiley faces when caries or restorations are recorded. The next row, **X-Ray Depth**, displays the radiographic severity and activity of lesions. The last row, **Possible Treatment**, contains an automatically generated suggestion for managing the lesions, which will be discussed later.

For an in depth multi-media tutorial with a spoken text regarding the icons and chart, please see <http://www.cise.ufl.edu/~shk>.

Although at first sight the new chart may appear complicated to use, initial standardized testing with twenty-four users found the error rate to be less than 3% for recording ninety-nine pieces of information (Benn, Dankel, Kostewicz, Evan, & Blaser, 1999). An example of a test lesion to be recorded was "Tooth #2, occlusal, new lesion, pit and fissure enamel only, cavitated, demineralizing, with an outer one third dentin lucency." This example contained five basic pieces of information. Test sub-

Figure 3. Radiographic Caries Classification.



A set of six computer icons is shown with a light gray enamel region divided into halves E1, E2, by a broken line. A darker dentin region is separated from the enamel by a black line. The dentin is divided into thirds D1, D2, and D3. Caries lucencies are shown in black. However, on the computer they are green for remineralizing or static lesions, red for progression, and red/green blocks when no previous radiograph is available for assessing lesion activity over time.

jects used only the tutorial program with no other assistance. It is reasonable to assume that with further use, the error rate will decrease.

Consistent Decision-making. Dentists have considerable difficulty in producing similar treatment plans, even when presented with identical information (Bader & Shugars, 1995; Bader & Shugars, 1997; Benn, 1993; Elderton, 1989). In one study of nine dentists, two dentists correctly diagnosed one in seven lesions, while only one dentist recognized more than half the lesions (Bader & Shugars, 1995). Consistent correct decision-making is of the utmost importance but the literature shows that this is a major problem area for our profession.

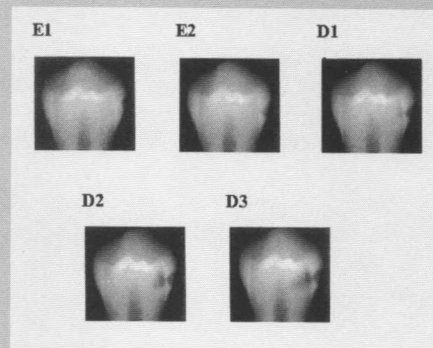
Compared to conventional treatment planning, evidence-based caries management will be more complicated since there are many new factors to consider (Benn, Dankel, Clark, Lesser, & Bridgwater, 1997). Hence, we should expect a larger variation in

the decision-making given the current performance with traditional caries management. For this reason, we decided to develop a computer program, which has a digital patient chart

and a large set of rules to automatically suggest a treatment plan (University of Florida Oral Health Decision Support System© 1997-1999) (Benn, Dankel, Clark, Lesser, & Bridgwater, 1997; Benn, Dankel, & Kostewicz, 1998). The rules were created by a group of teachers at the University of Florida and are based on the research literature (Benn, Dankel, Clark, Lesser, & Bridgwater, 1997; Dodds & Suddick, 1995). The objective of the program is to examine the data as they are entered for risk factors, and if there are any, increase the risk score until the patient becomes classified as medium or high risk for developing caries. As each lesion is recorded in the caries chart, the program examines the rules and based on the patient's current risk level, recommends a specific management for each lesion, which appears in the **Possible Treatment** row (Figure 5).

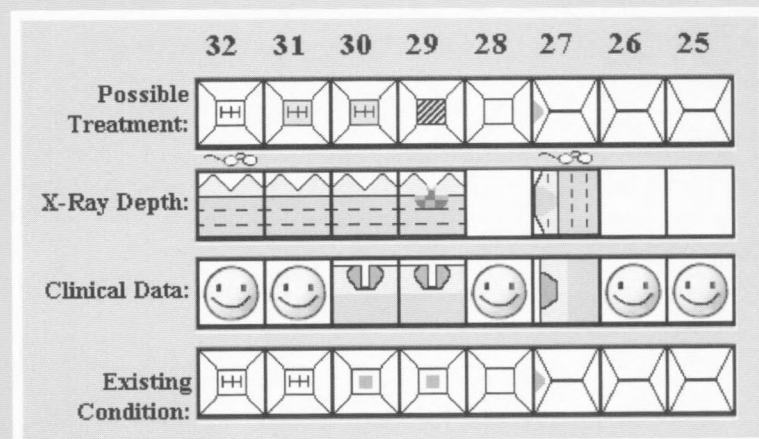
Complexity of the decisions. A review of the decision rules, needed for managing an individual lesion, shows the process to be complex. To produce a detailed treatment plan for all lesions, plus general recommendations such as chlorhexidine rinses and appropriate recall intervals, requires at least fourteen pages of flow charts (Benn, Dankel, Clark, Lesser, &

Figure 4. Examples of Radiographic Lesion Classification.



A set of five premolar interproximal radiolucencies is shown with examples of the classifications E1, E2, D1, D2, and D3. (Photographs courtesy of professors Ivar Espelid, Anne Bjög, and Ivar Mjör © 1994 Bergen, Norway).

Figure 5. New Caries Tooth Chart.



The lower right quadrant of a new format chart is shown for teeth #25-32. The first row, Existing Condition, is reserved for displaying the surfaces involved in new caries, restorations, or recurrent caries. The next row, Clinical Data, shows the clinical severity and activity of individual lesions. The third row, X-Ray Depth, displays the lucency depth and activity. The innermost row, Possible Treatment, shows the recommended treatment selected by either the computer or a dentist. Due to the lack of color in this paper, it is not possible to see the red (progressing) and green (remineralizing) lesions. Here is an explanation of the symbols: Tooth #32, shows a deep non-carious occlusal fissure pattern with no radiolucency. The recommendation, because the patient is low risk, is to monitor the fissures as indicated by the spectacles. Tooth #31, has the same occlusal findings, but because the patient is medium risk, the recommendation is to place a fissure sealant. Tooth #30, shows a non-cavitated enamel lesion and because of the absence of a lucency, the recommendation is a fissure sealant. Tooth #29 has the same findings except that there is an outer 1/3 dentin lucency (D1) and the proposal is to restore the tooth, indicated by the hashed region of the occlusal region of the treatment row. Tooth #27 has a non-cavitated distal enamel lesion with an inner enamel lucency (E2). The recommendation is to monitor the lesion.

Bridgwater, 1997). Such complex decision-making would be too great for a dentist or supporting staff to perform in a consistent and comfortable manner using a paper system. Our hope is that by providing a computer based system, we can hide the complexity of the decisions needed and at the same time reduce treatment variability.

Possible Practical Evidence-Based Tools

To illustrate the impact that such a system might have in a dental office, let us look at the management of some clinical situations.

