

# Journal *of the* American College *of* Dentists

EVIDENCE-BASED  
DENTISTRY

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# Journal of the American College of Dentists

A publication advancing  
excellence, ethics, professionalism,  
and leadership 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.

## OBJECTIVES of the AMERICAN COLLEGE of DENTISTS

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 potential 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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**Cover photograph:** It is important where you stand on evidence-based dentistry.

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## FROM THE EDITOR

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### LESSONS IN SHIFTING THE BURDEN: #1. MANAGING BAD APPLES

There are two ways to do well: create value and shift others' value to your advantage. In *Redefining Health Care*, Harvard Business School professor Michael Porter identifies the driving dynamism in the American healthcare system as getting ahead by cost shifting. Could this be happening in dentistry as well?

Let's look at bad apples. Every organization has them because there is an opportunity for some to grab the benefits of the collective hard work of their colleagues while cutting a few corners. Here are some examples: non-ADA dentists benefit from the lobbying, research, and public relations work of organized dentistry; new dentists accept scholarships and government-backed loans intended to ensure that citizens have access to care but open their practices in the well-heeled suburbs; practitioners expect patients to trust some pretty outrageous treatment plans because "all dentists are known to place patients' interest first." In each case, the burden is being shifted to society or the profession.

Such behavior hurts every dentist, but not very much. And that is why the profession puts up with bad actors. The pro-rata cost of tolerating a few stinkers is less than the individual cost of calling any of them out. In the extreme case, there are dentists who have engaged in massive misrepresentations of the benefits they provide the public who have been tolerated by state boards because these operators generate more in profits each year than the entire budgets of enforcement agencies. Insurance fraud raises the cost of care for everyone, makes ethical dentists less competitive, and tarnishes the reputation of all parishioners.

Item 4.C. in the *ADA Code of Professional Conduct* states clearly that "dentists shall be obliged to report to the appropriate reviewing agency as determined by the local component or constituent society instances of gross or continual faulty treatment by other dentists." I have met a few dentists who say they have mentioned their concerns to colleagues engaged in questionable practices, and I admire this brave and appropriate response. I do not know any dentists who have reported a colleague to a peer review or other jurisdictional board. Many dentists have told me that they simply would not do that. State boards anecdotally report that most disciplinary actions are initiated by patients, with staff members being the second most common source of complaints. Insurance companies also play a large role in identifying and initiating action against abusers of the system.

The profession benefits from fingering bad actors and creating a climate where it is obvious that cheating is not appreciated. But it has largely shifted the burden of this work to others.

There is an ethical core to this issue: there is also a matter of professional etiquette. The part of the problem that is professional etiquette is the norm of refraining from comparing one's work with that of colleagues. No philosopher would say that it is unethical to fairly compare work, and many would argue—as do the courts—that it is in the public's interest to provide all useful information to permit informed decisions by patients. Simply put, refraining from comparing one's work to other practitioners' (etiquette) is not a justification for failing to report colleagues engaged in actions that might damage patients and the profession (ethics).

Aside from the fact that there is a personal advantage to letting others deal with the cheats in the profession, there is an odor that lingers around whistle blowers. I have been working on this problem for about three years, using a computer game that simulates what happens in situations where four kinds of actors interact in a system. One actor is the good, but passive dentist. There are also ethical dentists who take an active role in reporting colleagues engaged in questionable practice. The third category consists of the bad actors

who game the system, up-code on insurance, over treat, fire staff weeks before profit sharing is vested, etc. Finally, there are enforcers who are indemnified for investigating and prosecuting the bad actors as necessary.

The simulation works by considering 16 relationships. What happens to a cheater when he or she interacts with an enforcer is such a relationship. The answer is, I assume, that it goes badly for the cheater. What happens when a good, passive dentist interacts with a cheater? It goes well for the cheater (he or she borrows the good dentist's reputation and professional cover—we could not have cheaters without passive ethical dentists), and it goes poorly for the ethical dentist (each loses a little reputation, pays more in malpractice insurance, and so forth). The simulation runs on a computer until a stable balance is reached.

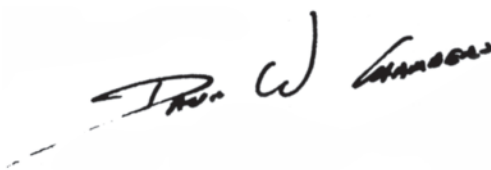
Some of the basic findings from this simulation include the following: the steady state includes about 75% good, passive practitioners, 20% cheaters, 5% enforcers, and virtually no good, active dentists. It does not matter what the original distribution of the four actors is, the proportion of types of actors in any system is determined by the long-term effects of interaction among the actors. These interactions are the design specifications that determine what the system will look like.

We always find the same thing. There is no way to protect the good,

active practitioner or change the number of cheaters by adjusting the interactions among the active dentists, the cheaters, or the enforcers. The number of enforcers is actually a result of the number of cheaters; not the other way around.

The only way to suppress the proportion of cheaters is for passive dentists to support the active ones. When there is a stigma attached by dentists to their colleagues who are willing to question bad practice, cheaters rise to a noticeable level and active dentists withdraw from participation. When good but passive dentists support their colleagues who are courageous in promoting professionalism generally, the number of cheaters is noticeably reduced.

The reason this does not happen, of course, is that the good, passive dentists maintain a personal advantage under either system. They shift the burden.



We could not have  
cheaters without passive  
ethical dentists.

## ETHICS AND LEADERSHIP: Pick Any Two

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Thomas F. Winkler III, DMD, MSD, FACD

### ACD PRESIDENT-ELECT'S ADDRESS

October 7, 2010  
Orlando, Florida

Fellow colleagues and guests: My name is Dr. Barbara Kay, and I am here this morning on behalf of my husband, your President-elect, Dr. Thomas F. Winkler III. He could not be with you because of illness. I know his heart and spirit are with all of you today as you are inducted into this wonderful organization.

It is fitting for me to speak for Tom because the American College of Dentists is especially dear to us both. We were both inducted into the College in the 1980s and served together on the Board of the New England Section. And that, incidentally, is how we met, fell in love, and have now had twelve wonderful years together. In fact, we were known among our friends as the ACD romance!

I wish Tom were here to welcome you this morning, for, unlike me, he is truly a gifted speaker. He usually has a few notes — not a written speech — and then speaks from the heart. You feel his warmth, sincerity, and caring when he speaks, as well as a bit of good humor. No written speech, which I am now about to read to you, can accurately convey his love and devotion to this organization or his wonderful sense of humor.

Now, I will read to you Tom's President-elect's speech.

Welcome to President Tom Wickcliffe, ACD Officers, Regents, Fellows, and our 2010 candidates and guests at this 90th meeting of the American College of Dentists here in Orlando, Florida. The American College of Dentists was formed

in 1920 at the Copley Hotel in Boston, Massachusetts, which also happens to be my hometown.

It was begun by individuals who felt there was a need to “bring together a group of men of outstanding prominence in the profession.” Obviously we now need to change that quote to include the greater percentage of outstanding women in the profession today, too.

To the new Fellows in the audience: a special recognition for your unique accomplishments and dedication to our profession that have led you to Fellowship in the ACD today. You are the 3.5% of our profession so honored with ACD fellowship. And, for all of you “more mature” Fellows here today, this should again be a day to feel proud of your accomplishments. Many of you are sponsors of these candidates and the ACD thanks you for taking the time to nominate them.

Do not think for a moment that your work is done, though, and that we are only an honorary organization. You have joined an active and vibrant group.

My theme this morning is to discuss with you the mission and vision



Dr. Winkler maintains a private practice limited to endodontics in Wellseely, Massachusetts.



of our college. Our mission: to advance excellence, ethics, professionalism and leadership in dentistry. Our vision: to be the leaders in the promotion of excellence, ethics, professionalism, and leadership in dentistry. In particular, I will highlight the roles of ethics and leadership that characterize Fellows of the College.

### Ethics

First, let's discuss the subject of ethics in our profession. I have experienced firsthand the rising costs of dental school education with my daughter Elizabeth's graduation from Tufts University School of Dental Medicine this year. Most of her friends are deeply in debt with school loans. Now they face an uncertain job market in the worst recession since the Great Depression. On top of all this, is the high cost of new technology that has become "necessary" in most dental offices. Beginning a dental practice today is far more expensive than when most of us began our practices.

We have seen the results of greed and arrogance on Wall Street. We, as members of the College, have to stand up against this same greed in our profession. In these trying times, how can we convince our younger and older colleagues alike that ethical and honest behavior is ultimately the cornerstone of success in our profession?

I challenge you, as new members of the American College of Dentists, to go out there and mentor young dentists and dental students. To quote Albert

Schweitzer, "Example is not the main thing in influencing others. It is the only thing."

Ethics and professionalism: can it be taught or is it a part of a person's character before he or she even enters dental school? I believe ethics can be taught and the American College of Dentists is the vehicle for this endeavor.

I am an endodontist and have been a volunteer professor for 40 years at the Tufts dental school. I have also participated for many years on peer review committees, and until recently served for nine years on the Board of the Eastern Dentists Insurance Company, a malpractice company that was formed in Massachusetts in 1991 "by dentists and for dentists." I witnessed firsthand how a lack of ethical behavior leads to malpractice lawsuits. However, I also saw honest and caring dentists facing malpractice suits. The reason being their lack of knowledge about ethical dilemmas in our profession.

EDIC routinely gives courses on malpractice issues. It publishes e-mails and newsletters and gives webinars for its members. Ethics is really the heart of these courses. They are designed to teach dentists how to avoid the situations that bring on malpractice suits.

I am soon to end my tenure of ten years as a Trustee for Tufts University and have been the liaison for the

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University to Tufts School of Dental Medicine, serving as Chair of the Board of Overseers for the Dental School. As a university trustee, teacher, and board chair, I have seen directly the ethical dilemmas faced by college and dental students. These are the problems that go across the desks of our college presidents and dental school deans.

In today's world, courses in ethics and professionalism are necessary in our profession. This is one of our main purposes here at the College: to educate our profession in ethics.

We have been called the "Conscience of Dentistry" and as such, have an obligation to bring these ethics courses to our dental students and our peers. All of the resources needed for these courses are here at ACD on our Web site.

Today, members of several of our sections are teaching ethics courses in our dental schools. They are not only teaching ethics, they are mentoring these young professionals. This is one of the areas where you, as new Fellows, can become involved. We need you to mentor and teach ethics to young dentists, regardless of your proximity to a dental school. And, if you are involved in the Young Dentists Organization, we at ACD need you to positively influence these individuals. The ACD Web site provides you with all the materials needed for these ethics courses. For each of you listening to me this morning, go on our Web site and take our course in ethical dilemmas, you will be amazed how much you will learn!

## LEADERSHIP

The second part of our mission statement which I am addressing today is leadership. You are the leaders of our profession. We need you. In these times of crisis and lack of moral responsibility, we seem to be lacking leaders of character and strong moral behavior, especially in our political arena.

Lee Iacocca, one of the most recognized business executives of all times, addressed this subject a few years ago in his bestseller entitled *Where Have All the Leaders Gone?* Let me restate Lee Iacocca's ten characteristics of leaders.

- Commonsense
- Curiosity
- Charisma
- Character
- Creativity
- Communicator
- Courage
- Competent
- Competitive
- Crisis management

I know this sounds familiar. I hope it feels comfortable. These are the traits of YOU, our members—it's all of you! You are the present and future leaders of our profession. Welcome to the responsibility of leadership.

And I say to you, if our profession is to survive in these difficult financial, political, and international times, we need all of you to become involved and continue as leaders in our profession.

Leaders are also givers. And all of you here this morning have given of your time and energy, not only to your profession, but to your community.



ACD needs your generosity as givers to expand our endowment funding. Without this funding, we could not hope to accomplish our mission. Only the interest that the endowment earns is spendable. To increase endowment funding, the Gies Fellow program was launched. It is named after Dr. William Gies to pay tribute to that outstanding Fellow who was a leader in the formative years of the College.

As a new Fellow, you have the opportunity to participate as a Gies Fellow or Benefactor. Your tax-deductible giving will help to build a solid and dynamic future for the College. If you and other members of your Section know of someone you would like to honor, this is an opportunity to establish a named fund in honor of that individual as a Gies Benefactor.

## Conclusion

My talk, this morning, has been more motivational than informative. Despite all of our self-praise, we all frequently feel insignificant. I have the solution: personal involvement is the key. I urge you to become involved with your Section, mentor young dentists and dental students and nominate new, deserving members.

Someone took the time to nominate you or you would not be so honored today. Those of you who will become fellows of ACD today are the future lifeblood of our organization. When you return home, look around in your Section for colleagues who are also

worthy of nomination. Try to set as your goal to nominate two candidates each year. The nomination process is all online and simple to follow. Without your involvement in nominating new Fellows, our organization would not be able to accomplish its goals. In addition, you receive the gift of knowing you have helped someone else become a Fellow in the College.

Thanks go to our excellent Executive Director, Dr. Stephen Ralls; also to Karen Matthieson, our Office Manager and Assistant to the Executive Director, and to Paul Dobson, our Controllor and Director of Meetings and Staff. Without this superb group, we could not exist.

Our journal under the editorship of Dr. David Chambers is the true intellectual voice of the American College of Dentists and of dentistry. The *Journal* discusses controversial and current topics of great concern to our profession. We are also the only dental journal to collaborate with the American Society for Dental Ethics, our new affiliate. We publish their articles in our journal.

I sat where you are this morning as a new Fellow in 1988, thanks to my sponsors, Dr. Alvin Krakow and Dr. Donald Stackhouse. It was not until 1991, when I became Secretary-Treasurer of the New England Section, that my true involvement and discovery of what ACD stands for began. From then to the present, my inspiration, commitment, and understanding of the special ideals and goals of the College became a reality. Through so many years, I have made many wonderful friends and accomplished so

much, yet there are so many challenges still to be met. As your incoming President of the American College of Dentists, you and I will work together toward the future.

In closing, I would like to give credit to my wife and personal editor, Dr. Barbara Kay, for her assistance in composing my President-elect's speech. She has worked tirelessly for the New England Section of the College for almost 20 years, serving as Editor and Chair. She accepted the Section Newsletter Award for New England yesterday at this meeting. I am proud of her accomplishments in our profession, especially last year when she received the American Association of Women Dentists highest award, the Lucy Hobbs Taylor Award. Of course, failing to give her the credit for helping me with this speech would be an act of plagiarism, which as all of you know is unethical!

Thank you for honoring me with this position. I look forward to the coming year serving as your President.

As a final note, you can see by his closing remarks that my husband is my biggest fan. Tom is VERY HONORED to represent this wonderful organization. Although he is not here today, Tom plans on spending the next year traveling throughout the country representing the College at many Section meetings. ■

## THE NEED FOR LEADERSHIP IN IMPROVING ORAL HEALTH

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William Bailey, DDS, MPH

### CONVOCATION SPEECH

October 7, 2010  
Orlando, Florida

Today we gather to celebrate the pride that goes with achievement; to rejoice in every deed done in harmony with the moment; to recognize that for which we have practiced and prepared; to honor those deserving of praise; and to share with those who support and inspire our successes and future actions. We work together to protect and improve the health of the individuals we treat. As skilled healers we unselfishly serve in communities throughout the nation.

You are here today because you believe in living your lives with integrity and compassion. You are guided by the values of the American College of Dentists: leadership, excellence, ethics, and professionalism. I am struck by the similarity between these values, and those of the U.S. Public Health Service: leadership, excellence, integrity, and service. This similarity is not a coincidence. These are core values that drive us as professionals and caring individuals. We understand the importance of health and contribute in many ways to maintaining and improving the health of others.

Yet we are aware that striking health disparities still exist. Over the past year we have seen changes being made in how we finance and deliver health care. But expanding healthcare coverage for Americans is only a first step to truly reducing the health disparities that plague our country. Reducing and ultimately eliminating health disparities will require more than just giving

Americans an insurance card. We have to address the social determinants of health, such as poverty.

A study published in the December 2009 issue of the *American Journal of Public Health* showed that poverty and dropout rates are at least as important as causes of health problems as smoking is in the United States. On average, poverty showed the greatest impact on health. Smoking was second, followed by being a high school dropout, a non-Hispanic, a Black, an obese individual, a binge drinker, and an uninsured person.

The second step, and one that is just as challenging, is prevention. Prevention is the foundation of our nation's public health system and the U.S. Public Health Service.

One of the goals of the American College of Dentists is to foster the extension and improvement of measures for the prevention and control of oral disorders. Yet we are not doing all we can with regard to prevention. In January, the Surgeon General released her first paper, *The Surgeon General's Vision for a Healthy and Fit Nation*. There is perhaps no more serious challenge to the nation's health and well-being than that posed by obesity. Since 1980—in just 30 years—obesity

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Admiral Bailey is Chief Dental Officer, U.S. Public Health Service; wdb9@cdc.gov

rates have doubled in adults and more than tripled in children. And the problem is even worse among Black, Hispanic, and Native American children. More than two-thirds of adults and more than one in three children are overweight or obese.

You see this in your dental practice and it is affecting the way we provide care. We see the sobering impact of these numbers in the high rates of chronic diseases, such as diabetes, heart disease, and other chronic illnesses, that are starting to affect so many. And they are affecting our children more and more. Recently, a study from the University of North Carolina School of Medicine reported that obese children as young as age three show signs of an inflammatory response that has been linked to heart disease later in life.

For many years, we have encouraged Americans to eat more nutritiously, engage in regular exercise, and maintain healthier lifestyles. *The Surgeon General's Vision for a Healthy and Fit Nation* is an attempt to change the national conversation from a negative one about obesity and illness to a positive conversation about being healthy and being fit—to stop bombarding Americans with what they cannot have and what they cannot eat, and to begin talking about what they can do to become healthy and fit. The Surgeon General believes that exercise is the new medicine. She encourages people to have fun, have a good time, dance, play, and enjoy being healthy and being fit, no matter what size you are.

But for people to do these things, Americans need to live and work in

environments that support their efforts. There is a growing consensus that we, as a nation, need to create communities and environments where the healthy choices are the easy choices and the affordable choices. We should remember that individuals are more likely to change their behavior if they have a meaningful reward; something more than reaching a certain weight or dress size. The reward has to be something that each person can feel, can enjoy, and can celebrate. The real reward is optimal health that allows people to embrace each day and live their lives to the fullest without disease, disability, or lost productivity.

And people cannot achieve health without good oral health. Ten years ago, *Oral Health in America: A Report of the Surgeon General* was released under the leadership of Surgeon General David Satcher and produced through the hard work of many dedicated health professionals. This was a groundbreaking report, the first issued on oral health by any Surgeon General. It focused attention on the “silent epidemic” of oral disease taking place within the United States and the burden this placed on health and quality of life.

The silent epidemic of oral disease continues today.

During the past ten years some advances have been made with regard to increasing access to care, strengthening infrastructure in state oral health programs, increasing the delivery of

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evidence-based preventive interventions, and expanding the safety net. But we are far from achieving our goal of oral health for the nation.

Today: Tooth decay affects more than one-fourth of U.S. children aged two to five, half of those aged 12–15, and more than 90% of adults aged 20 and older.

One in five of all adolescents aged 12–19 years currently has untreated tooth decay.

Advanced gum disease affects up to 12% of adults, and this may be an underestimate. A study released within the last month states that we may be underestimating periodontal disease by 50%.

One-fourth of U. S. adults aged 65 and older have lost all of their teeth.

And although older adults are keeping their teeth in greater percentages than ever before, they are more likely to have unmet treatment needs and to report that their oral health affects their quality of life.

This year, about 35,000 new cases of oral cancer will be diagnosed, and more than 7,600 people, mostly older Americans, will die from oral and pharyngeal cancers.

Additionally, disparities remain, with individuals from some racial and ethnic groups and those from lower-income families experiencing far more oral disease.

And preventive interventions are still underutilized. Water fluoridation is now enjoyed by 72.4% of people living on public water systems; however, nearly 100 million people do not have access to it. Far too few children and teens have dental sealants, especially children that need them most. And use of tobacco

products is still responsible for half of the cases of severe periodontitis and much of the oral cancer. As dental professionals, we still have much work ahead.

Congratulations to those who are receiving fellowship today. The fact that you have been recognized by your peers is a distinct honor. You should be especially proud of this achievement. Your contributions have earned you the special privilege of placing the letters FACD after your name, as appropriate to the occasion. Savor this achievement and I hope you will use it as a springboard to continue your professional and personal growth.

Our Surgeon General, Dr. Regina Benjamin, joins me in thanking all of you for your leadership and efforts to improve the health and lives of others. Together, we are making a difference. It is only through optimal health that individuals and communities can realize their full potential. The health of the nation is critically important, and it cannot be emphasized enough, that oral health is essential to overall health.

Let's all leave here with a new dedication to do all that we can do to improve health and encourage others to take action to make ourselves, our families, and our communities healthier.



## 2010 ACD AWARDS

### ETHICS AND PROFESSIONALISM AWARD



The Ethics and Professionalism Award recognizes exceptional contributions by individuals or organizations for effectively promoting ethics and professionalism in dentistry through leadership, education, training, journalism, or research. It is the highest honor given by the College in this area. The American College of Dentists recognizes the **Kennedy Institute of Ethics at Georgetown University** as the recipient of the 2010 Ethics and Professionalism Award. The Joseph P. and Rose F. Kennedy Institute of Ethics was established at Georgetown University in 1971 by a generous grant from the Joseph P. Kennedy, Jr. Foundation. Today it is the world's oldest and most comprehensive academic bioethics center. The Institute and its library serve as an unequalled resource for those who research and study ethics, as well as those who debate and make public policy. The Kennedy Institute is home to a group of scholars who engage in research, teaching, and public service on issues that include protection of research subjects, reproductive and feminist bioethics, end-of-life care, healthcare justice, intellectual disability,

cloning, gene therapy, eugenics, and other major issues in bioethics. Institute scholars figure prominently among the pioneers of the discipline. They are extending the boundaries of the field to incorporate emerging issues of equality, international justice and peace, and other policies affecting the world's most vulnerable populations.

Accepting the award on behalf of the Institute is Dr. Laura Bishop, Research Associate, National Reference Center for Bioethics Literature.

Selected activities and accomplishments of the Kennedy Institute of Ethics and its National Reference Center for Bioethics Literature are:

- Established a Bioethics Library in 1973 with funding from the Joseph P. Kennedy, Jr. Foundation
- Held its first Intensive Bioethics Course in 1974, combining lecture and interdisciplinary small group discussion
- Graduated the first PhD student from the Kennedy Institute of Ethics, Georgetown University, in 1976
- National Reference Center for Bioethics Literature established at the Bioethics Library in 1985 by the National Library of Medicine, along with a toll-free number for nationwide reference support
- Published the first issue of the *Kennedy Institute of Ethics Journal* in 1991
- Convened the first week-long intensive bioethics course focused on dental ethics in 1974 and stimulated other efforts in dental ethics education

- National Information Resource on Ethics and Human Genetics established at the Bioethics Library of the Institute with funding from the National Human Genome Research Institute at NIH in 1994
- Initiated the High School Bioethics Curriculum Project in 1998
- Faculty participated in authoring the first and second editions of *Ethical Questions in Dentistry* by James T. Rule and Robert M. Veatch
- Established a specific category and classification number (4.1.4) for literature on dental ethics as part of a partnership with ACD and the Professional Ethics Initiative
- Ongoing collection and indexing of literature in ethics and dentistry since at least 1977
- Awarded a three-year \$1,050,000 grant from Qatar National Research Fund to the Bioethics Research Library in partnership with the School of Foreign Service Library in Doha, Qatar, to develop information resources on Islamic medical and scientific ethics
- Islamic Medical and Scientific Ethics Database launched at the Bioethics Research Library
- Developed a special Dental Ethics Symposium for the weeklong Intensive Bioethics Courses in 2010

*The Ethics and Professionalism Award is made possible through the generosity of The Jerome B. Miller Family Foundation, to which we are extremely grateful.*



## William John Gies Award

The highest honor the College can bestow upon a Fellow is the William John Gies Award. This award recognizes Fellows who have made broad, exceptional, and distinguished contributions to the profession and society while upholding a level of leadership and professionalism that exemplifies Fellowship. The impact and magnitude of such contributions must be extraordinary. The recipient of the 2010 William John Gies Award is **Dr. Dale Francis Redig**.



Dr. Redig is recognized for his highly significant contributions to organized dentistry, dental education, oral health care, and his community. His record is replete with a variety of outstanding accomplishments in a multitude of venues. Dr. Redig is held in the very highest regard by his peers.

His achievements and contributions include:

- DDS and Pediatric Dentistry Residency, University of Iowa, College of Dentistry
- Executive Director, California Dental Association
- Dean, University of the Pacific, School of Dentistry
- Fulbright Fellow, University of Baghdad, Baghdad, Iraq
- Department Head, University of Iowa, College of Dentistry

- CEO and Board Chair, Alliance for Dental Reimbursement Plans
- President, American Society of Constituent Dental Executives
- President, Iowa Society of Dentistry for Children
- Member, Board of Directors, The Dentists Company CDA
- Member, ADA Council on Dental Education
- Vice President and Board Member, American Fund for Dental Health
- President-elect, American Association of Dental Schools
- Vice President, Council of Deans, American Association of Dental Schools
- Consultant Education, Federation Dentaire International
- Consultant Preventive Dentistry, United Nations Programme Development, Qatar
- Chair, ADA Special Communications Committee
- Member, ADA Commission on Accreditation of Dental and Auxiliary Educational Programs
- Board Member, Pacific Institute for Health Professions
- Chair, California Committee to Review State Dental Board Procedures
- Board Member, American Academy of Pediatric Dentistry
- Member, Governor's Committee (California) on Utilization of Dental Auxiliaries
- Member, Board of Regents, University of the Pacific
- Member, Corporate Cabinet, Sacramento AIDS Foundation
- Editor, Pedodontics and Preventive Dentistry Section, *Yearbook of Dentistry*
- Numerous publications and awards

## Distinguished Leadership Award

Since its founding in 1920, the American College of Dentists has exemplified leadership. The College was founded by the dental leaders of the time, and dentists have always been selected for Fellowship based primarily on demonstrated leadership in some aspect of dentistry or the community. The Distinguished Leadership Award recognizes individuals having an established record of significant and distinguished leadership in dentistry, public health, or national health policy while in a position of national or international responsibility. This is the most prestigious honor awarded by the College specifically for leadership. This year's recipient of the Distinguished Leadership Award is **Dr. James T. Fanno**.



**Dr. James T. Fanno**

Dr. Fanno's key accomplishments and credentials include:

- BS, Adelbert College
- DDS and MS, Case Western Reserve University School of Dental Medicine
- Speaker, House of Delegates, American Dental Association
- Chair, ADA Committee on Credentials, Rules and Order
- Chair, ADA Council on Ethics, Bylaws and Judicial Affairs
- Lecturer (ADA Liaison), U.S. Dental Schools
- Ex-officio Member, Board of Trustees, American Dental Association
- Delegate, Ohio Dental Association
- Parliamentarian, Ohio Dental Association
- President, Ohio Dental Association
- Chair, Council of Dental Care Programs, Ohio Dental Association



- Chair, Council of Membership Services, Ohio Dental Association
- Chair, Statewide Peer Review Committee, Ohio Dental Association
- Chair, Task Force on Executive Office Facility Analysis, Ohio Dental Association
- Chair, Task Force on Governance, Ohio Dental Association
- Chair, Annual ODA Spring Dental Health and Leadership Conference
- Delegate, American Dental Association
- President, Stark County Dental Society
- Member, Judicial Council, Nominating Committee, Long-range Planning Committee, Restructuring Committee, Task Force on Council Structure, Task Force on Executive Office, Bylaws Revision Committee, Stark County Dental Association
- Parliamentarian, Stark County Dental Association
- Lieutenant Commander, U.S. Naval Reserve

## HONORARY Fellowship

Honorary Fellowship is a means to bestow Fellowship on deserving non-dentists. This status is awarded to individuals who would otherwise be candidates for Fellowship by virtue of demonstrated leadership and achievements in dentistry or the community except that they are not dentists. Honorary Fellows have all the rights and privileges of Fellowship except they cannot vote or hold elected office. This year there are four recipients of Honorary Fellowship.



**DR. PHYLLIS L. BEEMSTERBOER.**

Dr. Beemsterboer has a very distinguished career and her accomplishments in the field of ethics are most notable. She serves as the Associate Dean for Academic Affairs of the Oregon Health & Science University, School of Dentistry. She also serves as the President of the American Society for Dental Ethics.

Highlights of her accomplishments and credentials include:

- BS, MS, University of Michigan, School of Dentistry
- EdD, Pepperdine University, School of Education
- Professor of Periodontology, Oregon Health & Science University, School of Dentistry
- Associate Dean for Academic Affairs, Oregon Health & Science University, School of Dentistry
- Associate Director, Center for Ethics in Health Care, Oregon Health & Science University
- Co-chair of the interprofessional ethics education program, Center for Ethics in Health Care
- President, American Society for Dental Ethics
- Chair of the Oregon Health & Science University All Hill Associate Deans Council
- Member, Omicron Kappa Upsilon
- Member, Sigma Phi Alpha
- Recipient, IADR Oral Health Research Award
- Graduate, Executive Leadership in Academic Medicine (ELAM) Fellowship
- Recipient, American Dental Education Association Gies Fellowship
- Chair, American Dental Education Association Academic Deans Section

- Published in the areas of education, dental ethics, and periodontics
- Author of three textbooks, including *Ethics and Law in Dental Hygiene*
- Service on numerous committees for the ADA Commission on Dental Accreditation and the ADA Joint Commission on National Dental Examinations



**MR. FRANCIS X. McLAUGHLIN, JR.**

Since 2006 Mr. McLaughlin has served with distinction as the Executive Director of the Maryland State Dental Association. In this capacity, his duties have included oversight of the day-to-day operations of the largest professional dental organization in Maryland. With more than 2,200 members, the Association is the lead agency regarding oral health in the state.

Mr. McLaughlin's record of accomplishments includes:

- BA, University of Maryland
- Certificate, Techniques and Strategies of Lobbying, Catholic University of America
- Executive Director, Maryland State Dental Association.
- Recognized advocate for the Maryland State Dental Association in Annapolis and Washington, DC, ensuring that members receive the best in advocacy, continuing education, products, and service lines that the Association can possibly provide
- Director of Political Affairs (ADPAC), ADA
- Provided oversight and direction of ADPAC, one of the nation's largest PACs

- Provided oversight and direction of the ADA grassroots program, which includes more than 13,000 volunteer dentists nationwide who represent the association politically and legislatively
- Planned and directed the agenda for ADA Washington Leadership Conference, which was attended by over 500 dentists and dental society staff
- Oversaw training and education of ADA membership on ADPAC and grassroots program, including presentations at state and regional dental meetings
- Created the ADPAC Partnership for Growth Program, which has resulted in significant increases in PAC revenue and membership for constituent society PACs and provides assistance for constituent dental PACs with recruitment, federal election law compliance, membership retention, and recruitment
- Served as the lead staff liaison to the major party committees for the ADA providing yearly budgets for all ADPAC funds
- Represented ADA at national party conventions and directed planning and arrangements for ADA Leadership
- Board Member, Public Affairs Council representing the ADA
- Officer, National Association of Business Political Action Committees (NABPAC)
- Commander, U.S. Naval Reserve, Intelligence Officer



**MR. DAVID OWSIANY, Esq.**

Mr. Owsiany is Executive Director of the Ohio Dental Association where

he directs day-to-day operations of a 5,500 member organization, including management of 20 employees, oversight of a \$2.5 million annual budget, and interaction with the board officers.

Significant achievements and accomplishments include:

- BA, University of Michigan
- JD, Washington University School of Law
- Executive Director, Ohio Dental Association
- Member, Board of Directors, Ohio Dental Association Services Corporation
- Member, Board of Directors, ODA Foundation
- Member, Ohio State Dental Board, Law and Rules Review Committee
- Member, Ohio State Dental Board, Anesthesia Committee
- Trustee, Ohio Alliance for Civil Justice
- Board of Visitors, Ave Maria School of Law
- Executive Director's Advisory Committee, American Dental Association
- Director of Legal and Legislative Services, Ohio Dental Association
- Administered Ohio Dental Political Action Committee
- Chief of Policy, Ohio Department of Insurance
- President, Buckeye Institute for Public Policy Solutions
- Clerk, Illinois Appellate Court
- Author of multiple articles on legal, public policy, and ethics
- Author of a regular column on dental issues in *ODA Today*

- Compliance Attorney, Nationwide Insurance Company
- Congressional Legal Assistant, United States Judiciary Committee Staff, Washington, DC.



**DR. BRUCE N. PELTIER**

Dr. Peltier is a Professor of Psychology and Ethics at the University of the Pacific, Arthur A. Dugoni

School of Dentistry, San Francisco. He is an expert in dental ethics and executive coaching, and he also maintains a private practice conducting psychotherapy and psychological assessments. Dr. Peltier has been an important resource for work in the field of dental ethics.

His major accomplishments and milestones are summarized below:

- BS, Engineering, United States Military Academy
- MEd, Psychology, Wayne State University
- PhD, Counseling, Wayne State University
- MBA, University of the Pacific, Eberhardt School of Business
- Professor, Psychology and Ethics, University of the Pacific, Arthur A. Dugoni School of Dentistry
- Management Consultant and Executive Coach
- Mentor, National Conference on Ethics in America, United States Military Academy
- Academic Council, University of the Pacific
- President, Professional Ethics in Dentistry Network (now American Society for Dental Ethics)
- Chair, Behavior Science Section, American Dental Education Association
- Chair, Outcomes Review Panel, University of the Pacific, Arthur A. Dugoni School of Dentistry
- Co-Chair, WASC Accreditation Team, University of the Pacific

- President, California Association for Specialists in Group Work
- President, San Francisco Academy of Hypnosis
- Consultant, California State Board of Dental Examiners
- Consultant, California State Board of Psychology
- Subject matter expert, Ethics Summits I, II, and III
- Editorial Board, Issues in Dental Ethics of the *Journal of the American College of Dentists*
- Editorial Board, The School Counselor
- Reviewer, *Journal of the California Dental Association*
- Author of *The Psychology of Executive Coaching*
- Recipient of the Teacher-Scholar Award and Distinguished Lecturer Award, University of the Pacific
- Research Assistant, Stanford University
- Postdoctoral Intern, University of Southern California

## SECTION ACHIEVEMENT AWARD

The Section Achievement Award recognizes ACD Sections for effective projects and activities in areas such as professional education, public education, or community service. The 2010 recipient of the Section Achievement Award is the New Jersey Section. The New Jersey Section is honored for its comprehensive Web site that significantly improves communication within the Section.

## SECTION NEWSLETTER AWARD

Effective communication is a prerequisite for a healthy Section. The Section Newsletter Award is presented to an ACD Section in recognition of outstanding achievement in the publication of a Section newsletter. The award is based on overall quality, design, content, and technical excellence of the newsletter. This year's winner is the New England Section. Honorable Mention recognition will be given to the New York Section and the Tennessee Section.

## MODEL SECTION DESIGNATION

The purpose of the Model Section program is to encourage Section improvement by recognizing Sections that meet minimum standards of performance in four areas: Membership, Section Projects, ACD Foundation Support, and Commitment and Communication. This year the Oklahoma Section earned the Model Section designation.

## LIFETIME ACHIEVEMENT AWARD

The Lifetime Achievement Award is presented to Fellows who have been members of the College for 50 years. This recognition is supported by the Dr. Samuel D. Harris Fund of the ACD Foundation. This year's recipients are:

Melvin H. Amler  
 Arthur A. Dugoni  
 William A. Johnson  
 Paul W. Kunkel, Jr.  
 Eugene S. Merchant  
 Leonard R. Moore  
 Julius N. Obin  
 Lyle E. Ostlund  
 Louis G. Terkla  
 John A. Watson  
 John G. Whinery (posthumous)

## 2010 Fellowship Class

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The Fellows of the American College of Dentists represent the creative force of today and the promise of tomorrow. They are leaders in both their profession and their communities. Welcome to the 2010 Class of Fellows.