Anatomical factors predisposing to caries formation. Suppose a clinical ex-

amination of tooth #32 were to reveal a prominent deep fissure pattern, but no clinical or radiographic caries. If the patient were assessed as low risk, the program would recommend monitoring the tooth periodically, but no sealant placement. The findings and recommendation are shown in the tooth chart (Figure 5) for tooth #32 as:

Existing Condition—a prominent fissure pattern in the occlusal surface.

Clinical Data—a smiley face in the absence of caries or restorations.

X-Ray Depth—no lucency seen.

Possible Treatment—the same fissure pattern icon as the existing condition, but with a pair of *spectacles* in-

dicating to monitor the region, but no other care required.

If the identical fissures were found on tooth #31, but now the patient was medium or high risk, the recommendation would be to place a sealant as shown in the chart (gray occlusal surface—Figure 5).

Non-cavitated enamel occlusal pit or fissure caries. Suppose that the molar in Figure 1A, showed non-cavitated enamel caries but no radiolucency, the recommendation would now be to place a fissure sealant, as indicated for tooth #30 (Figure 5). However, if any radiolucency was found below a non-cavitated enamel pit, as shown by the D1 for premolar

tooth #29, the recommendation would be to place a restoration as indicated by the hashed lines in the occlusal surface.

Interproximal non-cavitated smooth surface enamel lesions. In this situation, providing any radiolucency seen was confined to enamel and no cavitation was visible clinically, the recommenda-

tion would be to monitor the lesion (Figure 5, tooth #27). It may well be that nothing was visible clinically and only radiographic findings were recorded. The decision-making process to select either monitoring, sealant placement, or tooth restoration is explicitly defined in a flow chart (Figure 6).

Discussion

Many readers may have developed an opinion by now that the evidence-

based approach to managing oral health may be very difficult or too complex for routine office use. We believe this to be true if dentists wish to continue with paper-based methods for recording patient data. There may also be some anxiety that control of decision-making is being taken away from the profession by a computer. This is not correct since the computer is only making a suggestion, based on the findings from the scientific literature. If a dentist does not agree with the computer recommendation, it is a very simple process to choose an alternative procedure so that control still remains with the clinician. Nevertheless, we believe the complexity of the decisions has reached a point where support systems are needed to reduce the wide treatment planning variations, which have been observed (Bader & Shugars, 1995; Bader & Shugars, 1997; Benn, 1993; Elderton, 1989). Our goal is to design a computer system which simplifies the collection and use of data, while hid-

Our goal is to design a computer system which simplifies the collection and use of data, while hiding the complexity of the decision-making.

The above examples indicate how consideration of anatomical variation, patient risk classification, and lesion severity can be combined to provide different outcomes.

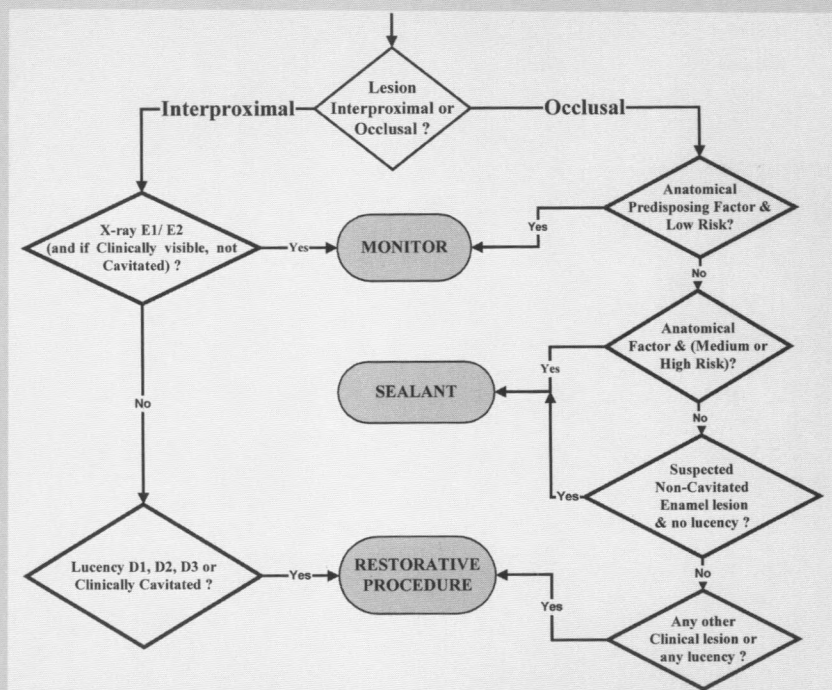
Selection of clinical and radiographic examination intervals. A patient who is initially classified as at high risk of developing caries, will be required to return at three-monthly intervals for *S. mutans* measurement until the count is below 100,000 colony forming units. A further low count will be sought after a further three months. Assuming the other risk factors are reduced to a low score (Benn, Dankel, Clark, Lesser, & Bridgwater, 1997), a reassessment after six months is required. Finally, a further low risk assessment leads to a twelve-monthly recall (Table 1).

A radiographic examination interval can vary between six to thirty-six months depending on the age, risk category, and date of previous exposure (Benn, Dankel, Clark, Lesser, & Bridgwater, 1997).

Although the rationale for selecting the appropriate recall interval is

simple, it is nevertheless a tedious and time-consuming activity to refer to a flow chart. Fortunately, the decision support system automatically recommends the correct recall period.

Figure 6. Flow Chart Illustrating Rules for Lesion Management.



The factors considered are caries risk assessment level, anatomical site, anatomical predisposing factors, and lesion severity. The recommendation for an individual site is to monitor, place a sealant, or place a restoration.

ing the complexity of the decision-making. However, dentists will need to understand and support the new way of working, which in turn will require the creation of new continuing education courses.

So far, we have not discussed the possible economic consequences for the profession of evidence based working. Firstly, insurance companies will need to adequately reimburse dentists for the extra time and skill needed for diagnosis, prevention, and disease control. If, as expected, evidence-based methods lead to a large drop in the numbers of restorations provided each year (Benn & Meltzer, 1996), insurance companies may be able to reduce the cost of care for low risk patients. Since low risk patients need only be seen once per year and can comprise about 70% of an office population, there is the potential to significantly increase the numbers of different patients seen per dentist. If every dentist saw two or three times their current numbers of patients, we may suddenly find a surplus of dentists. It will be difficult to estimate how large a problem this will be from cost effectiveness studies alone. Other factors, such as the demand for private cosmetic dentistry, may well have a major influence on the volume of care provided. Indeed, lowering the cost for low risk patients and following a preventive approach to caries

management may actually increase demand for care.

In conclusion, the adoption of evidence-based health care is likely to result in major change in general dental practice.