Karim Z. Alibhai  
*Bellevue, WA*

Nader E. Alley  
*Little Rock, AR*

Paul J. Allison  
*Montreal, QC*

Jay Alperin  
*Delray Beach, FL*

Dino R. Angelici  
*Mechanicsburg, PA*

Richard J. Angowski  
*Toms River, NJ*

Robert D. Argentieri,  
*Springfield, VA*

B. Denise Armstrong  
*Georgetown, TX*

Steve A. Astuto  
*Amarillo, TX*

Mindelyn T. Austin  
*Tupelo, MS*

William R. Bachand  
*APO, AE, Guam*

Ronald A. Bannerman  
*Halifax, NS*

Kelly Barnett  
*Ozark, MO*

Joseph A. Battaglia  
*Wayne, NJ*

Donald J. Bays  
*Victoria, BC*

Jeffrey L. Beattie  
*Orlando, FL*

Kay S. Beavers  
*Oklahoma City, OK*

Michael L. Beckley  
*Livemore, CA*

Ali Behnia  
*Rockville, MD*

Neal R. Benham  
*Eau Claire, WI*

Veronique Benhamou  
*Montreal, QC*

Bruce W. Bitzer  
*Ridgewood, NJ*

Thomas E. Blockley  
*Chattanooga, TN*

Gerald J. Botko  
*Miami, FL*

Carl T. Bridges  
*Lawton, OK*

Ronald N. Brown  
*Denver, CO*

Gregory G. Browne  
*New York, NY*

Christopher M. Bulnes  
*Tampa, FL*

Alban C. Burke  
*Bronx, NY*

Robert D. Calcote  
*Charleston, SC*

Rita M. Cammarata  
*Houston, TX*

Tom W. Campbell  
*Benicia, CA*

James K. Cantwil  
*Flushing, MI*

Nicholas Caplanis  
*Mission Viejo, CA*

Kerry K. Carney  
*Benicia, CA*

Christopher W. Carpenter  
*Cherry Hills Village, CO*

Robert H. Carroll  
*Toronto, ON*

Joseph B. Castellano  
*Laredo, TX*

Francis J. Cavlovic  
*Omaha, NE*

Bruce Y. Cha  
*Hamden, CT*

Michael A. Chanatry  
*Jacksonville, FL*

Charles C. Chen  
*Bethesda, MD*

David A. Chernin  
*Waban, MA*

Christena Chruszez  
*Toronto, ON*

Peter B. Claussen  
*Panama City, FL*

Andrew C. Cobb  
*Washington, DC*

Matthew E. Cohlmlia  
*Oklahoma City, OK*

Curles C. Colbert, Jr.  
*Detriot, MI*

Mel Collazo  
*Little Rock, AR*

George D. Conard  
*Huntington, WV*

Gary G. Cook  
*Winter Park, FL*

James J. Crall  
*Los Angeles, CA*

Ricardo A. Cuevas  
*Ripon, CA*

David R. Cummings  
*Mission Viejo, CA*

Anthony M. Cuomo <i>Carmel, NY</i>	Howard Ehrenkranz <i>Livingston, NJ</i>	Diana L. Galvis <i>Totowa, NJ</i>	Kurt J. Hassell <i>Bardstown, KY</i>
Robert DeFrancesco <i>Wayland, MA</i>	Carlo Ercoli <i>Rochester, NY</i>	Augusto C. Garcia-Aguirre <i>Aguadilla, PR</i>	Victor L. Hawkins <i>Carmichael, CA</i>
Larry DeGroat <i>Bingham Farms, MI</i>	Barry O. Evans <i>Portland, OR</i>	Michael A. Gardner <i>Toronto, ON</i>	Edward J. Hebert <i>Lake Charles, LA</i>
Tracy M. Dellinger <i>Jackson, MS</i>	Philip Eversman <i>Avon, IN</i>	Charles W. Genrich <i>Lincoln, NE</i>	Monica M. Hebl <i>Milwaukee, WI</i>
Gerriann DiFranco <i>Park Ridge, IL</i>	Walter D. Fain <i>Knoxville, TN</i>	Gary L. Glasband <i>Long Beach, CA</i>	Rhonda M. Hennessy <i>Romulus, MI</i>
Jack Dillenberg <i>Mesa, AZ</i>	Robert C. Fazio <i>Norwalk, CT</i>	John Gloag <i>Vancouver, BC</i>	John A. Herzog <i>Danvers, MA</i>
Charles J. Dombrowski <i>Altoona, PA</i>	Peter Fendrich <i>London, ON</i>	Jamie D. Goad <i>Carrizozo, NM</i>	Edward R. Hills <i>Aurora, OH</i>
Edward M. Dore <i>Ancaster, ON</i>	Alan E. Fetner <i>Jacksonville, FL</i>	Gregory G. Goggans <i>Douglas, GA</i>	Joseph H. Holcomb <i>Crockett, TX</i>
John M. Doris <i>Marietta, GA</i>	John Ficarelli <i>Newton Centre, MA</i>	Reginald H. Goodday <i>Halifax, NS</i>	Craig S. Hollander <i>St. Louis, MO</i>
Gila C. Dorostkar <i>Greenbrae, CA</i>	Steven J. Filler <i>Birmingham, AL</i>	Michael A. Gordon <i>Schererville, IN</i>	John K. Holman <i>Tupelo, MS</i>
Gary L. Dougan <i>Long Beach, CA</i>	Jay P. Fisher <i>Jackson, TN</i>	M. Gary Greenbaum <i>Rockville, MD</i>	S. Edward Hopwood <i>Clearwater, FL</i>
Jeffrey D. Dow <i>Newport, ME</i>	Gerald L. Foley <i>Kansas City, MO</i>	Lance F. Grenevicki <i>Melbourne, FL</i>	Glen D. Houston <i>Oklahoma City, OK</i>
Ronald G. Downey <i>Lexington, VA</i>	Bryan G. Foote <i>Columbia, MO</i>	Jerome Haber <i>Wellesley, MA</i>	Stephen I. Hudis <i>Princeton, NJ</i>
Stephanie J. Drew <i>West Islip, NY</i>	Jerome S. Forman <i>Kenilworth, NJ</i>	Christopher G. Halliday <i>Rockville, MD</i>	Stueart L. Hudsmith <i>Memphis, TN</i>
Rena N. D'Souza <i>Dallas, TX</i>	John T. Frey <i>Belmont, MI</i>	Jeffrey P. Halvorson <i>Grand Rapids, MI</i>	James M. Hudson <i>Decatur, IL</i>
Michael T. Duffy <i>Oklahoma City, OK</i>	Ronald E. Fritz <i>Rancho Santa Fe, CA</i>	Mark T. Hanstein <i>Oklahoma City, OK</i>	Mark J. Humenik <i>Northbrook, IL</i>
Richard W. Dycus <i>Cookeville, TN</i>	Terry F. Fugetta <i>Metairie, LA</i>	Stephen R. Harris <i>Farmington, MI</i>	C. Lynn Hurst <i>San Antonio, TX</i>
Mark A. Egbert <i>Seattle, WA</i>	Richard J. Galeone <i>Landsdale, PA</i>	Clifford R. Hartmann <i>West Allis, WI</i>	Robert P. Iovino <i>Southampton, NY</i>



Lisa E. Itaya <i>San Francisco, CA</i>	Frederick J. Lacey <i>Binghamton, NY</i>	Robert K. Manga <i>Garden Ridge, TX</i>	Merle Nunemaker <i>Kansas City, MO</i>
Andrea D. Jackson <i>Clinton, MD</i>	Jeffrey J. Laro <i>Charleston, SC</i>	Michael R. Martell <i>Cedar Lake, IN</i>	Dennis P. Nutter <i>Fairfield, CA</i>
Nancy L. Jacobsen <i>Oklahoma City, OK</i>	Noel Larsen <i>Portland, OR</i>	Raymond K. Martin <i>Mansfield, MA</i>	Kevin S. Oakes <i>Frederick, MD</i>
Brian B. Jacobus <i>Port St. Lucie, FL</i>	Bennett I. Lax <i>Green Island, NY</i>	Jerome M. Mayer <i>Clayton, MO</i>	Paul T. Olenyn <i>Burke, VA</i>
Margot H. Jaffe <i>New York, NY</i>	Irving S. Lebovics <i>Los Angeles, CA</i>	Michael J. Mayhew <i>Boone, NC</i>	Gordon M. Organ <i>Mississauga, ON</i>
Daniel N. Jenkins <i>Corona, CA</i>	Jessica Y. Lee <i>Chapel Hill, NC</i>	David H. McCarley <i>McKinney, TX</i>	Susan M. Orwick-Barnes <i>Knoxville, TN</i>
Viren L. Jhaveri <i>Old Westbury, NY</i>	Maureen H. Lefkoff <i>Columbia, MD</i>	Robert J. McGee <i>Leesburg, GA</i>	Norman V. Palm <i>Grand Rapids, MI</i>
Zelton G. Johnson <i>Flint, MI</i>	Michael F. Leifert <i>New York, NY</i>	Frederick H. McMillen <i>Johnston, RI</i>	Paul A. Palo <i>Winter Haven, FL</i>
Barton S. Johnson <i>Seattle, WA</i>	W. Thomas Lemons <i>Palmyra, MO</i>	Robert L. Meador, Jr. <i>Birmingham, AL</i>	William G. Parrish <i>Gainesville, GA</i>
Gary O. Jones <i>Mesa, AZ</i>	Stuart E. Lieblich <i>Avon, CT</i>	Mark S. Medel <i>Owosso, MI</i>	J. Benjamin Patrick <i>Athens, GA</i>
William T. Kane <i>Dexter, MO</i>	Hal R. Lippman <i>Hollywood, FL</i>	Lauro F. Medrano-Saldana <i>Brooklyn, NY</i>	Thomas C. Patterson <i>Memphis, TN</i>
Athanasios Karamitsos <i>Laval, QC</i>	Mark S. Lisagor <i>Camarillo, CA</i>	W. Scott Meldrum <i>Birmingham, MI</i>	Luis A. Perez <i>Flint, MI</i>
Paul F. Kenworthy <i>Burlington, VT</i>	Anthony Liscio <i>Toronto, ON</i>	Scott J. Merkelson <i>Bloomfield, CT</i>	Joseph F. A. Petrone <i>Pittsburgh, PA</i>
Paul E. Klein <i>Boynton Beach, FL</i>	Eugene A. Litteken <i>Ardmore, OK</i>	David T. Moore <i>Albuquerque, NM</i>	Andre Phaneuf <i>Laval, QC</i>
Christopher K. Klein <i>Mt. Vernon, IL</i>	John L. Little <i>Sea Girt, NJ</i>	Archibald D. Morrison <i>Halifax, NS</i>	James T. Phillips <i>Tifton, GA</i>
Michael G. Koslin <i>Birmingham, AL</i>	Steven D. London <i>Port Jefferson, NY</i>	John M. Murray <i>Brielle, NJ</i>	Sally-Jo Placa <i>Farmingdale, NJ</i>
Joe W. Krayner <i>Mt. Pleasant, SC</i>	Teri B. Lovelace <i>Abilene, TX</i>	Gary L. Myers <i>Birmingham, AL</i>	Jaleh Pourhamidi <i>Henderson, NV</i>
Bradley J. Krivohlavek <i>Norfolk, NE</i>	Rob R. Lovell <i>Traverse City, MI</i>	Thomas W. Nabors <i>Nashville, TN</i>	Donald A. Presley <i>Baldwyn, MS</i>
Akshay Kumar <i>Hackensack, NJ</i>	Richard G. Lubman <i>Mountain View, CA</i>	William S. Nantz <i>Beaumont, TX</i>	Gilbert A. Principe <i>Mt. Dora, FL</i>
	Elizabeth R. MacSween <i>Orleans, ON</i>	Leigh-Anne T. Nevins <i>Montgomery, AL</i>	Kevin T. Race <i>Brookfield, WI</i>
	David L. Maddox <i>Tulsa, OK</i>	Rodney S. Nichols <i>Milwaukie, OR</i>	Francisco Ramos-Gomez <i>Los Angeles, CA</i>
	Sabrina Mancini <i>Montreal, QC</i>	Blake Nicolucci <i>London, ON</i>	Kenneth L. Reed <i>Tucson, AZ</i>



Colin S. Richman <i>Atlanta, GA</i>	Keith T. Sellers <i>Charlotte, NC</i>	Samuel Strauss <i>Toronto, ON</i>	Cynthia L. Weideman <i>Fair Oaks, CA</i>
Michael R. Roberts <i>McMinnville, TN</i>	Akira Senda <i>Aichi-ken, Japan</i>	James L. Strawn <i>Fort Pierce, FL</i>	Martin W. Werschky <i>Flint, MI</i>
William F. Rocker <i>Holland, MI</i>	R. Scott Shaddy <i>Omaha, NE</i>	Janice M. Sugiyama <i>Carpinteria, CA</i>	Karen P. West <i>Las Vegas, NV</i>
H. Winslow Rogers <i>Rocky Mount, NC</i>	Terance A. Shapero <i>North York, ON</i>	David M. Sullivan <i>Cincinnati, OH</i>	Steven B. Whitaker <i>Springdale, AR</i>
Lance Gregory Rose <i>Beaver, PA</i>	Nader Sharifi <i>Chicago, IL</i>	Lawrence J. Sutton <i>Ocala, FL</i>	Robert K. White <i>Irving, TX</i>
Lawrence P. Rossoff <i>Richmond, BC</i>	Beth A. Shelton <i>Tupelo, MS</i>	William T. Sylvia <i>Lawrence, MA</i>	James L. Willey <i>Elburn, IL</i>
Danielle R. Ruskin <i>New Hudson, MI</i>	Ellen D. Shemancik <i>Nashville, TN</i>	Richard G. Tami <i>Woodbridge, VA</i>	Mark D. Williams <i>Meridian, MS</i>
David Sage <i>Woodstock, ON</i>	Eugene B. Shoemaker <i>Waukesha, WI</i>	Carl G. Tempel <i>Gettysburg, PA</i>	David O. Willis <i>Louisville, KY</i>
Deepinder K. Sahota <i>Fremont, CA</i>	Deven V. Shroff <i>Ellicott City, MD</i>	Thomas R. Tempel, Jr. <i>Alexandria, VA</i>	Nathan D. Willis <i>Bluff City, TN</i>
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Eugene T. Santucci <i>San Francisco, CA</i>	Kent C. Simmons <i>Albany, GA</i>	Earl G. Thomas <i>Mobile, AL</i>	Roger J. Wise <i>Marblehead, MA</i>
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# THE CHALLENGE, ACCESS, RISKS, AND DEFICITS OF EVIDENCE-BASED DENTISTRY

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## ABSTRACT

The ultimate goal of evidence-based health care (EBH) and evidence-based dentistry (EBD) is the improvement of health of our patients, our practices, and our families. The mechanics of balancing these in the face of overwhelming and increasing information is a challenge. With this challenge come the benefits of access to knowledge that can improve health, the legal risks for inattention, and arguments to the contrary. This conceptual introduction does not provide the truth—it provides one viewpoint. Clinicians will need to decide for themselves if and when they might (or might not) chose to embrace an evidence-based approach to healthcare improvement.

## THE CHALLENGE

The goal of evidence-based health care, and more specifically evidence-based dentistry (EBD), is to improve health. The mechanism for accomplishing this is by integrating: (a) the current best evidence with (b) clinical judgment and (c) the patient needs, values, and circumstances to improve health (Straus et al, 2005). Beginning with the end in mind, how can one improve health?

Over the last 20 years clinicians at the Institute of Healthcare Improvement ([www.ihi.org](http://www.ihi.org)) (led by Dr. Donald Berwick who currently heads the U.S. Centers for Medicaid and Medicare Services), successfully developed, tested, and implemented a process to continually improve health globally. The essential process is embedded in answering three questions: (a) What do I want to improve? (b) What can I do to improve? and (c) How will I know that I improved? The first and third questions require assessments of clinical judgment and patient knowledge, respectively, and can be characterized as “know what” and “know how” (Niederman & Leitch, 2006).

The second question is the challenge. To improve health, one needs access to the current best evidence. Yet, it is highly unlikely that practicing clinicians can stay current. Estimates from ten years ago indicated that more than 500 clinical trials are published annually in each dental clinical specialty and that this number is increasing at approximately 10% per year. In other words, to stay current, clinicians would need to identify,

obtain, read, appraise, and decide whether to implement more than one article per day, 365 days per year for the rest of their clinical lives (Niederman et al, 2002). This was a Herculean task ten years ago, more so today, and one unlikely to be fulfilled by most clinicians. Making clinical life more complicated, simply deciding among the results of clinical trials with conflicting results is difficult.

Fortunately, knowledge creators provide guidance for this in the context of an “evidence pyramid” and tools to use it (See Gune article, page 41 in this issue). In this pyramid, the higher the level of evidence, the more likely the evidence is to predict what would occur in one’s practice. Conversely, the lower the level of evidence, the less likely it is to predict what would occur in ones practice. In other words, a higher level of evidence “trumps” a lower level of evidence. This both captures the concept of a “fair test of treatments” and distills the historical evolution of this concept from 1550 BCE and through Sir Francis Bacon’s scientific method to the current time. ([www.jameslindlibrary.org](http://www.jameslindlibrary.org)).

The highest level of evidence is a systematic review of clinical trials. This

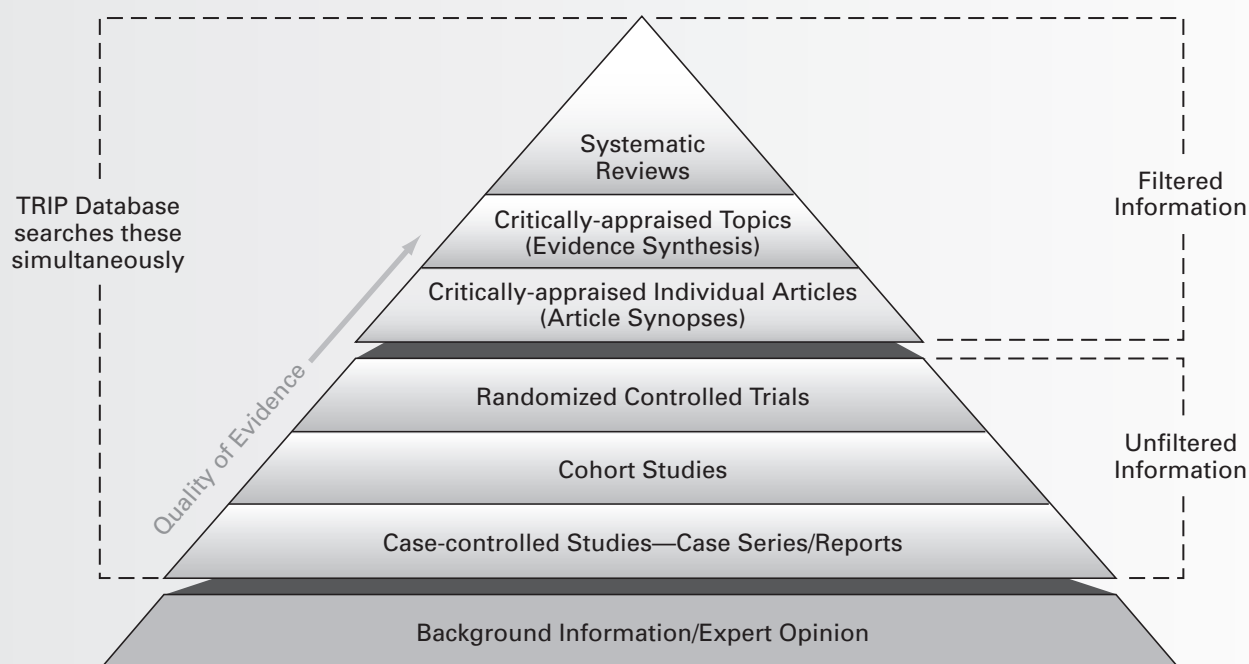


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## THE PYRAMID of Quality of Evidence



can be compared to the lowest level of evidence, the traditional narrative review or expert opinion. To create a systematic review, knowledge workers systematically search the world's clinical literature to identify human clinical trials, critically appraise those trials for validity and clinical impact, and distill that literature into usable pieces. In most cases, all of this is done independently in duplicate, and then reviewed by a third person prior to publishing. The term "systematic review" derives from this systematic approach.

The contrast with traditional narrative review or expert opinion is marked. Systematic reviews, like laboratory experiments, contain explicit documentation for each step in the process, can be independently verified, and are characterized by impartiality. Narrative reviews are more easily subject to the author's preconception, and are therefore more prone to bias. For example, systematic reviews are based on a focused question, use stated and formal methods to locate all relevant studies, employ standardized appraisal criteria,

base quantitative conclusions on quantitative data, and present results using statistical analysis. By contrast, traditional reviews of the literature address broad issues, have no clear statement of methods used, employ author selected studies, and present the reviewer's opinion as dichotomous results (Needleman, 2002).

### ELECTRONIC EVIDENCE ACCESS

A key consideration for clinicians is how closely the reported information from systematic or narrative reviews can be applied to a patient in one's practice. For example, at the extreme, a clinical trial of 1,000 people carried out in multiple cities (or a systematic review of 1,000 trials) is more likely to predict a clinical outcome in one's practice than a case report of one person in one city (or one trial). Similarly, a prospective trial comparing two therapeutics over time is more likely to predict cause and effect (and be applicable in one's practice) than a study at one time point.

The astute, well informed and well read clinician might be misled to feeling secure that they are familiar with, implement, and practice using the current

best evidence. And, fortunately, there are Web sites and search engines that make this information freely accessible and help clinicians achieve this goal (see sidebar).

Conversely, if this skill set may have passed them by, there are also textbooks (Richards et al, 2008), Web sites with training programs (Center for Evidence-Based Dentistry, Oxford, [www.cebd.org](http://www.cebd.org); the Global Center for EBD, [www.EviDentista.org](http://www.EviDentista.org)), and in-person training (ADA/Forsyth EBD training program, [www.ada.org/forsythcourse.aspx](http://www.ada.org/forsythcourse.aspx); and Oxford EBD training program, <http://cpd.conted.ox.ac.uk/ebhc/courses/ebd>) that can provide this training.

Interestingly, these organizations, Web sites, and training programs are providing lay-centric information and tools so that patients, clinicians, organizations, and governments can easily access and evaluate the current best evidence. Thus, like *Consumer Reports* and *Zagat Survey*, this information is becoming universally available on the Internet.