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Faux Ethics and the Ethical Community

David W. Chambers, EdM, MBA, PhD, FACD

The next quarter century in the dental profession will involve much wrestling with the consequences of the past fifty years of success. American dentistry offers better care, to more people, with more choice than at any time, anywhere. DMF and edentulism are dropping like rocks while orthodontics for adults and cosmetic dentistry are being sought by five and ten times as many as only thirty years ago (Chambers, 1995a; *Journal of Dental Research*, 1996). Dentists are well respected as a profession and have done marvelously financially. From 1990 to 1995, the Consumer Price Index rose by 17%; costs for oral health care rose by 33% during the same period (Spaeth, 1997).

Living With the Consequences of Past Success—A Challenge

A rhetoric of ethics has grown up around this success in dentistry. The shorthand version is "treat every patient as though he or she were your son or daughter." It is an ethic anchored in the principles of the beneficence and paternalism. This system has worked well when the expertise and skill of the profession have been used to relieve the burdens of the caries, periodontal diseases, and malocclusion.

But the historical roots of this tradition contain limitations as well as strengths. First, the ethical dental tra-

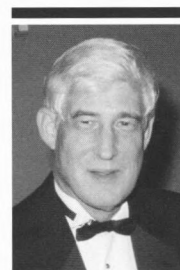
dition is incomplete. The operative stem, "treat your patients," reveals this. Dentists think first, and often only, of patients. There is much dental disease that never comes to the dental office. The most recent NHANES data show that 70% of caries and its consequences among children in this country are in only 20% of mouths (Drury, Winn, Snowden, Kingman, Kleinman, & Lewis, 1996); and these tend not to be patients in any dental practice. In fact, our system gives the most care to those who need it the least. The dentist-patient relationship is based more on patterns of health care seeking than oral health care need. It may be more proper to speak of an ethic of dental practice than an ethic of oral health.

The historical dental ethic is also incomplete in the sense of focusing predominantly on treatment. Dentists tend not to serve patients, to heal them, or to work with them; they treat them. Dentistry is conceptualized in terms of procedure codes—five-digit, computerized, universally accepted metrics for quantifying the delivery of dental services and claiming reimbursement. When dentistry is defined as a pattern of treatment codes, the major decisions are picking procedures that can be justified and doing adequate or better than adequate technical work.

The success of dentistry in the last fifty years has also led to inconsis-

tency in its views about what is good. The recent *Reader's Digest* article (Ecenbarger, 1997) told the public what the profession has known for some time (Bader & Shugars, 1995): dental treatment cannot be determined completely by the objective oral condition or the patients' personal preferences. There was a time, not that many generations ago when choice was limited by a combination of three factors: (a) frank disease far in excess of our capacity to treat it, (b) limited technology, and (c) an uninformed public. Paternalism, beneficence, and defining quality in terms of technical skill were all appropriate under those conditions. But these factors have given way to choice, ambiguity, and inconsistency.

It does not require unnatural perspicacity to predict that the short range future of dentistry will include research and technology developments that further expand treatment



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alternatives, more forgiving dental materials and less forgiving dental patients, demand growing away from need for dental service, persistent pockets of severe oral health care neglect, and more complex dental markets with payers and brokers exhibiting greater concern for the results of what dentists do and less with how they accomplish it. The ethical rhetoric of dentistry that grew up in the 1930s or the 1960s might have been appropriate for those times. It will not serve us in the future.

There is a second sense in which the history of dentistry defines the challenges it must face in the future. Success has laid the foundation of tension within the profession. The image of a solo practitioner owning his own practice and doing most of the dentistry, working with a single dental assistant, and sharing a common background and personal and professional goals with his colleagues is still idealized, even though it is an image more apt for the 1950s than for today. In the years since then the following changes have taken place. (a) The proportion of dentists' time spent in fixed and removable prosthodontics and operative dentistry has changed from 75% to less than 50% (Chambers, 1985). (b) Dentists are working approximately 15% fewer hours per week (Chambers, 1995b). (c) The number of assistants and hygienists employed has more than quadrupled; rising fairly constantly from the early '60s to the mid-'80s. (d) In the past ten years the number of dentists working as employees of other dentists doubled (last year, according to ADA statistics, 60% of dentists in practice one year after graduation worked as employees or associates for other dentists and another 15% worked as independent contractors) (American Dental Association, 1997a). (e) A little over one-third of students in dental schools are now women and almost four in ten dental students were born outside the United States (American Dental Association, 1997b). (f) The

fastest growing form of dental practice is the large group practice. (g) Nationwide, there are about two dozen chains of dental offices that are publicly owned and traded on the stock market (National Association of Dental Plans, 1996).

These factors taken together paint a picture of a profession evolving from relative undifferentiation—where each dentist was interchangeable with others—to one of complexity, specialization of function, and diversity. This evolution was not forced upon the profession; it was chosen in a series of incremental responses.

Rhetoric of ethics has grown up around the success in dentistry.

While the average income of dentists has risen faster than the economy generally, the proportion of oral health care dollars going in to dentists' pockets has continued to shrink, dramatically so for recent graduates. The game is opening up.

Dentistry has gone through a transformation from a profession where the dentist did the work to a profession where dentists predominantly manage the work. It is quite likely that the future involves yet another shift from dentists controlling procedures to becoming the dominant party in an oral health care system.

If the editorials in dentistry are any indication, the current crisis in the profession is one of voice. Formerly, the word of the dentist in dental matters was the first and the last word. Now patients have something to say. So do third parties and even large payers. OSHA and the FTC—to say nothing of the hygienists, assistants, employee dentists, and minority groups who have been created within the profession—all want to comment

on oral health care. These multiple voices, each grounded in a different set of self interests and each claiming some legitimacy, alter the very nature of ethical analysis in the profession. As difficult as it may be for relatively like minded professionals to agree amongst themselves about how to treat other people, allowing these other voices to be present at the table is an ethical issue of another order of magnitude.

One of the great problems facing American society as a whole today is learning how to talk with people who live in worlds that are not the same as ours. Dentistry is just discovering that it has this problem, too.

If there is any predictive validity in the immediate future I have sketched for the profession then our traditional approach to ethics is wanting. Principles and codes are inherently incomplete and inconsistent. This fact is explicitly acknowledged in the introduction to the American Dental Association *Principles of Ethics and Code of Professional Conduct*. Professional codes disenfranchise significant members of the community and underplay the consequences of ethical action. We must address ourselves to fashioning a workable alternative. In the remainder of this paper, I would like to accomplish two things; first to more fully expose the poverty of the principles approach to ethics and second to introduce one possible alternative—the ethical community which stems from the post-modern ethical theory associated with discursive ethics.

The Principles Approach—A Critique

The most common approach to ethical analysis in dentistry has become the principles approach (Hasagawa & Matthews, 1996). In this method a set of abstract ideals such as veracity, justice, autonomy, and beneficence, is used as a background for analyzing alternative courses of action. Those actions which are thought to characterize such principles are ethically preferred. The major textbooks available

to health professionals present this approach, although privately many professionals working in the field of ethics are aware of its shortcomings (Beauchamp & Childress, 1994; Ozar & Sokol, 1994; Weinstein, 1993). The principles approach is the view tested on the National Dental Board Examinations. Several professional groups have formalized variations on ethical principles as a code of ethics for their members.

As an educational exercise or a way of taking a position, there is little wrong with ethical principles; as a guide to action, however, they are not fail safe. As just one example of the gap between ethical principles and ethical action, consider the survey of

leave the tooth intact because replacements are always inferior substitutes for the natural dentition; another would have the tooth out because it has no opposing number and is superfluous in the dentition, or even on some theory that it may pose problems eventually. One could refuse to treat the patient because it would place the dentist at unnecessary risk; the other would argue that the patient is determined to have the tooth removed and he or she had better do so to protect the patient from some unscrupulous and probably undertrained colleague.

What have we learned from this exercise in using ethical principles? (a) Most of the lively discussions in ethics

So far, the principles approach to ethics has been challenged on empirical and logical grounds. But its flaws lie even deeper. Post-modern philosophers would throw it out altogether as being an impractical intellectual exercise.

The span from Descartes to Kant (roughly 1600 to 1800) is referred to as the "modern" era in intellectual thought. Post-moderns challenge many of the assumptions in that tradition, in particular the belief that the world is objectively given and can be known in any rational and comprehensive fashion (Bernstein, 1983; Hofstadter, 1979; McCarthy, 1993). Quantum mechanics and relativity theory have shown that Newton's world is only an approximation (Popper, 1959). Heisenberg proved that one can know the location of an atom or its direction of travel, but not both at the same time. An economist, Kenneth Arrow proved mathematically that when two or more people must make a choice between alternatives which have multiple attributes it is impossible to formulate a rule which is "fair" in some objective sense (Arrow, 1951). And perhaps the most damaging argument was contributed by the Princeton mathematician Kurt Gödel who studied simple number systems, in particular the positive integers. He proved that it is possible to have a number system which is complete but inconsistent or a number system that is consistent but incomplete; but it is impossible to have a system which is both (Nagel & Newman, 1964).

Although I can lift a chair that is empty or one that someone else is sitting in, I can't get very far lifting myself. The principles approach to ethics suffers from something like this limitation. Assuming objectivity makes interesting theory, but is open to inconsistent action when placed in context. Although we can imagine ethics in a universal context, we cannot practice it in such a world.

Inconsistency is also a well recognized consequence of principles of ethics. In fact, ethicists almost relish

*D*ental treatment cannot be determined completely by the objective oral condition or the patients' personal preferences.

New York City dentists reported recently in the *Journal of the American College of Dentists* (Sadowsky & Kunzel, 1997). Of those dentists who strongly disagreed with the statement "Dentists are ethically obligated to treat HIV+ patients," over 40% said they are nonetheless willing to provide such treatment in their own offices. In contrast, more than 10% who strongly proclaim the ethical principle were unwilling to put it into action.

But the indeterminate relationship between ethical principles and ethical action runs deeper than empiricism would indicate. Consider the standard case of removing a sound tooth that is a staple in many dental school ethics courses. Using the principle of patient autonomy we might say, "Yes, remove it if that is what the patient wishes." On the other hand, the dentist's autonomy must be honored and he or she might say, "That is not the kind of practice I wish to engage in." Or let's look at the principle of non-maleficence. One dentist would

courses that use cases probably come from students making different assumptions about vary abbreviated narratives rather than the dynamics of ethical principles. (b) The use of ethical principles depends heavily on the interpretations of details of implementation rather than the principles themselves. (c) With a little ingenuity, virtually any action can be justified by some ethical principle. (d) The same principle can be used to justify diverse and even contradictory actions. Those who might be tempted to accuse me of sophistry on this point are referred to Plato's dialogue *Euthyphro*. Socrates is brilliant as usual in calling out alternative principles for the young man who feels duty-bound to hand over his father for causing the death of a slave through some sort of negligence. The young man and countless generations of philosophy students since remain completely baffled. In the end, Plato leaves the issue unsettled; not even he could make the principles work in a practical case.

developing what are known as dilemmas. The technical definition of a dilemma is that two assumptions in one's rational system lead to contradictory actions—dilemmas are inadequacies in our understanding, not conflicts in the world. Dilemmas have a training role in pointing out inconsistencies among our ethical principles. At a deeper level they have a role in revealing that ethics based on principles is inherently inconsistent. The ethicist's joy in presenting dilemmas reminds me of the Harvard economist John Kenneth Galbraith's observation that "Economics is very useful, principally as a form of employment for economists."

Some who ground their teaching in principles fall back on something like a casuist approach. They say that students who have been trained to view ethical situations from the perspective of multiple principles are better equipped to function as professionals. The teacher in me finds this a reassuring argument. The philosopher remains skeptical. That statement—learning to use a set of incomplete or inconsistent principles promotes ethical thinking—must be a new principle, assumed on faith. I certainly don't know how one would test such a theory without having a secret

tion and often its contrary actions can be justified under certain circumstances by some ethical principle. Although I have not thought this through in detail, I am convinced that there is a difference between ethical justification and ethical action.

The most pernicious form of ethical justification would be called faux ethics. This occurs when an ethical principle is cited as justification for one's self-interested action in such a way that the self interest is made to appear as though it is part of the principle. Dentists who object to managed care for financial reasons but editorialize about patient autonomy are guilty of faux ethics (ADA Council on Ethics, Bylaws & Judicial Affairs, 1995). Hygienists who embrace managed care in the name of patient autonomy while seeking independent practice (American Dental Hygienists' Association, 1996) are also guilty of faux ethics. The state boards of examiners who regulate the supply of dentists by varying the passing standards while referencing protection of the public are also guilty of faux ethics.

Faux ethics is grounded in a logical fallacy. It goes something like this: "All ethical people do x" (major premise), "I do x" (minor premise), therefore "I am ethical" (conclusion).

considered the unit of analysis and the ethical decision is ultimately a matter of personal conscience.

A series of studies by Hartshorne and May (1928-30) casts significant doubt on this assumption. These researchers found that a child would engage in theft or deception in one case but not in another, while other children would have different checkered patterns of ethical behavior. While this research is almost seventy years old, human nature is unlikely to have changed so much as to invalidate the general concept. Rather than adopting the misleading way of saying that a person is generally ethical and leaving others to guess which situations might be covered, it is more accurate to say that individual acts (not individuals themselves) are either ethical or not ethical. The minor premise in the correct syllogism that could save principle-based ethics—I am ethical—may thus turn out to be a theoretical construct more than a practical reality.