## Publicly Available Resources for EBD

## 1. EVIDENCE-BASED GUIDELINES

ADA Center for Evidence-based Dentistry Clinical Recommendations  
<http://ebd.ada.org/clinicalrecommendations.aspx>

National Guidelines Clearinghouse (NGC)  
<http://guideline.gov>

National Institute for Health and Clinical Excellence Public Health Guidance  
<http://guidance.nice.org.uk/Topic/MouthDental>

NHS Evidence—Oral Health  
[www.library.nhs.uk/ORALHEALTH/SearchResults.aspx?tabID=288&catID=2128](http://www.library.nhs.uk/ORALHEALTH/SearchResults.aspx?tabID=288&catID=2128)

TRIP Database (filter by guidelines)  
[www.tripdatabase.com](http://www.tripdatabase.com)

## 2. SUMMARIES OF SYSTEMATIC REVIEWS

ADA Center for Evidence-based Dentistry Plain Language Summaries  
<http://ebd.ada.org/PLS/PlainLanguageSummaries.aspx>

CDC Guide to Community Preventative Services  
[www.thecommunityguide.org](http://www.thecommunityguide.org)

The Centre for Reviews and Dissemination (CRD)  
[www.crd.york.ac.uk/crdweb](http://www.crd.york.ac.uk/crdweb)

NHS Evidence—Oral Health  
[www.library.nhs.uk/ORALHEALTH/SearchResults.aspx?tabID=289&catID=2128&](http://www.library.nhs.uk/ORALHEALTH/SearchResults.aspx?tabID=289&catID=2128&)

Global Center for Evidence-based Dentistry  
<http://us.evidentista.org/index.aspx>

## 3. SYSTEMATIC REVIEWS

CDC Guide to Community Preventative Services  
[www.thecommunityguide.org](http://www.thecommunityguide.org)

The Cochrane Database of Systematic Reviews  
[www.ohg.cochrane.org/reviews.html](http://www.ohg.cochrane.org/reviews.html)

AHRQ Evidence Reports  
[www.ahrq.gov/clinic/epcindex.htm](http://www.ahrq.gov/clinic/epcindex.htm)

The Centre for Reviews and Dissemination (CRD)  
[www.crd.york.ac.uk/crdweb](http://www.crd.york.ac.uk/crdweb)

EviDents search engine  
[www.evidents.org](http://www.evidents.org)

PubMed using Clinical Queries feature with search filters for systematic reviews  
[www.ncbi.nlm.nih.gov/entrez/query/static/clinical.shtml#reviews](http://www.ncbi.nlm.nih.gov/entrez/query/static/clinical.shtml#reviews)

Trip Database (filter by systematic reviews)  
[www.tripdatabase.com](http://www.tripdatabase.com)

## 4. SUMMARIES OF SINGLE STUDIES

PubMed Clinical Queries  
[www.ncbi.nlm.nih.gov/entrez/query/static/clinical.shtml](http://www.ncbi.nlm.nih.gov/entrez/query/static/clinical.shtml)

Global Center for Evidence-based Dentistry  
<http://us.evidentista.org/index.aspx>

EviDents search engine  
[www.evidents.org](http://www.evidents.org)

Trip Database (filter by evidence-based synopses)  
[www.tripdatabase.com](http://www.tripdatabase.com)

## VARIATION, RISK, AND “STANDARDS OF CARE”

Variation in health care is chronicled yearly in the *Dartmouth Atlas of Healthcare* ([www.dartmouthatlas.org/default.php](http://www.dartmouthatlas.org/default.php)). Its findings indicate that extraordinary variations in care and outcomes occur across the U.S. Of significant concern is the consistent observation that increasing health expenditures do not correlate with improved outcomes of care. The Harvard surgeon, Atul Gawande, highlighted this variation in a 2009 *New Yorker* article looking at McAllen, Texas ([www.newyorker.com/reporting/2009/06/01/090601fa\\_fact\\_gawande](http://www.newyorker.com/reporting/2009/06/01/090601fa_fact_gawande)). McAllen, Texas, has the highest cost of care in the U.S. and one of the highest mortality rates. Yet the cost of care and mortality rates in comparable southern and northern communities can be 50% that of McAllen. These findings are not new and are not confined to surgical or medical care. A 10-year-old report in *Readers Digest* highlighting the variability of dental treatment plans (Echenbarger, 1997). The *Reader's Digest* report mirrors a highly regarded series of scientific studies demonstrating significant variability in dental diagnosis and treatment among dental school clinical teaching faculty (Bader & Shugars, 1997).

If we all practice evidence-based health care, why is there so much variation? The work of Nobel prizewinner David Kahneman and his colleagues (Kahneman & Klein, 2009) may shed light on this unseen variability in our clinical practices. When faced with exactly two choices, clinicians can readily make a choice. However, when faced with three or more choices (e.g., new diagnostics, new therapeutics, etc.), clinicians defer to what they have always done (Redelmeier & Shafir, 1995). The volume of new, and potentially conflicting information, can therefore add to our clinical variability.

To paraphrase Carl Sagan: “The absence of evidence in my practice is not evidence of absence.” Of particular note, the U.S. Supreme Court recognized the utility of the evidence pyramid and its probability to predict causality in their 1993 decision of *Daubert v. Merrill Dow*. Currently, the World Health Organization and the U.S. Department of Health and Human Services and its subsidiary organizations, the Centers for Disease Control and Prevention and the National Institutes of Health, all support evidence-based healthcare. Similarly, independent professional organizations, including the U.S. Institute of Medicine, the American Medical Association, the American Dental Association (ADA), and the Federation Dentaire Internationale, all support evidence-based health care. On exactly this issue, in 2010 the ADA’s Council on Dental Accreditation mandated that all U.S. oral health training programs include EBD training.

Thus, the U.S. “standard of care” is evolving. It is evolving from the practice patterns of local communities and specialized clinicians toward alignment with international standards for health-care evidence.

### PERCEIVED DEFICITS OF EVIDENCE-BASED DENTISTRY

Iconoclasts and traditionalists will dismiss EBD with one or both of two thoughts:

(a) It is too technically difficult to implement, and cannot be implemented perfectly. (The converse is also true: perfection is the enemy of good.) (b) All the evidence is not in, and even if it were, it still would not be definitive. (This has been true throughout history and will continue to be true.)

Examples of implementation avoidance of clinical evidence abound. The

classic example of underuse is citrus by the British Navy. James Lind, in 1747, carried out the first controlled trial and demonstrated that citrus prevents scurvy. It took 50 years for the Navy to mandate the use of citrus, and another 200 years for citrus to become the Navy’s standard scurvy preventive measure ([www.jameslindlibrary.org](http://www.jameslindlibrary.org)).

U.S. dentistry has been similarly slow to implement comprehensive prevention for the world’s most common infection—caries. The caries prevention measures, fluoride varnish and sealants, can reduce the incidence of caries by almost 50% and 90%, respectively. Recommendations by the Centers for Disease Control and Prevention, the American Dental Association, and the American Academy of Pediatric Dentistry all support fluoride varnish and sealant. The recommendations of these organizations are all based on systematic reviews of randomized controlled trials. In spite of these recommendations, and the systematic reviews upon which they are based (Ahovuo-Saloranta et al, 2008; Hiiri et al, 2010; Marinho et al, 2002), the U.S. Department of Health and Human Services Healthy People data indicates that in 1990 only 10% of children who needed sealants had them. By 2010 this increased to 25%—a substantial improvement—but that still leaves 75% of the population untreated.

### CONCLUSION

In attempting to improve the health of our patients, our practices, and our families, we might all benefit from access to the current best clinical evidence. We read *Consumer Reports* to select our cars and cameras, and we read *Zagat Surveys* to identify the current best restaurants, hotels, resorts, golf courses, and rides at Disneyworld. Is it so far-fetched that we (and our patients) might also seek to know what are the current best clinical

In 2010 the ADA’s Council on Dental Accreditation mandated that all U.S. oral health training programs include EBD training. Thus, the U.S. standard of care is moving toward alignment with an evidence-based approach to care improvement.



diagnostics and treatments? Is there a reason why we do not ask where a pilot trained when boarding a plane, but we do routinely ask this question of clinicians? Is this because pilots are routinely retested and re-credentialed (and go down with their planes), whereas health professionals do not? And why is it, as annually reported by the *Dartmouth Atlas of Healthcare*, that practice patterns are most significantly influenced by where one trained and on insurance reimbursement (www.dartmouthatlas.org), rather than the best evidence, clinical judgment, and patient's needs, values, and circumstances?

Isaacs and Fitzgerald (1999) facetiously suggested several origins and alternatives to evidence-based dentistry, and how this might lead us to vary from our best intentions:

- Eminence-based dentistry—where white-haired clinicians promote outdated interventions with increasing confidence over an impressive number of years.
- Vehemence-based dentistry—where stridency is the mechanism of inducement
- Eloquence-based dentistry—where sartorial elegance and verbal eloquence are substitutes for evidence.
- Diffidence-based dentistry—where the clinician does nothing from a sense of despair.
- Nervousness-based dentistry—where fear of litigation stimulates overtreatment or undertreatment.

- Confidence-based dentistry—where self-assured clinicians pursue interventions in spite of the current best evidence to the contrary.

I recall an eminent, vehement, eloquent, and confident clinical instructor characterizing his most successful clinical case. The patient had periodontal disease and was treated with surgery, endodontics, extractions, and prosthetics—multiple times. Ultimately, the patient had full mouth extractions, implants, and prosthetics. How much more “effective” might therapy have been if the clinician considered the possibility that periodontal disease is a preventable infection that, in refractory cases, can be controlled with a one-week course of generic antibiotics (van Winkelhoff et al, 1992)?

We can all do better. ■

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## A CLINICIAN'S PERSPECTIVE ON EVIDENCE-BASED DENTISTRY

Edward M. Feinberg, DMD, FACD

### ABSTRACT

Evidence-based dentistry seems to be more popular with researchers and those in policy positions than with clinicians. A private practitioner looks at the difference between the promise of evidence-based dentistry, which urges a blend of science, clinical judgment, and patient preferences, and the actuality of the rhetoric of rigorous and formulaic clinical trials. The same dichotomy exists in medicine, where the concept originated. Without subscribing to the formality of evidence-based dentistry, practitioners can place a valid scientific foundation under their practices by avoiding unproven assumptions, carefully monitoring outcomes, using measures that are clinically relevant, relating both positive and negative outcomes to possible explanations, and cautiously introducing new techniques. The standards for publishing clinical research seem to favor adherence to methodological rules over useful of outcomes.

Everyone would agree that dentistry should be practiced according to scientific principles. Pick up any journal or dental tabloid, however, and it is not uncommon to see some rather dubious restorative treatments offered with little more than photos of outcomes but no theoretical grounding or even an argument that the treatment is applicable to patients generally. In these publications, the new and hi-tech gadgets or materials are not evaluated for fit with theory, impact on other conditions such as periodontal health, or their longevity. Practitioners who lack experience in the general areas of care where new innovations are lauded may become easy targets for what amount to little more than marketing gimmicks masquerading as science. Clinicians may be less discerning today than in the past, so they are more accepting to what an advertiser or endorsing dentist says. Too often, economics is the standard rather than long-term overall oral health. It is even possible to characterize some of this behavior as “aimless experimentation,” with patients serving as the guinea pigs.

There is also, in my opinion, too much emphasis placed on the “art” of dentistry. Dental procedures can be transformative. They make patients attractive, and when patients feel attractive, their self-esteem and self-confidence increases. Dentistry has acquired an amazing ability to almost perfectly mimic or even improve on nature. It is one of the few fields where everything is custom-made for the patient. Fine dentistry in this respect is very much

akin to the most exquisite jewelry. This is one of the traits that makes dentistry fun for dentists. The literature and continuing education presentations are replete with testimonials and photographs of immediate and life-changing treatments. Unfortunately, there is very little long-term follow-up on such results.

But density is half art and half science. The art has to be done well and the science has to support the interventions. There must be excellence in both areas, and they must be balance or mutually supporting reasons for each treatment choice. Lifelong, comprehensive oral health is the goal.

### WHAT IS EVIDENCE-BASED DENTISTRY?

ADA's definition of evidence-based dentistry is: “Evidence-base dentistry is an approach to oral health care that requires the judicious integration of systematic assessments of clinical relevant scientific evidence relating to the patients' oral and medical condition and history, together with the dentist's clinical expertise and the patient's treatment needs and preferences.” Notice that there are three parts, presumably each of which is necessary.

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Practitioners can and should make significant contributions to the profession. Unfortunately, there are too many barriers preventing clinicians from contributing to scientific advancement in dentistry.

Because the current climate in the profession emphasizes marketing, experimentation, and art over science, a movement dedicated to evidence-based dentistry seems to be just what the doctor ordered. But is it? Where is the evidence that dentists who use this approach are providing superior care?

The evidence-based movement has already had many well-publicized conferences. Evidence-based “champions” are graduating from these conferences with instructions to spread the gospel and are given starter kits for public-relations efforts. An impression is growing that the Internet has the answers and those who have not confirmed their techniques on the Net are practicing outside the pale of professionalism. This may be another example of gadgets driving dentistry, but the science has yet to justify this approach. The mantra of advocates for evidence-based approaches to practice is that “only the best evidence should be used.” “Best” in this case usually means reports of rigorous research methods rather than information most suitable for the dentist or the patient.

### PROBLEMS WITH RESEARCH STUDIES

False actions can result from over reliance on statistics and statistical distortion of the data. Even when the science is sound, its application may be flawed; and systematic reviews are not what is needed to correct this problem. “The scientific method [in clinical trials] of testing hypotheses by statistical analysis stands on a flimsy foundation” says science writer Tim Siegfried (<http://whyfiles.org/siegfried/story17>). Much the same point was made recently by Dr. Michael Glick in his ADA editorial calling

for a standard of reporting measures of effect in addition to p-values (Glick & Greenberg, 2010).

Huge amounts of money are spent by manufacturers on tests that are often flawed or designed inappropriately, that examine unrepresentative or small samples, and that apply incorrect methods of analysis. “Even when performed correctly, statistical tests are widely misunderstood and frequently misinterpreted. As a result, countless conclusions in the scientific literature are erroneous, and tests of medical dangers or treatment are often contradictory and confusing” (Siegfried, 2010). The claim of advocates of evidence-based dentistry that poor studies should not be used as guides for practice is not logically equivalent to the conclusion that experimentally rigorous studies are useful for practice.

Sometimes researchers or their sponsors intend to mislead dentists when they make claims, but most often false findings get out unintentionally. There are natural pressures in universities to “publish or perish” or get grant funding, and industry cares deeply about what finds its way into the literature and subsequently in the ads with footnotes in too-small text at the bottom of the page. Studies with significant results are more likely to be published than are inconclusive investigations. Patrice Lewis opines: “We tend to elevate scientists to towering status because they possess great knowledge and have the ability to draw conclusions based on unbiased data. We think just because someone has academic credentials, his or her methods are sound, the ethics are above reproach, and the conclusions infallible. But such is not always the case” ([www.wnd.com/index.php/index.php?pagelid=127063](http://www.wnd.com/index.php/index.php?pagelid=127063)). Certainly, expertise in how to perform clinical trials is different from the expertise of knowing what dentists need in order to provide the best care to patients.

## THE ORIGINS OF EVIDENCE-BASED DENTISTRY

Where did the movement for evidence-based dentistry come from? It is an import from medicine. So it would be natural to inquire how evidence-based medicine has fared.

Dr. Jerome Groopman, a physician and chief of experimental medicine at Beth Israel Deaconess Medical Center in Boston, outlines his concerns about evidence-based medicine in his book *How Doctors Think*. "A movement is afoot to base all treatment decisions strictly on statistically proven data. This so-called evidence-based medicine is rapidly becoming the canon in many hospitals. Treatments outside the statistically proven are considered taboo until a sufficient body of data can be generated from clinical trials. Of course, every doctor should consider research studies in choosing a therapy. But today's rigid reliance on evidence-based medicine risks having the doctor choose care, possibly solely, by the numbers. Statistics cannot substitute for the human being before you: statistics embody averages, not individuals. Numbers can only complement a professional's personal experience with a drug or a procedure, as well as his knowledge of whether a 'best' theory from a clinical trial fits a patient's particular needs" (Groopman, 2004).

This physician worries that students will not achieve excellence as physicians if they are confined to learning algorithms based on research studies according to the evidence-based approach. Algorithms tend to discourage doctors from thinking independently and creatively. "The next generation of doctors is being conditioned to function like well-programmed computers that operate within a strict binary framework. Instead of expanding a doctor's thinking, algorithms can constrain it," he maintains.

Dr. David Sackett, the "father" of evidence-based medicine and his colleagues (1996), noted at the beginning of the movement that "the transfer of science into clinical practice remains a challenge because practitioners often face individual needs and demands that are not reflected in the required rigors of randomized controlled clinical trials." He continued, "All numbers don't have equal validity or certitude when making treatment decision." Physicians David Kent and Rodney Hayward agree. They noted in their 2007 *JAMA* article that "determining the best treatment for a particular patient is fundamentally different from determining which treatment is best on average. Ultimately, the practitioner's judgment must be the deciding factor for the successful outcome of patient care, not research studies or a third-party's selective summary of such studies. This conclusion is implicit in the ADA's definition of evidence-based dentistry but is not apparent in the evidence-based dentistry literature.

The current proponents of evidence-based dentistry appear to be intent on creating flow charts to control how dentists should practice. These systematic reviews and consensus conference standards tend too much toward "cookbooks" that "average over" professional judgment with rigorous best evidence.

## HOW ABOUT EVIDENCE-BASED PRACTICE?

I would like to push a wedge between evidence-based literature as practiced by researchers and evidence-based dentistry as practiced by dentists. Perhaps that way, we can retain the best of practice grounded in science without having to take some of the troubling formalities of evidence-based routine.

After we read the cookbook, we should put it back on the shelf and use our experience as professionals. University of Wisconsin educator I. C. Davis said in the 1930s that the key

elements required to approach clinical practice in a scientific way include:

- A willingness to change opinion on the basis of new evidence
- A desire to search for the whole truth without prejudice
- A concept of cause-and-effect relationships
- A habit of basing judgment on fact
- The ability to distinguish between fact and opinion

Most practitioners would agree that Dr. Per-Ingvar Branemark is the epitome of a great clinical scientist. He conducted nearly 20 years of clinical studies of osseointegration before bringing his techniques to the mainstream profession. He has documented his original cases in numerous articles and books for more than 40 years. Clinicians know that following the basic principles he outlined virtually guarantees a high percentage of success.

My father was a pioneer in crown and bridge work and he instilled in me an appreciation for building a practice on a lifetime of combining science and clinical experience. I have 100,000 slides and digital pictures that date back to 1950. All of the full-coverage restorations in these pictures were prepared and handled in the exact same manner, using techniques that come from dentistry's roots but differ markedly from mainstream techniques widely taught today. The cases were followed with full-mouth x-rays taken periodically over decades. They document reduced recurrent decay and less periodontal disease. When I present treatment options to patients, I routinely show them numerous cases that have been successful in cases much like theirs. I need not look on the Web for reports of what generally happens in other offices that may or may not be

like mine, but I believe I am entitled to say that I have an evidence-based practice, or at least one that combines science and professional judgment and gives patients what they seek.

Based on two generations of scientifically grounded and documented clinical practice, I believe there are six elements to consider in building an evidence-based practice.

### **Key Principles Cannot Be Based on Unproven Assumptions.**

It is a terrible mistake, says Tom Siegfried, to assume anything. But “when an assumption is clearly stated at the outset, it is easy to go back and check to see if that assumption skewed the results. When the assumption is invisibly ingrained into the scientist’s mind, a seemingly certain conclusion may actually be fatally flawed” (Siegfried, 2010). It is my belief that many assumptions ingrained in the minds of practitioners during their dental school education clearly do not make scientific sense. The same is true for clinical researchers. Too few practitioners and researchers take up their work with the courage to question their assumptions.

### **Evidence for Techniques Must Be Based on Years of Follow-up Observation.**

Practitioners find out quickly what works and what does not when they examine patients objectively at hygiene recall visits. Because individuals vary, the anecdotal case is not, by itself, evidence for the success or failure of a particular treatment. Most practitioners would agree that for a young person with no

periodontal disease and no susceptibility to decay, virtually any treatment will work. The measure of a successful treatment is how it works across a range of patients, including those who are medically compromised (and thus often excluded from the RCTs in studies cited in evidence-based dentistry) and those susceptible to bone loss and decay.

### **Evidence Must Include Parameters Clinicians Can Follow and Interpret.**

Long-term, fundamental indicators of comprehensive oral health are especially important. One of the most important parameters clinicians have for measuring success is the radiograph, because bone support is a key indicator of health. It is the bone level rather than gingival texture that determines the ultimate fate of natural teeth, restorations, and implants. A succession of full-mouth series, using Rinn attachments, every two years has proven useful for my work.

### **Successes Must Be Analyzed for Reasons.**

The difference between success and failure in various patients in a practice provide a natural “experiment.” Clinicians naturally form impressions regarding common features in their clinical successes. If these natural hunches (hypotheses) continue to be confirmed in subsequent patients, the practitioner is justified in drawing conclusions regarding the factors that support clinical success. Sound principles of engineering and healthy architecture play a major role in creating success. The basics of scientifically sound treatment should not be overlooked because they are not novel or for sale from industry.

### **Failures Must Be Analyzed for Reasons.**

Failures can be analyzed to throw light on contributing factors just as successes are. But there is a difference. The inability to handle criticism objectively, coupled

with a litigious environment, promotes a protective screen tending to block objective analysis of failures. That naturally leads to distortion of clinical experience. Good record-keeping helps. So does a frank realization that failures are usually multifactorial and often a result of something that “was not done” instead of being the result of a conscious, active intervention. Such factors, of course, are not the normal stock in trade of the research that is the basis for evidence-based dentistry. In fact, published research on interventions that are not taken is extremely scarce. Ethics boards are unlikely to approve this sort of research that focuses on failures in any case. An honest practitioner with adequate experience will “know” these factors, even if they cannot be quantified. A true scientifically grounded dentist learns from today’s failures in order to prevent future ones.

### **New Treatments Must Be Grounded in Good Science, Practice Philosophy, and Trust, and Be Free from Likely Harm.**

There can be no advancement in dentistry without experimenting with new approaches in the office. However, evidence-based practices begin with innovations that have a scientific base or at least some clinical research support from reputable sources. The shared experiences of the best of one’s colleagues is also of value. As Dr. Branemark says, “Clinical documentation established during the last century must be respected.” (Branemark, 2005). There is much research now on new technologies such as digitally made all-ceramic crowns. The attention given the technology of fabrication may have obscured the importance of properties of ceramics—whether milled, pressed, or baked.



## BARRIERS TO SCIENTIFIC CONTRIBUTIONS BY CLINICIANS

Practitioners can and should make significant contributions to the profession. Unfortunately, there are too many barriers preventing clinicians from contributing to scientific advancement in dentistry. The definition of evidence-based dentistry says nothing about academic research as a criterion, even as it supports the dentist's clinical expertise as one of the main ingredients essential to the successful outcome of treatment. Yet when it comes to credibility in publications, the clinician is almost always discounted in favor of the academic. Most journals, in fact, are geared toward academic researchers.

In almost every case the required format for contributions is tailor-made for academic researchers, not for clinicians. It would be very helpful if journals would develop formats designed specifically for clinicians to present techniques, comparative case reports, theories, and clinical evidence.

The fashion in which peer review of manuscripts is conducted is another barrier to contributions by clinical practitioners. Peer review has become synonymous with scientific credibility in the eyes of the profession, where it is largely a matter of protecting against breaches of statistical and research design rigor and use of currently accepted technical terms. The peer review system has unfortunately evolved into a gate-keeping function and virtually no journal is willing to publish the consistency, or lack of consistency, among its reviewers or to include practitioners in equal numbers to academics on review panels. In the opinion of David Crowe, "It has been shown that peer review does not increase the quality of studies because the anonymous reviewers generally represent established ideas and thus it is an effective way to suppress

innovation" ([www.suppressedscience.net](http://www.suppressedscience.net)). Although editors usually have authority to decide what is published independent of the opinions expressed by reviewers, it seems to be the case that editors favor the opinion of reviewers over those of readers.

Changing the practices in the publication of clinical dentistry might eliminate some of the "politically correct" constraints that favor methodological purity over clinical usefulness. It would be unfortunate if the drift continued toward setting up screens for what is publishable because practitioners could not be trusted to form their own opinions about what is useful in practice and what is not. It is clear in commercially sponsored, so-called supplements to peer-reviewed publications and in some "non-subscription" journals that economic interests have already found ways to exploit the current system.

There is a contradiction in the current evidence-based movement. Clinicians are encouraged to be consumers of research and to preach on its behalf, but they are discouraged from participation in the development of scientifically sound practice innovations, whether used entirely in their own offices or shared with colleagues. Part of the problem lies with the practitioner. Science might have been presented on an elevated plane while in school. Very likely it was not presented in a fashion that required mastery. This has resulted in a "cult of the expert," someone who has special knowledge that practitioners need not understand, only accept and use.

"A favorite maxim of science," says Stephen Jenkins in *How Science Works: Evaluating Evidence in Biology and Medicine*, "is 'study nature, not books': in other words, judge evidence relating to a hypothesis based on your own

observations and analysis, not what someone tells you." (Jenkins, 2004). Practitioners who have followed their scientific curiosity and instinctive skepticism—like Branemark—have been able to leave a legacy of scientific breakthroughs and healthy patients. The idealistic quest for knowledge—free of assumptions, fundamentalism, and personal gain—should be affirmed by the profession as the real essence of evidence-based practice. The profession can best affirm this ideal by encouraging the free flow of ideas among all, clinicians and academics alike. ■

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## EVIDENCE-BASED PRACTICE OF PERIODONTICS

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### ABSTRACT

Evidence-based practice involves complex and conscientious decision making based not only on the available evidence but also on patient characteristics, situations, and preferences. It recognizes that care is individualized and ever-changing and involves uncertainties and probabilities. The specialty of periodontics has abundant high-level evidence upon which treatment decisions can be determined. This paper offers a brief commentary and overview of the available evidence commonly used in the private practice of periodontics.

At the onset, let us settle one issue. What, you may ask, do a few academics know about the private practice of periodontics? Academic titles and degrees can be misleading and may tempt one to make invalid judgments. Between us three authors, we comprise a total of 25 years in the full-time private practice of periodontics, 40 years as full-time academicians, and 10 years of teaching periodontics as part-time faculty. Collectively, we qualify as having some insight regarding the challenges of both private practice and academic dentistry. Surely, we can challenge the old adage “Those who can’t do—teach,” as all of us can legitimately claim to have made a good living from the private practice of periodontics, enjoyed the privileges of teaching, and experienced the frustrations of clinical and laboratory research.

So, what is the evidence-based practice of dentistry? Is it something that has clinical relevance or is evidence-based dentistry an ivory tower philosophy? An answer to the first question is simple. In our opinion, the evidence-based practice of dentistry is simply choosing appropriate treatment based on good scientific evidence. Where evidence-based treatment (EBT) is applied, it encourages professionals to use the most appropriate information available in making patient-related decisions.

Ideally, the evidence-based practice of dentistry continually develops individualized guidelines of best practices to

progressively improve treatment as increasingly more evidence is generated. EBT is a philosophical approach that is in opposition to “rules of thumb,” and tradition. Examples of a reliance on “it has always been done this way” can be found in almost every profession, even when those practices are contradicted by new and better information.

Many areas of professional practice, such as medicine, psychiatry, and dentistry, have had periods in their pasts where practice was based on heretical dogma with little research. Some of the knowledge was simply tradition based on the experiences of generations of practitioners, and much of it had no true scientific evidence on which to justify various treatments. An interesting historical example in medicine was bloodletting of patients to “remove the bad humors” (Parapia, 2008). Bloodletting originated during the Renaissance era when it was believed that our bodies contained four “humors,” i.e., black bile, yellow bile, phlegm, and blood. The concept of four humors was based on the teachings of Hippocrates. The “letting of blood” was used to treat a great variety of diseases, e.g., acne, asthma, cancer, cholera, epilepsy, gangrene, gout, insanity, and bubonic plague. Bloodletting, although disproved by the English physician William Harvey in the early 1600s, continued to be administered to patients



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well into the 1920s and early 1930s. In spite of sound scientific evidence that contradicted “tradition,” it took almost 300 years to rid medicine of bloodletting!

Another example of dogma that affected both medicine and dentistry was the mass extraction of teeth and tonsillectomies to reduce the chance of infecting other organ systems (the focal infection theory). The experimental evidence supporting the theory of focal infection was minimal, consisting of publication of a noncontrolled case series and an animal experiment (D’Aiuto, 2007). Nevertheless, from about 1915 to 1950, the unnecessary extraction of teeth and tonsillectomies were common preventive strategies.

### NEW TREATMENTS IN PERIODONTICS

The practice of periodontics has experienced a quantum leap in knowledge over the last three decades. For example, consider developments in therapies and techniques such as guided tissue regeneration, use of growth factors, a variety of bone graft materials, use of block bone grafts, sinus augmentation for implant placement, and a variety of surgical procedures aimed at improving esthetics. Additionally, the generation of knowledge in such areas as the biology of biofilms and their interactions with the host, immunology and inflammation, genetics, connective tissue and bone biology, and the associations of periodontal diseases with the host systemic inflammatory response and the repercussions thereof. The magnitude of this expanding base of information

has placed great demands on clinical decision making and requires the clinician to be knowledgeable of current evidence.

The upside of this knowledge explosion is that the practicing periodontist has an abundance of good evidence to support treatment decisions. Evidence-based decision making is based on a hierarchy of experimental design and analysis of research data. The hierarchy, in order of decreasing importance, is: systematic review of the literature with meta-analysis; randomized, blinded, controlled, longitudinal clinical trials (RCTs); longitudinal studies; case controlled studies; noncontrolled case studies; descriptive studies; in vivo animal studies; and in vitro laboratory studies.

Below we have listed examples of common periodontal treatment procedures with commentary regarding the level of evidence. The referenced studies are either systematic reviews, RCTs, longitudinal studies, or case-controlled studies—all representing high levels of evidence.

### Nonsurgical Periodontal Therapy

The evidence supporting the role of nonsurgical therapy in the treatment of slight to moderate periodontitis is abundant and consistent—scaling and root planing (SRP) works (Cobb, 1996; Cobb, 2002; Suvan, 2005). The evidence shows that SRP alone can effect a 1.0 mm reduction in probing depth of a 4.0-to-6.0 mm periodontal pocket and

Confirmation bias occurs when we selectively notice or focus upon evidence which tends to support the things we already believe or want to be true while ignoring that evidence which would serve to disconfirm those beliefs or ideas.

about 2.0 mm in pockets of 7.0 mm. We know that SRP results in a significant reduction in subgingival bacterial loads and an increase in clinical attachment levels. Lastly, we know that the adjunctive use of systemic or locally delivered antibiotics will effectively reduce pockets by an additional 0.2 to 0.4 mm (Haffajee et al., 2003; Hanes & Purvis, 2003).

Reduction in soft tissue inflammation is dependent on initial probing depth, clinical skill level, and post-treatment patient compliance regarding oral hygiene and periodontal maintenance.

Clinical research has also demonstrated that it is virtually impossible to remove all subgingival calculus and biofilm from pockets greater than 5.0 mm in depth. Numerous studies have reported that no one type of instrumentation, e.g., manual, sonic or ultrasonic scalers, or lasers, is totally effective at eliminating all subgingival biofilm or calculus. The primary reason for residual deposits is one of access. There is a direct correlation between increasing periodontal probing depth and increasing presence of residual biofilms and calculus. Thus, in some moderate and most severe cases of periodontitis surgery may be indicated. This is particularly true in cases of furcation involvement and intrabony defects. Any clinician who has surgically reflected a gingival flap following SRP has found residual calculus—many times at the cemento-enamel junction which is easily accessible prior to surgery.

### Periodontal Maintenance

Long-term studies have proven that periodic reevaluation of therapy and periodontal maintenance (also called supportive periodontal therapy) is absolutely critical to long-term success of treatment (Axelsson et al, 2004). As with SRP, the literature regarding the

importance of continual monitoring and periodontal maintenance is plentiful and consistent. Reevaluation of therapy and periodontal maintenance are part of the treatment decision matrix—not endpoints of therapy. When patient compliance is good, long-term goals are achieved (Hirschfeld & Wasserman, 1978).

### Periodontal Surgery for Treatment of Periodontitis

Although more conservative means of treating moderate and severe chronic periodontitis are currently popular with general dentists, this philosophy does not always recognize the limitations of such therapy. The evidence is clear and unequivocal, periodontal probing depths of 6.0 mm or greater respond better to surgical than to nonsurgical therapy (Becker et al, 2001; Heitz-Mayfield, 2005; Serino et al, 2001). In subjects with advanced periodontal disease, surgical therapy provides better short and long-term periodontal pocket reduction and may lead to fewer subjects requiring additional adjunctive therapy, assuming good compliance with ongoing periodontal maintenance.

### Surgery for Root Coverage

Surgical root coverage has developed rapidly over the last 20 years. We now have sufficient evidence supporting long-term (10-20 years) benefits and stability of results (Nickles et al, 2010; Roccuzzo et al, 2002; Trombelli et al, 2005). The evidence supports use of autogenous subepithelial connective tissue over commercial membranes, although the difference in some studies is minimal. We have sufficient evidence to enable the clinician to predict the expected amount of root coverage, dependent on dimensions of the presurgical defect and choice of technique.

### Bone Regeneration

Data from systematic reviews indicate that guided tissue regeneration, bone

grafting, and application of enamel matrix proteins produce comparable clinical results. Depending on the architecture of the bony defect, tooth morphology, and involvement of furcations, one can regenerate 50-100% of lost bone or convert Class II furcations to Class I (Jepsen et al, 2002; Needleman et al, 2005; Trombelli, 2005)

### Dental Implants

Placement of dental implants certainly impacts treatment planning. Placement of implants becomes a debatable question when it involves saving the natural dentition or sacrificing teeth that have a good long-term prognosis, if treated appropriately, in favor of implant placement. Current evidence regarding dental implants indicates a very high success rate and good long-term prognosis. Many times a patient will view the dental implant as quicker, less expensive, and requiring less effort than undergoing periodontal therapy. This mind-set does not recognize the existence of peri-implantitis. Simply put, patients lose their teeth due to bad habits, bad genetics, the presence of highly virulent bacteria, systemic disease impact (e.g., poorly controlled diabetes or a compromised immune system), or any combination thereof. Placement of a dental implant changes none of these risk factors. Thus, when considering a dental implant case selection becomes paramount and peri-implant maintenance takes the place of periodontal maintenance with all the same compliance issues and inflammation-related consequences.

### Treatment of Periodontitis by Laser

Given the professed usefulness of lasers, why, after almost two decades, does the use of a dental laser in periodontal therapy remain controversial? Is it because

lasers challenge the traditional modalities of treating periodontitis or because of a lack of hard evidence on which to make an informed decision? It is well known that many in private practice are using various types of lasers for the treatment of periodontal disease and most express some level of satisfaction with the results of therapy. Such testimonial evidence is undoubtedly influenced by conformational bias. Confirmation bias occurs when we selectively notice or focus upon evidence which tends to support the things we already believe or want to be true while ignoring that evidence which would serve to disconfirm those beliefs or ideas. In this respect it is interesting to note that several recent systematic reviews of the literature have suggested there is little evidence in support of the purported benefits of lasers in the treatment of periodontal disease compared with traditional periodontal therapy (Cobb et al, 2010; Karlsson et al, 2008; Schwarz et al, 2008; Slot et al, 2009). Thus, it appears that current use of a dental laser for the treatment of periodontitis is not based on the available research evidence but rather hearsay evidence and marketing.

### Association of Periodontal Disease and Systemic Disease

Papapanou (2009) proposes four levels of evidence that must be satisfied before one can definitively relate a specific risk factor with a particular disease. The levels of evidence are: (a) biologic plausibility, (b) supporting data from well-designed epidemiologic studies, (c) evidence from experimental studies, and (d) evidence from intervention studies, e.g., randomized, controlled clinical trials.

The biologic plausibility, epidemiologic, and experimental study criteria for an association between moderate and severe periodontitis and systemic disease have been satisfied. Two decades of research have demonstrated a significant association between inflammatory

periodontal disease and coronary heart disease, ischemic stroke and, to a lesser extent, peripheral artery disease. The positive association persists after statistical adjustment for other established risk factors, such as age, gender, smoking, race, diabetes, hypertension, cholesterol level, and body mass index. Epidemiology studies have confirmed the association of periodontitis with increased levels of systemic markers of inflammation such as high sensitivity C-reactive protein (hsCRP), Interleukin-1 (IL-1), and Interleukin-6 (IL-6) (Friedewald et al, 2009).

However, there are no large intervention studies addressing the impact of periodontal treatment on the prevention of secondary cardiovascular or cerebrovascular events. The existing intervention studies involved small populations of subjects and the data show substantial variability in results. Although the majority of clinical studies indicate that periodontal treatment can lower the levels of systemic markers of inflammation (hsCRP, IL-1 and IL-6) and improve arterial endothelial function, there are some well done and well-designed studies that report little to no effect (Friedewald et al, 2009).

Thus, from a practice standpoint, it would appear prudent to inform the patient of the importance of reducing the inflammatory burden. Periodontal disease can be treated and a healthy mouth can be maintained over time, thereby reducing the inflammatory burden on other organ systems. There is no downside to reducing disease associated inflammation—there is only a positive benefit to the patient.

### Conclusion

A letter to the editor in a recent issue of the *Journal of Dental Education* (Spielman & Wolff, 2008) asked “Why is it that dentists are among the very few

[There are] several possible reasons for ignoring the best available evidence, such as expediency, difficulty finding reliable evidence-based references, easy access to questionable information, and a desire for quick profits.

health professionals who can ignore critical evaluation of the scientific literature and treat patients with personal experience as its equal?" The authors suggest that many dentists may be providing treatment without critically evaluating whether such treatment is consistent with the best evidence. The authors also present several possible reasons for ignoring the best available evidence, such as expediency, difficulty finding reliable evidence-based references, easy access to questionable information, and a desire for quick profits.

The evidence supporting treatment of periodontally diseased teeth versus minimal or no treatment reveals that the average untreated patient will lose three and a half to four times the number of teeth over a ten-year period than will the average patient receiving treatment (Cobb, 1996; Hirschfeld & Wasserman, 1978). With respect to clinical periodontics there is no difficulty in finding reliable and abundant evidence to support appropriate treatment decisions. It just takes a desire to learn and the motivation to become a better clinician. ■

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# EVIDENCED-BASED DENTISTRY VERSUS BIASED-BASED EVALUATION OF THE EVIDENCE

## THE DISREGARD SYNDROME AND THE TRUE BELIEVER

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### ABSTRACT

It is important for clinicians, educators, and researchers to be able to evaluate journal articles for bias. Authors may exhibit a bias against a particular therapeutic or procedure and present arguments supporting their individual viewpoint while neglecting literature that supports the opposing viewpoint. Failure to cite literature supporting the opposing viewpoint is referred to as the 'disregard syndrome.' Individuals who accept a particular viewpoint and deny evident data to the contrary may be referred to as "True Believers." It is important for clinicians, educators, and researchers to evaluate the literature fairly. It is especially important for editors and journal reviewers to fairly evaluate manuscript submissions with a critical eye and for the readers of the literature to be aware of unreasonable bias.

Our departed colleague and friend, Dr. Thomas J. Pallasch, often spoke of the "disregard syndrome." Basic scientists often participate in journal clubs. The journal club experience encourages participants to question the way studies are conducted and to question the interpretations of the authors of the study or article. Were the statistics manipulated? Did the study demonstrate sufficient power to make a particular conclusion? Was the literature thoroughly evaluated to present the cons to the author's pros? Was the study design unbiased or was the study purposely designed to come up with a particular conclusion? Were important issues and studies disregarded? Were the results both statistically relevant and clinically relevant? The major element of the "disregard syndrome" is a disregard for data and opinions contrary to the author's viewpoint or conclusion. Unfortunately, a number of dental journal editors and journal reviewers have allowed the publication of studies, reviews, and commentaries built upon a particular bias with an unreasonable absence of honest, opposing viewpoints and contrary data.

"True believers" are described as individuals who believe that their view of a particular concept is correct no matter what evidence exists against their particular true belief. Examples include "flat-worlders" and "creationists." "Flat-worlders" deny that the earth is spherical and "creationists" deny the concept of evolution. These are two fairly extreme examples, but certainly there

are relevant examples with regard to dentistry. Examples in dentistry include those that support the belief that dental amalgam restorations and fluoride pose a major health threat to dental patients. Such "true believers" deny the concept that the vast majority of medicaments and pharmacotherapeutics have toxicological potential which is based upon dosage. Therefore, they deny the concept that there are safe dosages which can be used with relative confidence with regard to risk-benefit analysis.