The Ethical Community—An Invitation

A principles approach better suited the profession fifty years ago than it does today, and may even become misleading in the future. We need a new way of talking about ethics that reflects the diversity and interdependence that are emerging within dentistry. We need language that reflects responsibility within community rather than individual rectitude.

One view that holds some promise for being useful in this regard is the post-modern, discursive view of ethics advocated by Habermas (1984; 1993) and others. I will only present the briefest outline of this philosophy, having addressed it in some detail in a previous publication (Chambers, 1996).

The problem with the principles approach to ethics is that our actions and their justification exist in two different worlds. That is why endorsement of principles may not alter action, why actions and their opposites can both be justified by a single principle, and why principles can be used

One of the great problems facing American society as a whole today is learning how to talk with people who live in worlds that are not the same as ours.

method for differentiating the ethical individuals from the defective ones.

The dangers of a principles approach to ethics extend beyond philosophy. I am afraid that what happens on a daily basis is a confusion between self interests and ethical principles. Citing an ethical principle that is consistent with the behavior one wishes to engage in does not make that behavior ethical. This follows from the demonstration that every ac-

(The correct form of the syllogism is: All ethical people do x, I am ethical, therefore I do x.)

Before considering a possible alternative to ethical principles as a foundation for a future ethics of oral health, one more confusion in the traditional view must be considered. I think it is natural that most dentists, hygienists, and others in the profession think of individuals as being ethical or otherwise. The individual is

to obscure self interests, as in the case of faux ethics. Discursive ethicists would like to get both the action and the justification on the table at the same time. The key to accomplishing this is to realize that much of the language we use to discuss ethical issues is in fact a kind of action itself. For example, perjury is as much an illegal action as is battery. A minister does not identify that a couple is married—the marriage comes into being because it is pronounced to exist. An agreement to buy or sell creates a legal liability. A diagnosis creates a treatable entity, provided that the diagnosis is rendered by someone licensed to do so. In the post-modern view, promises are ethical actions.

In all these cases, language does more than describe, it creates relationships between people and changes the future (Alston, 1964; Austin, 1965; Wittgenstein, 1966). There are promises inherent in a great deal of what we say to each other. Even factual statements can be considered performance language, carrying an implied promise that one would be able to back up the factual claim if challenged to do so. That is an important part of the scientific community in which we live and deserves to be explored in the context

(1978), and others. In order to show how this system works, I will mention eleven such performance language rules which are variations of those developed by post-modern thinkers. The full implication of this performance language is a project yet to be worked out.

(1) *One may assert only what one is prepared to justify.*

This is the fundamental performance language claim. As a condition for being allowed to speak in a community we must be prepared to redeem any claim we make. This might be so simple as having another piece of pie after complimenting the hostess on the first one or a willingness to discuss the radiographs when saying that a particular tooth is carious. It is not necessary to justify everything we say, but there is an implication that we are prepared to do so if necessary in order to show we are trustworthy members of the community.

(2) *Agreement among individuals is demonstrated by their assent to the consequences of a course of action.*

This is a paraphrase Habermas' famous universality principle (1993) which he offers as an alternative to the Golden Rule. Individuals agree to a course of action that effects them if

The universality principle naturally leads to this third rule of performance language. Deciding what someone else wants based on our own values, except in the case of minors and others with impaired capacity, is inherently unethical. The paternalism of "treat all patients as though they were members of your family" violates this condition for ethical community. Codes of ethics made by dentists for dentists create an unrealistically narrow ethical community.

(4) *Actions that are not performance language should be interpreted consistent with one's promises.*

Although performance language creates the ethical community, all action reflects on its members. One can be called upon to justify any of one's actions in addition to one's promises. This is simply a fancy way of saying that those who let it be assumed that they have made the promises that define membership in an ethical community are expected to behave accordingly.

(5) *The meaning of all actions is determined within the context of the ethical community.*

Ethics is not a matter of individual conscience. Too many despots and sociopaths who knew they were right remind us of the fallacy of that thinking. Descartes was among the first modern thinkers, and his famous *cogito* (I think, therefore I am) was refuted by the post-moderns who simply ask "Who cares?"

(6) *All members of the community have the same ethical status.*

There are no ethically privileged positions. Higher levels of knowledge or training do not translate into differential ethical status. It is the consequences of action we are called to agree on, not their rational justification. Dentists, patients, and third parties are on even ground in choosing among alternative outcomes of dental care.

(7) *If something is held to be true because it follows from a certain method or logic, anything else that follows from the same method or logic must also be accepted as true.*

Principles and codes are inherently incomplete and inconsistent.

of continuing education courses and many product and procedure claims.

The move from recognizing language as action (promises that create relationships) to ethics grounded in language is relatively straight forward. An ethical community is one whose members have agreed to certain rules about language as a precondition for membership in the community. This agreement need not be formal or even conscious. Some of these fundamental rules of language within community have been identified by Habermas, by one of his students Robert Alexy

they accept the likely consequences that result from such action. Universality is a condition of ethical behavior. The tooth can be removed ethically if the patient, the dentist, the patient's parents, the third party carrier, the community, and others all agree to accept the consequences of removing the tooth. Because it is consequences that are at stake and not the action itself, considerable flexibility exists in ethical behavior, but disclosure and informed consent cannot be avoided.

(3) *All who are effected by an action have a right to speak to it.*

This is a paraphrase of the truth condition proposed by the father of American Pragmatism, C. S. Pierce. It is the foundation for scientific and professional communities. What is "true" in dentistry, for example, is not what we have discovered of the objective world but what we as a community of researchers and practitioners have agreed to be the most robust interpretations of our common experiences based on the methods we have agreed to. We are prepared to substitute new truth as it emerges from these methods. We attack quacks and fanatics based on their inadequate methods, and are often surprised to find out that the public (which does not share our methodological standards) still hesitates between conflicting "truths" regarding fluoride, amalgam, etc.

The last four ethical performance language statements are offered without commentary:

(8) *If a course of action A is appropriate in condition C, then A is also appropriate in any other conditions agreed to be functionally equivalent to C.*

(9) *All members of an ethical community can be called upon to justify the behavior of any member.*

(10) *All members of an ethical community are elevated or damaged by the behavior of any member.*

(11) *Individuals who show a pattern of behavior inconsistent with the ethical community are no longer entitled to its benefits.*

A professional ethics based on performance language and post-modernism would look different from one based on principles such as beneficence and paternalism. The guiding forces would be generated within the group—not discovered (or subscribed to) by individuals. Participation in the ethical community is not based on superior knowledge or purported superior virtue. It's qualifications are two in number: (a) being affected by the actions of others and (b) willingness to honor the speech conventions of the group.

On this view, the character of ethical issues shifts from dilemmas to conflict and reconstruction. Ethical

dilemmas take place within a group that subscribes to a set of principles. They are a sign of the inconsistent and incomplete nature of the principles and the inability to engage groups that do not subscribe to the same principles. Conflict, on the other hand, is a useful term for de-

The system of ethics that served the profession fifty years ago and now dominates our recently discovered ethical awareness will not serve this future well. A new ethics based on performance language and the participation of all affected by the consequences of actions is necessary.