Misunderstood dental material and dental therapeutic toxicity issues have previously been referred to as the "Chicken Little syndrome" (Brown, 2006). This syndrome refers to dentists (and physicians) determining that a therapeutic (or material) is too toxic to be used because of limited case reports or because of limited knowledge regarding a particular mechanism or pathway. It is possible that the rationale behind the case report may be incorrect (that the cause of the condition was due to something other entirely) and the support of such rationale was due to bias. It is possible that the particular mechanism or pathway is not completely



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All therapeutic decisions should be based upon a risk-benefit analysis.

understood and that the pharmacotherapeutic in reality does not pose a risk or only a limited risk. Furthermore, it is important to understand that just about all therapeutics have the potential for toxicity and toxicity alone is not grounds for eliminating a particular therapeutic which may have important value for many. Such benign substances as water and oxygen have potential toxicity with regard to hyponatremia and blindness in newborns. The endodontic obturation material, gutta percha, is widely accepted as a benign, nonreactive, inert, nontoxic material. However, there are those within the dental community who purport that because gutta percha has toxicity issues (Hamann et al., 2002; Kang et al., 2007; Pascone & Spangerg, 1990; Szep et al., 2003), gutta percha should be banned. Furthermore, an extremely toxic medication, botox/botulism toxin, is currently used in any number of therapeutic regimens. Physicians use the poison responsible for botulism for many applicable medical therapies. Fluoride, which is also a deadly poison, is safely used in community water supplies for dental cavity prevention. To quote the fifteenth century author Paracelsus, "Poison is in everything, and no thing is without poison. The dosage makes it either a poison or a remedy."

All therapeutic decisions should be based upon a risk-benefit analysis. Is the benefit worth the risk? If the risk outweighs the benefit, then that therapeutic probably should not be used. However, many of these decisions involve a gray area, and as such it is important to educate the patient as to the pros and cons and allow the patient to make an informed decision or informed consent. (Brown et al., 2007) But invariably, "true believer" clinicians shield others (including patients) from relevant information and insist that a particular therapeutic be either used or banned.

## EVALUATING EVIDENCE OF BIAS

There are a number of indications of bias which the cynical, analytical reader may be able to identify. However, it may be necessary for the reader to look up the citation and evaluate the citation with regard to accuracy and appropriateness. In a perfect world, the evaluation of literature citations would be cross-checked and evaluated by reviewers and editors. However, reviewers and editors, as fellow humans, may not always completely evaluate author citations and may have individual biased views of their own (Glick, 2010). The uncovering of problematic citations and bias can be brought to light with letters to the editor from the readership. However, it is always possible that in some instances the biased opinion may later prove to be the correct opinion.

Categories of problematic and biased points of view include: (a) commercial or financial considerations; (b) "cherry-picking" (disregarding data that do not support the author's position); (c) unrealistic and unsupported views regarding toxicity; (d) manipulation or sloppiness with statistics; (e) biased experimental design and scientific basis; and (f) false claims.

## COMMERCIAL OR OTHER FINANCIAL CONSIDERATIONS

Tarasoff and Csermak (2003), representing Norvartis Pharmaceuticals, wrote an article refuting the reports of Marx (2003) and Migliorati (2003) with regard to bisphosphonate medications being the cause of an oral condition noted for osteonecrosis. They reported that their search of the literature did not reveal any association between bisphosphonate administration and osteonecrosis in either humans or animals. In fact, they cited several references regarding the successful treatment of osteonecrosis with bisphosphonates. Tarasoff and Csermak's article was completely reasonable and the logic and

citations within this article were well-supported. However, as it turned out, their assumptions were incorrect. They openly disclosed their connection with their corporate sponsor.

Sharma and others (2002; 2004) reported the efficacy of an essential oil mouth rinse with regard to dental infection and inflammation. There is no indication that Sharma and colleagues did anything other than to produce an excellent research study as they openly disclosed their association with their corporate sponsor. However, these studies have not as yet been replicated by others without corporate sponsorship and a financial interest in a particular product. Therefore, it is possible that bias may be involved and others testing the same hypothesis may or may not replicate similar results and conclusions.

#### “CHERRY-PICKING”

This practice refers to selective inclusion or exclusion of information in order to strengthen a previously chosen position.

Lewis (2010) quotes several articles regarding formocresol toxicity issues and included a particular Ribeiro article (2008) but neglected other articles by Ribeiro and colleagues. Ribeiro and colleagues conducted a number of studies (2004; 2005; 2006; 2007), to evaluate endodontic compounds. The 2008 article reported a comprehensive review of endodontic compounds and induced genetic damage. He reported that formocresol (FC) was noted for positive genotoxicity in some assays and negative genotoxicity in other assays. Ribeiro (2009) also noted that such compounds as hydrogen peroxide, sodium hypochlorite, tetracycline, lidocaine, prilocaine, and epoxy resin root canal sealers tested positive with regard to some assays as genotoxic. To counter, Ribeiro's findings regarding the issue of FC and secondary genetic damage, Lewis (2010a) cited

Hagiwara and co-workers (2006) using the Syrian Hamster embryo assay. According to Lewis (2010a), Hagiwara and co-workers (2006) “found that the percentages of cells with chromosomal aberrations, polyploidy, or endoreduplication were increased by FC. What Lewis (2010a) did was to tease out the results as though the only material tested was FC. But in reality, Hagiwara and co-workers reported, “The percentages of cells with polyploidy or endoreduplication were enhanced by formocresol, sodium arsenite, p-chloro-phenol, p-phenolsulfonic acid, sodium hypochlorite, erythrosine, prilocaine hydrochloride, and procaine hydrochloride in the absence or presence of exogenous metabolic activation. Hagiwara's research led to reports that “the chemical agents that had a positive response in the present study are potentially genotoxic to mammalian cells.” Therefore, it appears according to Hagiwara and colleague's assay that sodium hypochlorite, and prilocaine are also problematic medicaments. Lewis (2010a) was not interested in condemning the use of these medications.

In a similar example, Boakes and others (1973) incorrectly suggested the seriousness a Tricyclic antidepressants and a catecholamine vasoconstrictor drug interaction in quoting a previous Boakes and coauthors (1972) article.

The lack of epidemiologic findings would tend to undermine concerns regarding the reported toxicity attributed to such medications, dental materials, and drug interactions as formocresol, amalgam, and the combination of tricyclic antidepressants and dental epinephrine vasoconstriction. To date, there are no reported cases documenting oral cancer or hypersensitivity reactions secondary to the dental use of formocresol and there are no reported cases secondary to a drug interaction between tricyclic antidepressants and dental epinephrine vasoconstriction. (Brown, 2006; Brown & Rhodus, 2005; Milnes,

2006; 2008; Rolling & Thulin, 1976; Simon et al, 1982; Wahl & Brown, 2010) Furthermore, the incidence of side effects related to dental amalgam is exceeding small and related only to hypersensitivity reactions. (Mackert & Berglund, 1997; Wahl, 2001)

#### MANIPULATION OR SLOPPINESS WITH STATISTICS

Abraham and colleagues (1984) used a two-beat per second chewing gum assay to measure both air and blood mercury in evaluating 14 subjects without amalgam restorations and 47 subjects with amalgam restorations. They reported a mean of 0.7 ng/ml, with a standard deviation of 3.3 in subjects with amalgams and 0.3 ng/ml with a standard deviation of 0.3 in the amalgamless subjects. They concluded that there was a significant increased value in blood mercury levels within the amalgam group as compared to the amalgamless group with a p-value less than 0.01. Reappraisal of the statistical significance reveals an erroneous conclusion. Lewis (2010a, 2010b) purported that previous articles by Milnes (2006, 2008) incorrectly measured the exposure of FC. However, Lewis (2010a, 2010b) incorrectly stated that Milnes reported that the amount of formocresol within a squeezed cotton pellet was between 0.02 and one mg per dose. In reality, Milnes reported the dosage of formocresol from a squeezed cotton pellet was between 0.02 and 0.1 mg (not 1.0 mg) per dose.

#### BIASED EXPERIMENTAL DESIGN AND SCIENTIFIC BASIS

Examples of biased experimental design can be found in the studies by Abraham and colleagues (1984) and Vimy and Lorscheider (1985). In these studies individuals chewed sugarless gum at two

The uncovering of problematic citations and bias can also be brought to light with letters to the editor from the readership.

beats per second. Vimy and Lorscheider purported that this experimental model was comparable to physiologic chewing and liberation of mercury vapor from dental amalgam restorations. But it appears that the assay was designed to produce heat in dental restorations in order to ensure the release of mercury vapor. Physiologic chewing would involve food substances acting as a cooling agent with repeated swallowing and the introduction of foods at various temperatures. Furthermore, as mercury vapor has an extremely low level of GI absorption but a high level of pulmonary absorption, physiologic chewing would tend not to result in an increase in blood mercury values. Therefore, the assay was not an accurate reflection of physiologic mercury vapor release and absorption into the blood stream during chewing and increased risk of mercury exposure. (Mackert & Berglund, 1997; Wahl, 2001)

In a similar manner, Carson and colleagues used thermography to determine the pattern of heat generation, distribution, and dissipation during ultrahigh-speed cavity preparation comparing air spray to water-and-air spray. Their data demonstrated an increase in intrapulpal temperature during cutting procedures, but no significant differences in the cooling effectiveness between air-water spray and air spray alone were found. However, others reported differences in heat generation to the pulpal areas with similar experimental designs uncontrolled for bias. If the operator was biased and allowed to use greater pressure when preparing one technique versus the other, the results would tend to demonstrate a difference in heat generation.

Block and colleagues (1977; 1978; 1979a; 1979b; 1981) published studies regarding the allergenic potential of FC. These researchers evaluated an antibody response to medicaments introduced to pulpal tissues. They tested a number of medicaments with regard to antibody formation. In every one of the studies, each of the medicaments tested was determined to have an allergenic potential. Block and colleagues concluded that these materials posed a risk of allergy for patients treated with these medicaments. However, a more reasonable interpretation of the data would be that exposing pulpal tissues to endodontic medicaments reliably reproduces antibody reactivity. Furthermore, Rolling and Thulin (1976) reported the absence of allergy after FC pulpotomy procedures in children.

#### FALSE CLAIMS

Wahl (2001a; 2001b) and Mackert and Berglund (1997) noted numerous instances in which publications have reported incorrect and blatantly false assertions concerning amalgam restorations, both with concerns regarding toxicity and functionality.

Lewis (2010a) attacked FC with regard to efficacy and suggested that any number of medicaments appear to be equal or superior with regard to pulpotomy therapeutic efficacy. For instance, Lewis (2010a) reported that Noorollahian (2008) showed positive results when MTA was compared to FC. However, Noorollahian only reported that MTA could be substituted safely for FC. Furthermore, Lewis (2010a, 2010b) stated that FC is recommended by neither the American Association of Endodontists nor the American Academy of Pediatric Dentistry. However, the journal sponsored by the American Academy of Pediatric Dentistry followed with the statement: "A few members have recently called

regarding a February 2010 article entitled 'The Obsolescence of Formocresol' published in the *Journal of the California Dental Association*. The author states that the American Academy of Pediatric Dentistry does not recommend the use of formocresol. This statement is incorrect and should not be considered as a change in Academy policy. Please note that the Academy continues to support the use of formo-cresol as stated in our guideline on pulp therapy for primary and immature permanent teeth."

## CONCLUSION

There is a natural inclination for researchers to prefer presenting positive results. There is a natural inclination for dental specialists to demonstrate that their research project enhances the importance of their particular specialty. There is a natural inclination for all of us to assume that authors who have similar views to our views are more correct compared to authors who do not have similar views to ours. There is a natural inclination for editors to view research with positive results in a more favorable light compared to research with negative results (Glick, 2010).

In a perfect world, reviewers and editors would evaluate all author citations with regard to objectivity and the elimination of bias. However, as editors and reviewers are only human and have their own individual biased views (as do we all), there are many published articles which include problematic levels of bias. The discerning editor, reviewer, and reader may be able to evaluate articles for objectivity, but not without added time and effort. ■

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The discerning editor, reviewer, and reader may be able to evaluate articles for objectivity, but not without added time and effort.

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*Editor's note: With regard to Dr. Brown's concern about bias in the published literature, please note that the three criteria used by reviewers and the editor for selecting papers for inclusion in the Journal of the American College of Dentists are (a) interest and importance of the contribution, (b) freedom from bias, and (c) clarity of presentation.*

*Responsibility for demonstrating bias, however, rests with the reviewer; it is insufficient to remark that "the study may be biased" without explaining why that is likely to be the case.*



# DROWNED IN INFORMATION YET STARVED FOR KNOWLEDGE

## EVIDENCE-BASED DENTISTRY, WHAT'S IN IT FOR ME?

Abhijit Gune, DDS

### ABSTRACT

A graduate of the ADA Evidence-based Dentistry Champions Conference explains what he has learned about the techniques of EBD literature and literature searches. EBD is the area of overlap among the literature, clinical experience, and patient characteristics. This paper focuses on evidence from the literature. Sources of summarized evidence are mentioned that can be accessed via the Internet, especially those that summarize evidence of the greatest research rigor that have been summarized systematically.

I was first introduced to this term in 1999. I was doing my masters in orthodontics at that time in one of the most prestigious dental schools in India. Our professor was well-known nationally and internationally in his field and to complete a masters program under his guidance was an honor for us. So when his own son and my classmate at that time started speaking about evidence-based orthodontics, I was shocked and taken aback by his thoughts. He was explaining to us the importance of looking at evidence when we are planning treatment for our patients. My immediate reaction was, "Is he saying that our professor is not teaching us the best techniques," and if not, then "how could he think that what we are doing is not the best thing for our patients." Whether you have just graduated from a dental school or have been in practice for over 25 years, we all believe that we always do the best thing for our patient.

Earlier this year when I was surfing the ADA Web site, I found a link to the Evidence-based Dentistry Conference and its Champions program. It sparked my interest in this topic all over again. Ten years had passed since I first heard about EBD, and it surprised me that the interest in EBD had not gone away. In fact, it seemed to me as if the ADA was trying to rejuvenate the interest of its members in this topic. So I decided to attend the EBD Champions Conference at the headquarters in Chicago. After two and a half days of the workshop and conference, I felt much empowered. The conference gave me all the necessary

tools to make sure I keep my clinical decision-making skills current. I wanted to share those tools with my fellow colleagues and help with the ADA's mission of disseminating the information on EBD. I know of no dentist who believes that he or she does not practice EBD. It is the intention of this article to show that with the tools presented, one can find the best current evidence for a clinical situation without spending hours in front of the computer or by going through volumes of scientific journals.

### WHAT IS EBD?

In the 1990s, evidence-based ideas and methodology were introduced to clinical medicine to facilitate the translation of clinical research to patient care. Dentistry, like other healthcare fields, is a science-based profession. And as we are well aware, research and technologies are continually evolving. Change is an anticipated, a necessary, and a welcomed aspect of any science-based healthcare profession. What is EBD, and how would it help us in our day-to-day practices?

According to the ADA, "evidence-based dentistry (EBD) is an approach to



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oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences." EBD is an approach to oral health care that requires the integration of systematically assessed evidence with the clinician's expertise and the patient's needs and preferences.

By saying "relating to the patient's oral and medical condition and history," this definition takes a patient-centered approach to treatment decisions. If we think about evidence, clinical judgment, and patient needs and preferences as three overlapping circles, then EBD is right in the center where the three circles overlap. It is important for us to understand that EBD is an approach to practice, an approach to making clinical decisions, and is just one component used to arrive at the best treatment decision. EBD is a method to use current science in patient care. We all do that for our patients, and so it was unclear to me as to why I should be worrying about EBD. Most of us take various CE courses to keep current or even to learn newer techniques. We often hear the term EBD being used on many occasions by many different people. Some believe that it takes away the dentist's ability to provide individualized patient care, that it is cookbook dentistry, that there is a path that is mandated from diagnosis to treatment that everyone should or must follow, and that it is a substitute for clinical judgment. In fact, I learned that this is not the case. What the ADA is trying to do is increase awareness among us about the importance of looking at the latest clinical research and its applicability in

day-to-day to practice. One example that comes to mind immediately is the placement of sealants over early carious lesions. We all have placed sealants and all of us tell our patients, "Keep your follow-up appointments, I will see you soon." At the next appointment, we check it and make sure everything is okay. Now if a patient is not regular and does not maintain oral hygiene well enough, one might seriously consider a restoration to begin with.

So EBD is actually about providing personalized dental care based on the most current scientific knowledge. Some of us are born to read the scientific literature and can scan through an article or an entire journal issue during our lunch break. For someone like me, it takes at least two readings before I can comprehend what the author has to say. Plus the challenge in front of me is the vast amount of information that is out there. To gain some perspective on the challenge we face, it was amazing for me to see how much information is published every year in our field. In health care, there are a total of 20,000 journals with over 400,000 articles published annually. On an average, investigators publish more than 500 human clinical trials related to each dental specialty. These trials appear in more than 50 journals. Therefore, to provide patients with the highest quality of care based on the best clinical evidence, we would need to obtain, read, and appraise more than one article per day, 365 days a week for the rest of our professional lives. That is a Herculean task, and I am not sure if any of us are ready to do it.

To understand the challenges we face in implementing EBD, it was important for me to understand the very nature of our professional development. Dentistry developed differently from medicine. While there were great advances being made in the diagnostic abilities of our medical counterparts, we were achieving amazing successes in

the therapeutic aspect of restoring lost and damaged tooth structure. While doing that, we all became very skilled technicians. And as we all say, we became "hands-on" people. Often we hear great speakers say during their CE presentations, "it works in my hands," and the notion is passed along that perhaps "practice makes perfect." But a recent qualitative study at Oxford University looked into four primary information domains that influence the dentist: (a) tradition (accumulated institutional knowledge); (b) experience (tradition is supplanted by clinical experience in practice as confidence increases); (c) evidence (new information informs dentists and influences clinical decisions); and (d) reason (clear thinking and application of reasons are foundational to clinical decision making).

Therefore, as we gain more experience, we may come closer to being perfect in our techniques. However, we may also lead ourselves to a state of inertia. We start to believe that the experience we have gained in our years of practice is sufficient to make a clinical decision each and every time we are faced with a question. It becomes very difficult to go back to reading journals or to research a topic online. We prefer to make decisions based on our personal experiences or on casual advice from a friend or peer. From the perspective of the practicing dentist, EBD is a way to quickly and accurately answer clinical questions. It increases our comfort level of looking for evidence related to our clinical situations.

### THE VALUE of EBD

As practitioners, we may gain...

- Improved clinical decision-making capability
- Greater self-confidence in treatment planning

- Satisfaction derived from creating customized treatment plans
- Greater respect from improved communication with patients

Our patients may gain...

- More trust and confidence in you and your practice
- Greater incentive to invest in quality oral health care
- Increased pride from being a patient of a community thought leader and a distinctive practice

Our dental team and practice may gain...

- Increased staff confidence, pride, trust, and personal satisfaction
- Enhanced recognition in the community and with peers
- Greater opportunity to conserve the practice financial resources by enabling wiser decisions in product, equipment, and therapeutic selections

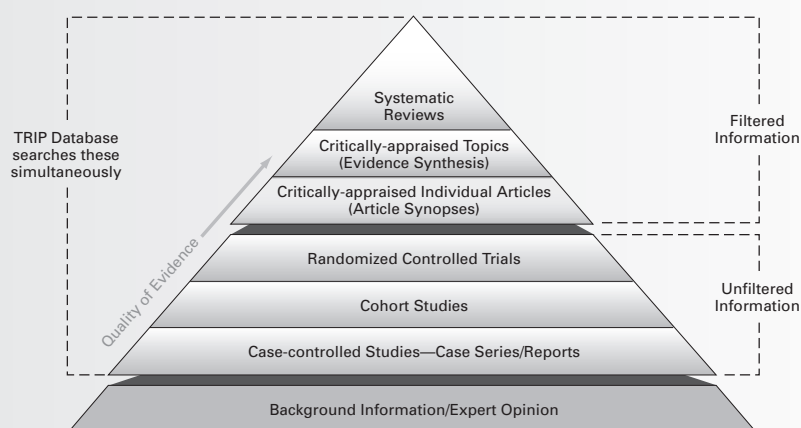
### WHAT CONSTITUTES THE EVIDENCE?