A new ethics based on performance language and the participation of all affected by the consequences of actions is necessary.

scribing a mutual recognition that inconsistent courses of action flow from diverse value systems. These "different worlds" might be separate groups (such as dentists, patients, allied professionals, or managed care brokers) or even subgroups (such as young dentists who work for other dentists or Korean-American dentists). The California Dental Association just released a study of the difference between concerns of dentists and patients (Boyd, 1997). Dentists are more concerned than their patients are about managed care and treating patient fear; patients, more than anything else want the cost of dental care lowered. Under these circumstances, the ethical principle "put the patient's interest first" is simply untenable. Dentists are not expected to lower their costs just because that is what patients say they want above all else. The alternatives are "put the dentist's definition of the patient's interests first (paternalism)" or "let's talk about it" (discursive ethics).

Ethical reconstruction is the never-ending process of working through conflict by seeking common ground in performance language among all those affected. It is the work of creating useful ethical communities. And, unless I have done my analysis wrong, the issues of consistency and completeness are made moot in this perspective. Further, there is no issue of conflict between self-interest and ethical principles.

Much work is needed—and it is new work—to construct the ethical community for oral health.

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Professional Development

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Abstract

The current program of continuing education is unnecessarily restricted by outdated conceptions of professionalism and learning; thus it fails to serve the needs of dentists today. A new model—professional development—is proposed, based on new ideas about what it means to be a professional and what professionals learn. The central role of practice is emphasized.

Dentists continue to learn throughout their careers. Nothing seems to be able to stop them. Although the learning curve is steepest during the initial years of formal education, the sheer amount of useful change resulting from experience is much greater once the professional enters practice.

The “learning while earning” phase of professional growth has traditionally been called continuing education. But surely we need a better term. Continuing education has been around so long and beat up so badly that it has lost some of its utility. Its

foremost meaning is probably economic—a way for entrepreneurs and organized dentistry to make money. The secondary meaning would be an activity engaged in by dentists, the effects of which have never been well documented and the primary associated verb being “attend.” There is a third meaning for continuing education that carries moral overtones. It is part of what professionals do to maintain the public trust they have been granted. G. V. Black’s famous saying, “A professional has no alternative other than to be a continuous learner” is very much to the point. It is also to the point that Black said “continuous learner” not “CE attendee.”

The Continuing Education Model

The way we now do CE is dominated by two sets of assumption, one having to do with professionalism and the other with education.

The classic definition of a professional is one who has a specialized body of knowledge and, in exchange for placing high regard on others’ benefits, is granted self governance. Dentistry, along with medicine and law, are stereotypical professionals in

the classic sense. Not only is their body of knowledge and skill specialized, it is achieved through lengthy training and the average citizen may not have the aptitude and opportunity to acquire that training even if they desired it.

Placing high regard on others’ interests has always been problematic among the professions. This does not mean literally placing the patients’ interests first in the unselfish service we associate with the ethical principle of autonomy. Otherwise, lawyers would be as poor as nuns. Sometimes this means working in a field where there is an inherent and natural human need—as in the “oldest profession;” sometimes it means that the professional has such powerful and specialized knowledge relative to those they serve that the professional takes a leading role in defining what is needed, sometimes even codifying this into law. Examples might include county clerks and food service workers.

Self governance is based on standards for entry into the profession, standards of conduct, formal regulation of conduct—as in peer review—and informal regulation as norms of conduct, professional codes, and the



cumulative effect of professional interactions. Society never grants complete self governance to any profession. But greater self governance is allowed based on the degree to which knowledge and skills are specialized—and thus difficult for the public to understand—and on the effectiveness

...lawyers would be as poor as nuns.

with which the profession succeeds in regulating itself.

The primary professions are held as the ideal, based on their historical ascendancy several centuries ago when the vast majority of citizens were engaged in agriculture with smaller numbers in commerce and manufacturing. Beginning with this century the so-called minor professions began to gain recognition. These include education, architecture, pharmacy, and engineering. In the United States Department of Commerce job classification system, professionals are the fastest growing segment of the economy, having multiplied four-fold in the past thirty years.

Today musicians, phlebotomists, bus drivers, journalists, travel agents, and football players are all claiming professional status. Most of them, in fact, meet the classical criteria for inclusion among the professions. Consider professional wrestlers. They claim to know and honor what their spectators need in terms of entertainment and there is an elaborate formal and informal structure for regulating the profession. There is also a specialized body of knowledge and skills; and although it may not require lengthy study to master these, most dentists, for example, lack the aptitude to undertake such training. If the example appears crude in the American context, consider the historical stature of Sumo wrestlers.

The other half of the continuing education model is education. Learn-

ing is assumed to be the accumulation of knowledge and skills, and the essential challenge is to transmit that knowledge and skill from individuals who have it to individuals who want or need it. This view of learning makes no distinction regarding type of knowledge or skills, the teaching situation, or the current level of mastery of the students, and it regards problems of motivation, lack of attention and disinterest in subject matter, or missing prerequisites as deficiencies in the learner. Since learning is learning, the techniques that were used for students before granting their doctoral degrees are essentially the same techniques that are used thereafter. The surest signs that one is in a continuing education course instead of an undergraduate one are the lavish use of the term "doctor," high quality Danish, the speakers' attempts to establish their credibility, and classy venues.

The pedagogical foundations for continuing education are open to challenge, especially the one about learning is learning. In addition, one more problem must be considered.

Today musicians, phlebotomists, bus drivers, journalists, travel agents, and football players are all claiming professional status.

An assumption is traditionally made that learning can be measured. To prove it we count clock hours of curriculum time, CEU units, and even now the number of procedures completed by CE course gurus. What is actually being measured in every case is the teaching and not the learning. It may be acceptable to overlook the confounding of teaching and learning in dental education up to one's first professional degree where there is a demonstrable connection between teaching and learning in such highly structured situations. It will not work in the individualized learning contexts

that characterize professional practice. But what of the use of examinations as a measure for learning? Such scores are measures of the performance of students in highly structured situations; they are not valid indicators of professionals competence. No dentist can make a living answering the questions at the end of the journal about the CE articles.

The point is that the learning appropriate to students is not the same as the learning appropriate to practicing professionals.

Professional Development Model

Continuing education comes close to the mark, but seems to skip across the surface rather than getting at the fundamental issues of how professionals adapt to changing demands and continuously raise the standards of their performance. We settle for it because nothing that is clearly better is at hand. Part of the problem is that we have left our assumptions about professionalism and learning unquestioned. If we rummage around in

those concepts, we just might find something of value.