The question in my mind at this point is, “what is this evidence they keep talking about and where do I access the current information related to my clinical decision-making capacity?” The dictionaries define evidence as “an outward sign” or “something that furnishes proof.” In a court of law we often hear the words “circumstantial evidence” or “hearsay evidence.” Therefore, there are different types of evidence, some of which serves as better proof than the others. In health care, we also have different levels of evidence.

EBD is not about replacing our skills as clinicians, but it is about enhancing our skills to solve clinical problems. It involves two fundamental principles: (a) evidence alone is never sufficient to make a clinical decision, and (b) a hierarchy of evidence exists to guide clinical decision making so that the highest level of evidence is considered for a given question.

The highest level of evidence is a systematic review or meta-analysis. In this type of secondary evidence, the

### THE PYRAMID OF QUALITY OF EVIDENCE (See larger image on page 21.)



authors try to identify all evidence on a particular topic and analyze the data cumulatively. The advantage of this type of documentation, and the reason why it is at the top of the pyramid, is that it is based on multiple studies, not just one. It follows a systematic process, and it provides a big picture of all the evidence on a topic. Next is primary research evidence, such as a randomized controlled trial or RCT. This is the highest level of a clinical study. There are other types of clinical studies, cohort studies, case control, case series, and case reports. Under the clinical studies are the expert opinions, especially those developed through consensus panels followed by animal research and bench-top research.

### HOW DOES EBD WORK AND HOW IS IT DIFFERENT FROM TRADITIONAL PRACTICE?

There are five steps in practicing EBD:

1. Define a clinically relevant, focused question. In defining a question, we must pay attention to four elements—what is the population (children/adults or smokers/non-smokers, etc.), what is the intervention, what are we comparing it to, and what is the outcome that we need?

On an average, investigators publish more than 500 human clinical trials related to each dental specialty. These trials appear in more than 50 journals.

We prefer to make decisions based on our personal experiences or a casual advice from a friend or peer.

2. Focus on systematically searching for published or unpublished evidence that may help to answer this question.
3. Appraise the validity and reliability of the evidence. Important questions to ask at this point concern the level of evidence used to arrive at the conclusion and its applicability to my patients.
4. Use the evidence in treatment planning. Based on my clinical expertise and the patient's needs and preferences, how strongly should I recommend this to my patient?
5. Assess treatment outcomes for the patient.

In traditional practice, we do not actively look for emerging evidence; we depend on what we learned in school or what we hear speakers say. We never ask if the speakers are talking from their experiences and their study findings or if their presentations are based on a systematic assessment of all the evidence. We look for “Yes/No” answers to most clinical questions.

In contrast, EBD is about using the best available evidence after a systematic assessment of the literature and accepting that sometimes we do not have the answers and we should be ready to

change when these answers are found. So EBD is a paradigm shift that involves questioning the answers we know and an effort to learn continuously.

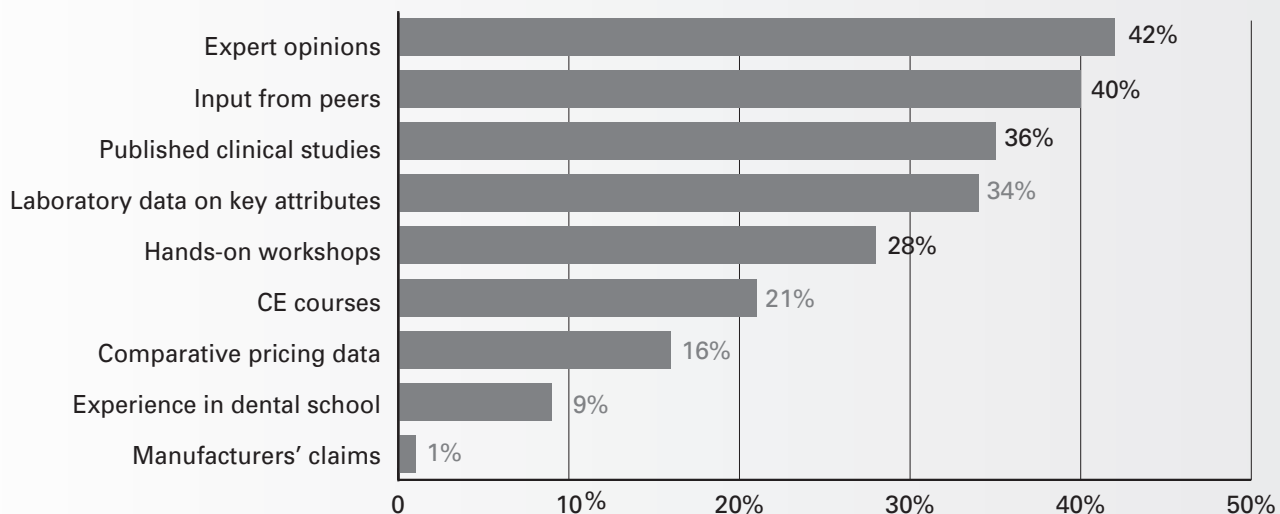
We all consider evidence in practice but the question now is whether we are considering all the evidence? Are we systematically assessing this evidence? Are we aware of the level of evidence? The ADA recently conducted a survey for their professional product evaluation program and asked dentists how they rated the different sources of information when trying to purchase a product. The highest source (42%) on this survey was expert opinion! So when we hear a speaker on stage using the term “evidence-based,” should we be asking ourselves whether this information is based on a systematic assessment of existing literature? What is the level of evidence being presented? Is this just the presenters’ own study conclusions?

#### WHERE CAN WE FIND EVIDENCE?

We all know where our patients go to find out about dentistry. After word of mouth, Google seems to be the destination of most of our patients, and sometimes it works for us as well. There are plenty of resources other than

#### ADA SURVEY ON DENTISTS’ SOURCES OF PRODUCT INFORMATION

When seeking dental products, how valuable do you find each of these sources of information?



## ORGANIZATIONS THAT PROVIDE INFORMATION ON APPRAISALS OF SYSTEMATIC REVIEWS

Resource	Information Available
Ebd.ada.org	Summaries of dental systematic reviews published elsewhere
Database of Abstracts of Reviews of Effectiveness (DARE)	Structured abstracts of systematic reviews; includes commentary on overall review quality
National Library for Health— Oral Health Specialist Library	Structured abstracts of systematic reviews
Journal of Evidence-Based Dental Practice	Summaries of dental systematic reviews, commentary, and analysis; Critical evaluations of published articles on various topics
Evidence-Based Dentistry Journal (UK)	Systematic review summaries/analyses
Evidentista (Pan American Centers for Evidence-Based Dentistry)	Clinical questions and answers grouped by topic area
Centre for Evidence-Based Dentistry	Evidence summaries from the Oral Health Specialist library grouped by topic and/or specialty area

Google available to us which can furnish us with excellent scientific literature. Some Web sites will even give us a critical summary of a systematic review. For a busy practitioner who does not have time to look at primary research, these Web sites will be the best sources to access and appraise the best evidence available.

The ADA established the Center for Evidence-based Dentistry in 2007 to provide tools for practitioners to help implement the EBD approach. The ADA Center has a twofold vision. First, the center aims to help implement EBD. Second, its goal is to disseminate the most current scientific information for members of the dental team. The center accomplishes this through three initiatives: (a) clinical recommendations (ADA publishes Clinical Recommendations in JADA); (b) an EBD Web site (<http://ebd.ada.org>); and (c) education through conferences and workshops.

However, the ADA is not the only player in this game. In fact, the ADA did not join until a little later. There are three additional databases available to us:

1. *Medline*. Compiled by the U.S. National Library of Medicine (NLM) and published on the Web by

Community of Science, MEDLINE is the world's most comprehensive source of life sciences and biomedical bibliographic information. We can access information from this database by visiting the PubMed Web site, [www.ncbi.nlm.nih.gov/pubmed](http://www.ncbi.nlm.nih.gov/pubmed).

2. *Cochrane Library*. The Cochrane Collaboration is an international, not-for-profit and independent organization, dedicated to making up-to-date, accurate information about the effects of health care readily available worldwide. The literature pertaining to our profession can be found at [www.ohg.cochrane.org](http://www.ohg.cochrane.org).
3. *CINAHL*. Cumulative Index to Nursing and Allied Health Literature is the most comprehensive resource for nursing and allied health literature.

Of these three databases, the Cochrane Oral Health Group provides us with systematic reviews on major topics in dentistry. Each of these systematic reviews is updated every two years by the Cochrane OHG.

For some of us who do not have the time to go through systematic reviews, whether on the ADA's EBD Web site or on the Cochrane Collaboration's Web site, there are other Web sites that provide information in a very concise way

through what are known as "critical appraisals of systematic reviews." These critical appraisals give us the gist in a nutshell. Organizations that provide such reviews of reviews are identified in the side bar, above.

As dentists, we are taught to care for our patients to the best of our abilities. With the ever-changing face of dentistry, we find ourselves motivated and compelled to invest in newer technology. In this new digital era in dentistry, along with additional investment comes the responsibility to sell to our patients the treatment that works best for their given circumstances. With the additional pressure that comes from the "business of dentistry," it is sometimes easy to ignore the "science of dentistry" when proposing treatment plans to our patients. Evidence-based dentistry may work as a useful tool for busy practitioners in reaching our goals to provide the best care to our patients regardless of the pressures of the "business of dentistry."



If we think about evidence, clinical judgment, and patient needs and preferences as three overlapping circles, then EBD is right in the center where the three circles overlap.

## GRADING THE EVIDENCE

Philippe Hujoel has captured the thought of every practicing dentist in an article that appeared in the *Journal of Evidence Based Dental Practice*. He stated, "We all live in an evidence-based world where  $2 + 2$  should equal 4, not 5 or 3. Unfortunately, judging the soundness of evidence in medicine or dentistry is not as straightforward as simple addition." When we want to choose a restorative material, why should the recent graduate accept the common claim that gold is the "best" restoration? To help us look at these types of clinical questions, EBD has formalized rules for applying evidence to practice.

As mentioned previously, the lowest levels of evidence are expert opinions, case control studies, case reports, or animal studies. This level of evidence is considered "low" not because of the quality of study but because this evidence cannot be valued when clinical decisions are based on such studies alone. In dental practices, many issues related to proposed treatments and success rates associated with them are discussed with our patients. One clinician had suggested that teeth with periodontal involvement, when surrounded by teeth without periodontal involvement, should be extracted when an arch of teeth is being restored. If a randomized controlled trial were conducted on this topic then it would give us a better idea on whether or not to accept such a recommendation.

High-level evidence consists of controlled systematic experiments in humans: case control studies, cohort studies, and RCTs. In a case control study, individuals with and without a disease or a condition are compared with respect to the prevalence of a suspected etiological factor. For example,

individuals with or without brain cancers can be compared with respect to the prevalence of past medical or dental diagnostic x-ray exposures. In a cohort study, exposed and nonexposed individuals are followed longitudinally and the incidence of outcome of interest is monitored. For example, exposure to fluoride through community water fluoridation and its effects on individuals. Both these study designs do have an element of observer bias built into them.

In a randomized controlled trial, individuals are randomly assigned to exposures and the incidence of the outcome of interest is monitored. For example, individuals can be randomly assigned to either a xylitol gum or sorbitol gum and the incidence of caries can be monitored. Certain evidence-based organizations, such as Cochrane, focus exclusively on evidence from RCTs when they report treatment effectiveness. Recently, the Cochrane group has also focused on the systematic reviews to answer such clinical effectiveness questions.

## WHAT IS A SYSTEMATIC REVIEW (SR)?

Systematic reviews sit at the top of the pyramid of the evidence. They are reviews of literature that identify and evaluate all of the worthy evidence with which to answer a specific, narrowly focused clinical question.

The hallmarks of systematic reviews include exhaustive search for studies; elaborate procedures to maximize objectivity and minimize bias; identification, presentation, and consideration of the best available evidence; quality of each included study explicitly evaluated using standard criteria; and interpretation of the evidence for clinicians and researchers. Such reviews are superior to traditional reviews because they address specific clinical questions, are sensitive to the quality of studies considered, minimize reviewer bias, and present results in a fashion that facilitates comparisons

across studies. In a systematic review, one might expect to see the question stated in “PICO” format (population, intervention, comparisons, outcomes), search strategies that use several databases, clearly stated inclusion and exclusion criteria, evidence tables that summarize key findings and results, and a narrative summary of the highlights of the evidence table.

### CARING FOR PATIENTS IN THE ABSENCE OF EVIDENCE

Many practices in dentistry have weak or no evidence to support definitive treatment decisions. Nevertheless, treatment decisions need to be made. If we believe it is at least as important to say the right things to the patient as it is to skillfully perform the correct procedures, then we need the best evidence before we offer an answer to our patients’ clinical queries. If the best evidence is to affect treatment plans, we must access, evaluate, compile, and present the evidence compellingly. This is particularly true when there is weak evidence and the patient is vulnerable to misinformation and quackery. Treating patients in the absence of evidence requires working with and communicating uncertainty without compromising care.

Most times, careful evaluation of our best sources may yield a frustrating weakness in the current evidence for answering a clinical question. Sometimes, because of the level of uncertainty, the selection of words is important when communicating with the patient. Considering patient preferences and values in addition to the evidence leads to an evidence-based treatment plan.

### SEARCHING FOR EVIDENCE

#### What Can Be Done in Five Minutes?

The EBD.ADA.org Web site can be accessed by topic for systematic reviews with critical summaries from the

### LEVELS OF EVIDENCE RELATED TO TYPE OF QUESTION AND TYPE OF STUDY

<i>Type of Question</i>	<i>Methodology of Choice</i>	<i>Question Focus</i>	<i>Why Study?</i>
Therapy/ Prevention	Meta-Analysis (MA) or Systematic Review (SR) of RCTs  Individual RCT  SR of Cohort Studies	Study effect of therapy or test on real patients; allows for comparison between intervention groups and control groups for a particular condition.  Largest volume of evidence-based literature	To select treatment, if any that do more good than harm that are worth the effort and cost.
Diagnosis	SR of Controlled Trials  Individual Controlled Trial	Measure reliability of a particular diagnostic measure for a disease against the “gold stan- dard” diagnostic measure for the same disease. Sensitivity and specificity of the measures are compared.	To select and interpret diagnostic methods or tests. To determine the degree to which a test is reliable and useful.
Etiology, Causation, Harm	MA or SR of RCTs  Individual RCT  SR of Cohort Studies  Prospective Cohort Study	Compares a group exposed to a particular agent with an unexposed group. Important for understanding prevention and control of disease.	To identify causes of a disease or condition including iatrogenic forms. To determine relationships between risk factors and possible causes of a disease or condition.
Prognosis	SR of Inception Cohort Studies  Individual Cohort Study  Retrospective Cohort	Follows progression of a group with particular disease and compares with a group without the disease. Groups must be as similar as possible and must have good follow up > 80% of each group.	To estimate clinical course of progression of a disease or condition over time and anticipate likely complications.

Treating patients in the absence of evidence requires working with uncertainty without compromising care.

Cochrane Collaboration, DARE, and the national library for health. This is fast, simple, offers free access to high-quality reviews, and requires little computer sophistication. But there are drawbacks. One is the need to rely on others to have performed the critical appraisals; another is that the topics one is interested in may not have been researched or reviewed. In the end, it remains the practitioner's responsibility to determine whether the results are valid and whether they are applicable in treating the condition faced by the patient.

#### What Can Be Done in 30 Minutes?

Again, the EBD.ADA.org Web page is a good place to start. But two journals can also be useful: *Journal of Evidence-Based Dental Practice* (JEBDP.com) and *Evidence-Based Dentistry* (nature.com). PubMed is also a natural choice. In addition to systematic reviews, these sources also direct inquirers to RCTs. There may be costs associated with some of these searches.

#### What Can Be Done with More Time?

It is worthwhile becoming familiar with PubMed. This is a free service of the U.S. government that facilitates searches of virtually the entire published literature in medicine, dentistry, and related disciplines. There are screens and search strategies that can be employed to focus searches. The system displays abstracts of most publications (editorials, for example, seldom have abstracts), and full articles in PDF format are sometimes available, usually for a fee.

#### THE ADA CENTER FOR EBD AND ITS EBD Web Site

The home page can be accessed via <http://ebd.ada.org>, and three areas will appear on the screen:

- **Systematic Reviews and Summaries.** This section of the EBD Web site has a database of systematic reviews that is categorized by clinical topic. The database currently has over 1,200 systematic reviews and is updated quarterly. Inclusion of a systematic review does not imply an endorsement of the publication or its contents.
- **ADA Clinical Recommendations.** Developed under the sponsorship of the ADA Council on Scientific Affairs and the ADA Center for Evidence-Based Dentistry, clinical recommendations are useful tools that can be used by practitioners in conjunction with their clinical judgment and their patients' needs and preferences to make evidence based treatment decisions.
- **Resources.** In addition to providing additional resources for our review, the ADA has also provided us with the "Suggest Clinical Idea" page where interested ADA members may submit topics of interest to the ADA to conduct a systematic review.

If any ADA members are interested in becoming EBD champions or EBD reviewers, there is a link for that information on the EBD Web site. The goal of the Champions Conference is to improve the quality and effectiveness of dental care through the application of an evidence based approach to patient care. If you decide to volunteer to become an evidence reviewer, then you have a unique opportunity for educational and professional development under EBD experts, continuing education credit, publication acknowledgement, and an opportunity to help colleagues use current evidence in decisionmaking. ■

# COMPARISON OF PATIENT CENTEREDNESS OF VISITS TO EMERGENCY DEPARTMENTS, PHYSICIANS, AND DENTISTS FOR DENTAL PROBLEMS AND INJURIES

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## ABSTRACT

**Background:** Patient-centered care has a positive impact on patient health status. This report compares patient assessments of patient centeredness during treatment in hospital emergency departments (EDs) and physician and dentist offices for dental problems and injuries.

**Research Design:** Participants included low-income White, Black, and Hispanic adults who had experienced a dental problem or injury during the previous 12 months and who visited an emergency department, physician, or dentist for treatment. A stratified random sample of Maryland households participated in a cross-sectional telephone survey. Interviews were completed with 94.8% (401/423) of eligible individuals. Multi-variable logistic regression analyses were performed.

**Results:** The measure of predictive power, the pseudo-R<sup>2</sup>s, calculated for the logistic regression models ranged from 12% to 18% for the analyses of responses to the measures of patient centeredness (satisfaction with treatment, careful listening, thorough explaining, spending enough time, and treated with courtesy and respect). EDs were less likely than dentists to treat patients with great courtesy and respect.

**Conclusions:** Further research is needed to identify factors that support patient-centered care.

## INTRODUCTION

The Agency for Healthcare Research and Quality (AHRQ) has identified quality measures of health care across the four dimensions of health-effectiveness, safety, timeliness, and patient centeredness (U.S. Department of Health and Human Services, 2004). The Institute of Medicine (2001b) has identified patient centeredness as a core component of quality health care. Patient centeredness is "... health care that establishes a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect patients' wants, needs, and preferences and that patients have the education and support they need to make decisions and participate in their own care (Institute of Medicine, 2001b)." Patient centeredness "... encompasses qualities of compassion, empathy, and responsiveness to the needs, values, and expressed preferences of the individual patient (Institute of Medicine, 2001a)."

Patient-centered care has been found to have a positive impact on patient health status (Anderson, 2002; Little et al, 2001; Stewart et al, 2000). A study of 39 family physicians found that patient-centered practice not only improved patient health status, but also enhanced the efficiency of care delivery by reducing unnecessary diagnostic tests and referrals (Stewart et al, 2000). Similarly, an examination of 865 consecutive patients attending three general practices found that patient-centered care was associated with greater patient satisfaction and enablement, as well as reduced symptom burden and lower

rates of referral (Little et al, 2001).