First, we need a distinction between students and practicing professionals. Students learn in order to earn the privilege to practice. Professionals learn while they are practicing and in order to practice better.

The difference between learning in order to earn and learning while earning points to an often overlooked but essential characteristic of professionals. Professionals practice. Students might practice their lessons but professionals practice the art of a service that is essential to the public with all of its at-



tendant ambiguity, complexity, and shifting demands. Donald Schön defines practice as “an exploration and testing of alternative means of producing qualities of product one finds appealing.” He further points out “practice is learnable but is not teachable.” One of the components, that must be added to our definition of professionalism is that learning is an intrinsic expression of practice that is qualitatively different from the learning needed to qualify to begin practice. In this sense, mandatory continuing education requirements for licensure are not professional at all—they are “preprofessional.”

Modern society is entering the age of professionalism. Our world has become so complex that we delegate many aspects of our lives to specialists whom our parents would never have considered consulting. For example, we can't exercise without our personal trainer. Executives hire coaches, babysitters need Red Cross Certification, and every other person you meet is an investment counselor or real estate agent. Everyone is a professional and they have the initials behind their names to prove it.

With so many new professionals and society's willingness to turn almost any aspect of our lives over to professionals, an emerging issue becomes the territorial interface among professionals. When a “professional” in alternative nutritional therapy contradicts a dental professional's advice about amalgam, what is the patient to do? When the ENT or the plastic surgeon competes with the oral maxillofacial surgeon for patients, what is the chief of staff supposed to do? The classical characteristic of a professional as someone with a specialized body of knowledge and skill is becoming less useful in resolving such conflicts. Increasingly, professionals are resorting to legislative, credentialing, and even hours of continuing education as means of distinguishing themselves from other professionals. Expected or exclusive right to practice is now part of the definition of professional. Den-

tistry is not the only profession where it is impossible to distinguish between the initial examination as a form of protection for the public and as a form of market regulation.

There is also a growing body of thought regarding professionals as a community of practice. According to this view, the most reliable method for identifying a professional is neither titles, formal qualifications, nor even work setting. The essential characteristic of a professional is an approach to practice defined by a unique set of behavior and values. Dentists, for example, typically orient towards surgical-technical excellence as the primary patient service, long term and personal responsibility for patients' well being (including avoidance of anything that puts patients at risk),

for the uniformed services, a dental school, or as a consultant to an insurance company is still a dentist. Even without a handpiece in hand, we would anticipate that dentists approach problems from a specific point of view and uphold a set of standards and ethics unique to dentistry. Community of practice is a way of seeing the world and framing our actions towards it that is independent of the environment where we are working. Professionals live at the intersection of their internalized communities of practice and their work environments. Often these worlds are conflicted. The challenges of alternative forms of reimbursement and employment are not professional issues—they are in the work setting, not the community of practice. Issues of the diagnosis and

Expected or exclusive right to practice is now part of the definition of professional.

professional determination of what is in the patients' best interests, and adherence to and active defense of common standards for practice. As strange as it may seem, this definition of dentistry in terms of a community of practice contains no mention of teeth or anything else in the curriculum of dental schools or continuing education programs. And yet it defines the profession. Even if a hygienist or assistant could be trained to identify and to restore caries or a denturist to fabricate bridges, they would not be dentists in the sense of this definition. The meaning of a task cannot be determined by its physical characteristics; it can only be understood in the context of a community of practice.

Community of practice has elements of standards and norms, ethics, and identity inherent in it. That means professionals carry their community of practice with them into any work setting. A dentist working

management of oral health are professional issues. An emerging definition of professionalism includes strong identification with a community of practice and using a community of practice as a guide for behavior rather than using the circumstances of one's employment or work condition.

Our definition of what it means to learn has become richer and more functional in recent years as well. Competency-based education redefines both what it means to learn and how the process takes place. The accumulation of facts and skills is not the definition the learning, it is only part of it. Learning is the residue of experience that allows a person to do something they are doing now better or allows them to do something new. Learning is always context specific. A competent diagnostician is one who can function appropriately in practice where a variety of patients present diverse problems. A competent student



(with regard to diagnosis) is one who answers multiple choice questions, identifies conditions from slides, and works with a faculty member to learn the protocol of diagnosis. It would be misleading to say that students and practitioners had learned dental diagnosis in the same sense, even for those students who have received excellent

but has no appreciation of its place in dental practice cannot be said to be competent.

Although competence is the definition for the level of learning that should entitle an individual to independent practice status, it is certainly not the end of learning. Two other levels are conventionally recognized:

Learning is the residue of experience that allows a person to do something they are doing now better or allows them to do something new.

grades. The diagnostic skills of practitioners with one or two years of practice are not comparable to those with many years of experience.

The progression of learning in the competency-based approach to education normally assumes a ten to fifteen year horizon and evolves through five levels. In the psychological literature, this is known as the novice-expert continuum. Novices learn by doing what they are told and the only context is acting like a student; faculty members assume all responsibility. Beginners are struggling to integrate alternative information and procedures and to share responsibilities with their teachers. Competent individuals possess the understanding, skills, and values necessary to begin independent practice. In dentistry this defines the criteria for graduation from dental school or advanced training programs. It is essential to realize that competencies are a combination of understanding, performance, and professional values. One who understands the basic science behind infection control and is capable of doing it

proficiency and expertise. The first few years of one's professional practice are devoted to issues of professional identity and values, extension of some procedures to more complex patients and less frequent use of others (primarily through referrals), and the balancing of practice setting with community of practice issues. Expertise is mastery of one's situation. It is only achieved through years of skilled practice and continuous learning. It is characterized by exquisite functional sensitivity to the demands of one's practice and a deep foundation in one's community of practice and ethics. Several organizations within dentistry have recognized the appropriateness of mastery as the true goal of professional development. Some examples include the Panky Institute and others of that nature and the Academy of General Dentistry (although AGD's equation of mastership with hours of continuing education is a wholly inadequate proxy of what it means for professionals to learn).

The debate over continued competency is mis-framed: it is too low a

goal to set for dentists to remain throughout their entire careers at the same level of understanding, skill, and values that they had at the time of graduation from dental school.

Professional Development Behavior

The standard view of continuing education is a disservice to dentistry because it is such a limited vision. We need a new conceptual structure that is based on a more contemporary definition of professionalism, particularly including the central role of practice and the importance of a community of practice. We also need a different definition of learning, one that acknowledges that professionals learn differently in practice from the way they learn before they begin practice and one which moves our attention away from the accumulation of isolated knowledge and skills to its proper place focused on the continuous development of the dentist as a professional. To ensure a clear distinction between these different concepts, it would be useful to use a consistent terminology of *preprofessional education* for the journey from novice to competence and the term *professional development* for the journey from competence to mastery. The literature in professional development is thin and scattered. Only the barest outlines are beginning to emerge. The remainder of this column will mention six broad characteristics of professional development that characterize, however incompletely, the way professionals learn.

Learning as Part of Practice. For the professional, learning and intelligent practice are the same thing. The definition of learning includes "the re-



siduals of one's experience..." therefore, professionals are always in a learning environment. Part of the definition of being competent is that one is qualified to continue professional growth in a self directed fashion while practicing. Practicing professionals are only indirectly the recipients of information during learning and directly the designers of incrementally better practices. Learning cannot be found in a list of knowledge or skills. It is recognized in successively more masterful practitioners who function in more effective ways of providing patient care—greater professionalism.

Intrinsically Motivated. Professional development is never for the sake of something else; it is always for the sake of better developed professionals. The great power in intrinsic motivation is that no external party can control it. When dentists know that they have elevated their understanding of oral diseases or have enhanced their capacity to provide esthetic restorations, no one needs to give them a letter grade or a certificate to place on the wall. Their sense of enhanced functionality is reward in itself. It is immediate and no one can degrade or artificially inflate it.

Concrete and Personal. Professional development is not general or theoretical. The ultimate test is the way an idea or procedure works in one's hands for one's patients. It is nice to know about the success stories of others and large controlled experimental trials; but it is essential to know what will happen with the patient in the chair. Schön defines practice as a "form of self-directed experimentation." Of course, only those who are competent should be allowed

the privilege of such experimentation. We miss the mark when we assume that dentists learn by attending continuing education courses, reading journals, or even attending hands-on workshops in institutes over a period of time. The real learning takes place in the dental office as the dentist struggles to incorporate new and useful ideas. All professional learning is self-validated in context.

Community Based. At first it may seem like a contradiction to say that professional development is individually validated and then to say that it is community based. The community in this case refers to the community of practice, one's professional peers. The efficacy of new information or procedures is individually validated in each office, but their meaning, appropriateness, and ultimately their value is determined by the norms, standards,

centrated. Most professional development occurs spontaneously and is incidental to the performance of dental practice. One of the great challenges of professional development is to find ways to measure and manage learning that is distributed over time, location, media, and experience. The situation is somewhat analogous to dentistry's current position with regard to periodontal disease. Although we can see its effects, we have a hard time actually catching it happen.

Two-way. Transmission of knowledge from the teacher to the student is a valid metaphor in preprofessional education. It is unnecessarily restrictive in the case of professional development. Most of the people on the CE circuit are there because they are better learners than their colleagues and not just because they are better teachers. Each one of them will say from time to time,

For the professional, learning and intelligent practice are the same thing.

and ethics of the community of practice. Perhaps the greatest value in continuing education offered through organized dentistry comes from assembling groups of colleagues who discuss (usually in the hallways) the appropriateness of new procedures independent of whether they can work in the hands of the experts or can be learned by the attendees.

Distributed Learning. A major reason we so significantly underestimate the amount of learning professionals do during their lifetimes is that we count the courses and the journals where learning is contained and con-

"one of the dentists at my seminar two weeks ago came up and told me..." The lunch conversation between two colleagues is crammed with informal comparisons between experiences that help both of them practice better in the future. The same thing occurs on a larger scale in meetings from the component society through the Hinman or the Chicago Midwinter. Dentists even learn from their patients; most of them relish the challenge of a case that stretches their competence in a realistic fashion. In professional development the roles of teacher and student become blurred—what matters most is learning.



Recommended Reading

* Boyatzis, Richard E., Cowen, Scott S., Kolb, David A., and associates (1995). *Innovation in Professional Education: Steps on a Journey from Teaching to Learning*. San Francisco, CA: Jossey-Bass. ISBN 0-7879-0032-X; 280 pages, \$?.

Collection of papers describing various aspects of the effort at Weatherhead School of Management, Case Western Reserve University to reinvent the MBA program. Elements in the new program include (a) more responsiveness to the practical skills needed to function in business, (b) promoting reflection and self-assessment for students, and (c) measuring outcomes. The claim that the book "Provides an approach and perspective on learning, curriculum revision, and adult development that the reader can adapt to a particular situation and institution or organization...we stress the need to develop a philosophy of learning as a basis for curriculum innovation" (xii) is not carried off completely.

* Boyer, Ernest L. (1990). *Scholarship Reconsidered: Priorities of the Professoriate*. New York, NY: The Carnegie Foundation for the Advancement of Teaching. ISBN 0-7879-4069-0; 145 pages; about \$13 (Available from Jossey-Bass, San Francisco).

A renowned scholar and leader in American higher education looks at the past and future of colleges and universities. He argues that we need more models than the large research university. The text is the front end of a survey report commissioned by the Carnegie Foundation for the Advancement of Teaching. The key issue is faculty time or effort—what activities will be valued? "The most important obligation now confronting the nation's colleges and universities is to break out of the tired old teaching versus research debate and define, in more creative ways, what it means to be a scholar. It's time to recognize the full range of faculty talent and the great diversity of functions higher education must perform" (xii).

Chambers, D.W. The continuing education business. *Journal of Dental Education*, 1992, 56, 672-679.

A critique of the limited role dental-school-based continuing education programs play in meeting the needs of practicing professionals and some suggestions for changes.

Chambers, D.W. Toward a competency-based curriculum. *Journal of Dental Education*, 1993, 57, 790-793.

General introduction to competency-based education in dentistry.

Chambers, D.W. and Hamilton, D.L. Continuing dental education: Reasonable answers to unreasonable questions. *Journal of the American Dental Association*, 1975, 90, 116-120 and *Journal of the California Dental Association*, 1975, 3, 61-64.

The argument against mandatory continuing education.

Hughes, E. (1959). The study of occupations. In R. K. Merton, L. Broom, and L. S. Cottrell, Jr. (Eds.). *Society today*. New York, NY: Basic Books.

Discussion of the classical definition of professions and of emerging new professions.

* Schön, Donald A. *Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions*. San Francisco, CA: Jossey-Bass, 1987. ISBN 1-55542-220-9; 355 pages; \$?.

The reflective practitioner, one who combines knowledge and art in practice, must be taught in ways beyond traditional, didactic, rational theory and fact out of context. The alternative proposed is the practicum, a learning by doing in a controlled environment under the care of a coach. The need for this approach, what learners get from it, and the dynamics of the coaching relationship are presented. There are several examples—architecture, music, psychology, consulting—worked out in great detail, with original case material.

Editor's Note

Summaries are available for the three recommended readings preceded by an asterisk (*). Each is about four pages long and conveys both the tone and content of the book through extensive quotations. These summaries are designed for busy readers who want the essence of these references in fifteen minutes rather than five hours. Summaries are available from the ACD Executive Office in Gaithersburg. A donation to the ACD Foundation of \$15 is suggested for the set of summaries on professional education; a donation of \$50 would bring you summaries of all the 1999 leadership topics.

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