Increased efficiency in care delivery through patient-centered care also has been reported in the emergency room setting (Redelmeier et al, 1995). In addition, patient centeredness that enhances doctor-patient communication has been shown to improve adherence to medical recommendations (Beck, 2002). This is important because approximately 40% of patients do not follow physician recommendations (DiMatteo, 1994). Although patients consider communication skills to be among the top three competencies needed by physicians, they frequently rate their own doctor's skills as unsatisfactory (McBride et al, 1994).

It is clear that that doctor-patient interaction plays a critical and central role in the delivery of health services (Beck, 2002). This is obviously as true in the dental office as it is in other ambulatory settings. Hospital emergency

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departments (EDs) and physician offices may be used for the treatment of dental problems by individuals who do not have access to private dental practices. Prior research compared patient satisfaction with the care received from EDs, physicians, and dentists for toothache pain, but did not examine the role of patient centeredness on care delivery (Cohen et al, 2008). This report compares patient assessments of patient centeredness during treatment in EDs and physician and dentist offices for dental problems and injuries. Our hypothesis was that care for dental problems that is received in dental offices would be more patient-centered than care received in hospital emergency departments or physician offices.

## Methods

### Study Population

The target population was drawn from low-income non-Hispanic White, non-Hispanic Black, and Hispanic Maryland households with adults age 21 and older who had experienced a dental problem or injury during the previous twelve months and who visited a physician, ED, or dental office for treatment of that problem. Low-income was defined as respondents with annual family income less than \$25,000, which is approximately 150% of the federal poverty level for a family of three. Participants with higher income were included in the study for comparative purposes and to examine the relative impact of income levels on respondent service use. Dental problem or injury was self-defined by a positive response to the question, "Have you had a dental problem or injury at any time during the past 12 months? By dental problem or injury we mean things like toothaches, accidents and other trauma, gum infections, jaw or face pain, dry or

burning mouth, tongue or lip problems, sores or ulcers in the mouth, bleeding anywhere in the mouth, and pain caused by dentures, crowns or bridges, but not routine dental care like cleanings or check-ups."

### Questionnaire Development

The investigators used measures of patient centeredness taken from the 2004 National Healthcare Quality Report (see Table 1 for individual items) (U.S. Department of Health and Human Services, 2004). Because it was necessary to conduct telephone screenings and interviews with Hispanic respondents who have limited English language capability, the screening and interview instruments were translated into colloquial Spanish that could be understood by Spanish-speaking persons with limited education. Trained bilingual interviewers conducted the interviews with the Spanish-speaking persons.

### Sample Selection

2000 U.S. Census data were used to stratify the 3,058 block groups in Maryland according to the percentages of low-income persons and persons of different races/ethnicities they contained. Five strata were created based on income and race/ethnicity. A random sample totaling 27,002 Maryland households with listed telephone numbers was selected from within each of the strata of block groups identified by poverty income level and racial/ethnic composition with the objective of having approximately equal numbers of interviewed persons from each stratum.

### Survey Execution

Interviews were conducted using Computer Assisted Telephone Interviewing (CATI) technology to screen for eligible adults (those who had a dental problem or injury and sought treatment) and to interview only one eligible adult per household. Interviewers completed the

screening and interview in either English or Spanish, based on respondent needs. All of the 27,002 listed telephone numbers in the sample were called. However, 6,758 (25.0%) did not meet our specification as working residential land line telephones, but were instead business phones, cell phones, pay phones, fax machines, or non-working numbers. Of the remaining 20,244 working residential numbers, contact was made with 13,136 (64.9%). Of those contacted, 4,357 (33.2%) households completed a screening interview. From these, we identified 1,387 households that contained one or more eligible person. Where there was more than one eligible person in a household, the CATI program randomly selected one to interview.

In order to attain some balance between the numbers of persons visiting an ED or a physician's office and a dentist, the CATI program was programmed to select a random sample of approximately 20% of the large majority of eligible adults who reported visiting only a dentist for treatment of their dental problem or injury. Interviews were completed with 401 (94.8%) of the 423 randomly selected eligible respondents: females 282 (70.3%) and males 119 (29.7%); Hispanics 41 (10.2%), Whites 144 (35.9%), Blacks 199 (49.6%), and other 17 (4.2%). Only 12 of the selected eligible respondents who were contacted for an interview refused; however, there were ten additional individuals who had not been recontacted when the study ended. All respondents were asked a common set of background questions dealing with their dental problem experience as well as specific questions related to their treatment site.

The sample cases were weighted to represent the size of the target population for analysis—low income or



minority, 21 years of age or older, who had a dental problem or injury in the previous 12 months and visited a physician, ED, or dentist for treatment. The weighted sample yielded the following population distribution ( $n = 80,203$ ): males 33,280 (41.5%), females 46,923 (58.5%); and Hispanics 2,928 (3.7%), Whites 64,928 (81.0%), Blacks 9,472 (11.8%), other 2,875 (3.6%). There were no statistically significant associations between the respondents' age, gender, race/ethnicity, and income with the exception that a larger percentage of males were in the older age groups ( $2 = 3.0$ ;  $df = 3$ ;  $p = .03$ ) and Blacks were more likely to be in the lower income groups than Whites or Hispanics ( $2 = 3.9$ ;  $df = 6$ ;  $p = .001$ ). The research protocol was reviewed by the University of Maryland at Baltimore Office for Research Studies and judged exempt from IRB review; however, a verbal informed consent was obtained from all participants. Respondents were sent a \$10 gift card for taking time to complete the interview.

### Data Analysis

Interviewed cases were weighted for analysis to adjust for sampling design, probability of selection, unlisted, non-residential, and unanswered telephones, as well as for screening and interview nonrespondents. Weighting was necessary because the sample design was developed to achieve oversampling of low-income minority (Hispanic and non-Hispanic Black) households. Analysis weights were used to restore proper representation to the study groups by adjusting for differences in sampling and non-response rates. The analysis is thus based on an estimate of the number of Maryland adults who had a dental problem/injury in the past 12 months and sought care from a physician, ED, or dentist ( $n=80,203$ ). Pain intensity was measured by asking the respondents to

**Table 1. PERCENTAGE Distribution of Respondent's Satisfaction with Patient Centeredness Parameters of Care by Treatment Site**

<i>Patient Centeredness Parameters of Care</i>	ED ( $n=5,683$ )	MD ( $n=11,236$ )	DDS ( $n=66,036$ )
How satisfied were you with the treatment you received from the ED/MD/DDS?			
Very Satisfied	55.5	73.5	72.2
Somewhat Satisfied	42.3	19.8	23.4
Not Satisfied	2.2	6.7	4.4
How carefully did the ED/MD/DDS listen to what you had to say?			
Listened very carefully	68.6	97.3	80.5
Listened somewhat carefully	30.5	1.4	17.2
Did not listen very carefully	0.9	1.3	2.3
How good a job did the ED/MD/DDS do explaining things in a way that you could understand?			
Very good job	69.2	78.1	85.0
Somewhat good job	28.6	21.6	12.6
Not very good job	2.2	0.3	2.4
Did the ED/MD/DDS spend enough time with you?			
Spent all the time you wanted	94.5	58.2	88.5
Could have spent a little more time	2.3	41.0	6.2
Needed to spend a lot more time	3.2	0.8	5.3
Did you feel you were treated with courtesy and respect by the ED/MD/DDS?			
Everyone treated me with great courtesy and respect	93.7	98.4	93.7
Almost everyone treated me with great courtesy and respect	1.6	0.2	3.0
Some people needed to be a lot more courteous and respectful	4.7	1.4	3.3

Almost all of the respondents reported that they were treated with great courtesy and respect at each of the treatment sites.

rate the worst level of pain they felt with their most recent toothache on a scale of 0 to 10, where 0 stood for no pain and 10 was the most pain possible. Weighted tabular analysis was conducted using Chi Square tests of statistical significance that accounted for the sample stratification and differential response rates. All statistical tabular analyses used SUDAAN, an analytic package designed especially to analyze complex survey samples with clustered and weighted data. In addition, multivariable logistic regression analyses were performed to test whether there were statistically significant differences in how patients perceived they were being treated according to the type of provider they saw (or saw first, if they went to more than one). We examined how the three different types of providers—the ED staff, a medical doctor, or a dentist—were assessed by patients with regard to the five different dichotomously scored dimensions (first response versus second and third combined) of patient centeredness. Comparisons with physicians and ED staff were made against how the respondents said they were treated by dentists. We tested the associations in models that included a number of covariates that could be important modifiers of the relationship. These covariates included demographic characteristics; along with healthcare utilization/access measures such as having Medicaid, health insurance, dental insurance, a regular physician, a regular dentist, annual preventive medical and dental visits; and measures of their morbidity such as pain level, level of disability experienced from the dental problem, type of dental problem, and the frequency of having had such problems in the past ten years.

## Results

Respondents were asked a series of questions concerning their perceptions of the patient centeredness of the different treatment sites (Table 1). The majority of respondents reported that they were “very satisfied” with the treatment they received at each of the sites, with the highest approval ratings being given to the treatment received at physician and dentist offices. Similarly, a majority of respondents reported that they were listened to “very carefully” at each site with respondents receiving care from physician offices giving the most favorable reports. The majority of respondents reported that the treatment sites did a “very good job” explaining things in a way that they could understand, with highest ratings received by dental offices. Although a majority of respondents reported that the treatment sites spent enough time with them, there was a clear distinction, with EDs receiving the most favorable ratings and physician offices the least favorable. Almost all of the respondents reported that they were treated with great courtesy and respect at each of the treatment sites.

The results of the logistic regression modeling for each of the five measures of patient centeredness appear in Table 2. The models we tested have pseudo-R<sup>2</sup>s ranging from 12% to 18%. The pseudo-R<sup>2</sup>s can be interpreted and used as indicators of how much the variables in the model contribute to reducing errors in predicting the likelihood of respondents’ responses to the five questions. Our analysis indicates that for only one of the questions about the dimensions of patient care centeredness—being treated with courtesy and respect—is there a statistically significant difference between the respondents’ perception of the care provided by the different types of providers. ED staff members are assessed as being significantly worse than den-

tists, with about 68% lower odds than dentists of being rated as treating the patients they saw with great courtesy and respect.

There are, however, a number of other statistically significant differences among the levels of several covariates in how the care provided was perceived by respondents for the other four dimensions when the effects of the covariates are statistically controlled. The most consistently significant variable is whether the respondent had a regular dentist or place where dental care was obtained. Respondents who did not have a regular source of dental care had 61% lower odds of expressing satisfaction with the care they received as those who did have a regular source of dental care. Respondents without a regular source of dental care also had 76% lower odds of reporting that their provider listened carefully to what they had to say. They also had 68% lower odds of indicating that their provider explained things so they could understand them. Finally, respondents without a regular source of dental care had 51% lower odds of saying that their provider spent enough time with them.

The next most consistently significant variable was whether the respondent was Black rather than White. For three of the five dimensions Black respondents had significantly higher odds of providing a positive assessment than White respondents—being listened to carefully (572% higher odds of a positive assessment), having things explained understandably (317% higher odds), and spending enough time (130% higher odds)—when the effects of the other covariates are statistically controlled.

A third covariate, the level of disability experienced from the dental problem, was significantly associated with the assessments of four of the five dimensions, but not in a consistent manner. Persons for whom the dental problem had a low level of disruption of normal

activity had 238% higher odds of positively assessing their overall satisfaction with the care they received and 272% higher odds of positively assessing how effectively their provider explained things to them in terms they could understand than persons whose dental problem caused a high level of disruption. However, persons whose dental problem was the cause of an intermediate level of activity disruption had 70% lower odds of positively assessing how carefully their provider listened to what they have to say and 55% lower odds of positively assessing the adequacy of the time spent dealing with their dental problem than persons whose problem created a high level of disruption.

The type of dental problem that necessitated the dental visit also was associated with the odds of giving a positive assessment of whether the provider explained things in a way the respondent could understand and spent enough time with the respondent. Persons whose problem was associated with their gums had odds of reporting a positive assessment than persons whose dental problem was a broken/cracked tooth that were lower, respectively, by 85% and 88%.

The remaining two covariates with statistically significant associations with the odds of a positive assessment only affect one of the dimensions each. Our analysis shows that persons with a dental problem who do not make annual preventive dental visits had 86% higher odds of giving a positive assessment of their satisfaction with the treatment they received than persons who reported that they did make preventive dental visits. Further, the analysis indicates that elderly persons (65 years of age and over) experiencing a dental problem had 354% higher odds of positively assessing

the amount of time their provider spent with them than young adults 21 to 34 years of age.

## Discussion

All of the measures of patient centeredness were positive at each of the treatment sites. This finding is consistent with prior reports which examined patient assessments of how much the treatment received from EDs, physicians, and dentists helped with addressing the patient's toothache pain (Cohen et al, 2008), or dental problems or injuries (Cohen et al, 2009). Our hypothesis that care for dental problems that is received in dental offices would be more patient centered than care received in hospital emergency departments or physician offices was not generally supported. There were no differences between treatment sites in respondent reports of the different measures of patient centeredness with the exception that dentists were more likely to treat the respondent with courtesy and respect than were EDs. It might have been expected that since treatment provided by dentists would generally be more definitive, it would have received considerably higher patient centeredness ratings than care provided by physicians. The parity in ratings may reflect the fact that respondents had greater expectations for treatment from dentists than they did for physicians (Dayton et al, 2006). Despite the positive ratings, it was noted that for each of the treatment sites, respondent assessments of satisfaction with the actual treatment received were generally less favorable than those for the other measures of patient centeredness.

Measures of patient centeredness in this study were consistent with those reported nationally by adults who reported going to a physician's office or clinic in the last 12 months (U.S. Department of Health and Human

**Table 2. RESULTS of LOGISTIC REGRESSION ANALYSES of MEASURES of PATIENT CENTEREDNESS for VISITS to EDs, PHYSICIANS, AND DENTISTS for MOST RECENT DENTAL PROBLEM/INJURY CONTROLLING for EFFECTS of CO-VARIATES.**

	Satisfaction			Listening			Explaining			Time Spent			Courtesy/Respect		
	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit
<b>Type of Provider</b>															
ED	0.55	0.27	1.14	0.81	0.34	1.93	0.80	0.33	1.94	0.95	0.42	2.15	0.32	0.12	0.86
Physician	0.58	0.29	1.19	1.33	0.57	3.11	1.27	0.52	3.07	0.89	0.40	1.95	1.37	0.46	4.14
Dentist	1.00			1.00			1.00			1.00			1.00		
<b>Age Group</b>															
21-34	1.00			1.00			1.00			1.00			1.00		
35-49	1.57	0.74	3.31	1.14	0.47	2.78	2.10	0.88	5.02	1.54	0.70	3.41	2.55	0.80	8.20
50-64	1.93	0.95	3.95	1.47	0.62	3.53	1.52	0.65	3.58	2.17	0.93	5.10	2.31	0.83	6.44
65+	1.71	0.69	4.24	0.55	0.19	1.60	1.28	0.41	4.03	4.54	1.47	14.01	0.91	0.26	3.19
<b>Gender</b>															
Male	1.16	0.62	2.17	0.72	0.36	1.45	0.61	0.28	1.31	0.89	0.45	1.75	1.47	0.57	3.82
Female	1.00			1.00			1.00			1.00			1.00		
<b>Race/Ethnicity</b>															
Hispanic	1.36	0.53	3.52	1.10	0.37	3.21	1.25	0.40	3.93	0.66	0.25	1.73	0.61	0.15	2.54
White	1.00			1.00			1.00			1.00			1.00		
Black	1.93	0.94	3.93	6.72	2.89	15.62	4.17	1.65	10.52	2.30	1.03	5.17	1.75	0.60	5.16
Other	1.75	0.48	6.41	0.83	0.14	4.86	0.66	0.09	4.91	0.47	0.09	2.36	0.68	0.10	4.65
<b>Income</b>															
<\$25,000	1.31	0.53	3.25	0.90	0.27	2.97	1.84	0.46	7.41	0.48	0.15	1.54	1.07	0.32	3.64
\$25,000—<\$50,000	0.68	0.31	1.51	1.18	0.40	3.50	1.61	0.49	5.31	0.64	0.23	1.78	1.08	0.41	2.87
\$50,000 +	1.00			1.00			1.00			1.00			1.00		
<b>Education Level</b>															
< High School	1.67	0.64	4.38	1.41	0.42	4.72	1.05	0.28	3.99	0.55	0.20	1.49	1.37	0.35	5.33
HS/Trade School	1.36	0.63	2.91	0.91	0.32	2.58	0.46	0.14	1.45	0.81	0.31	2.13	1.30	0.41	4.12
Some College	0.83	0.37	1.85	0.41	0.13	1.22	0.28	0.09	0.90	0.34	0.13	0.88	0.41	0.15	1.09
College Graduate +	1.00			1.00			1.00			1.00			1.00		
<b>Has Medicaid</b>															
Yes	1.00			1.00			1.00			1.00			1.00		
No	1.51	0.76	3.01	1.77	0.77	4.05	1.31	0.57	3.01	0.67	0.31	1.46	0.97	0.40	2.35
<b>Has Health Insurance</b>															
Yes	1.00			1.00			1.00			1.00			1.00		
No	1.30	0.58	2.94	0.95	0.39	2.27	0.75	0.31	1.86	1.22	0.55	2.71	1.09	0.37	3.20
<b>Has Dental Insurance</b>															
Yes	1.00			1.00			1.00			1.00			1.00		
No	0.68	0.35	1.33	1.17	0.51	2.70	0.95	0.41	2.19	0.81	0.39	1.68	1.01	0.37	2.75

	Satisfaction			Listening			Explaining			Time Spent			Courtesy/Respect		
	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit	Odds Ratio	Lower 95% Limit	Upper 95% Limit
<b>Has Source of Medical Care</b>															
Yes	1.00			1.00			1.00			1.00			1.00		
No	0.83	0.37	1.86	0.55	0.21	1.43	0.51	0.19	1.33	1.45	0.63	3.38	0.80	0.25	2.51
<b>Annual Preventive MD Visit</b>															
Yes	0.80	0.46	1.37	0.65	0.34	1.23	1.57	0.75	3.26	0.85	0.46	1.60	0.95	0.41	2.19
No	1.00			1.00			1.00			1.00			1.00		
<b>Has Source of Dental Care</b>															
Yes	1.00			1.00			1.00			1.00			1.00		
No	0.39	0.19	0.77	0.24	0.10	0.56	0.32	0.13	0.77	0.49	0.24	0.99	1.07	0.39	2.98
<b>Annual Preventive DDS Visit</b>															
Yes	1.86	1.03	3.37	1.11	0.55	2.25	0.65	0.29	1.41	0.83	0.42	1.64	0.98	0.44	2.14
No	1.00			1.00			1.00			1.00			1.00		
<b>Type of Dental Problem</b>															
Toothache Pain	0.80	0.35	1.82	0.82	0.28	2.37	0.82	0.29	2.33	0.75	0.30	1.83	1.32	0.40	4.32
Injury	0.65	0.20	2.12	0.43	0.07	2.63	0.33	0.06	1.75	0.26	0.06	1.10	0.63	0.12	3.21
Gingival Problem	0.85	0.14	5.16	0.19	0.04	0.92	0.15	0.03	0.65	0.12	0.03	0.50	1.17	0.09	15.69
Miscellaneous	0.93	0.19	4.51	2.82	0.22	35.38	0.50	0.05	4.76	1.33	0.18	9.68			
Infection	1.19	0.49	2.91	0.85	0.28	2.55	1.03	0.33	3.26	1.41	0.51	3.87	1.15	0.32	4.16
Other Pain	0.34	0.12	1.03	0.21	0.05	0.83	0.09	0.02	0.38	0.86	0.20	3.60	0.40	0.07	2.22
Bridge/Denture	0.79	0.24	2.57	0.96	0.25	3.73	0.74	0.18	3.03	0.35	0.09	1.28	0.96	0.21	4.40
Broken Tooth	1.00			1.00			1.00			1.00			1.00		
<b>Pain Level</b>															
Low	0.95	0.32	2.79	1.49	0.37	5.95	0.74	0.15	3.58	1.35	0.39	4.64	1.42	0.24	8.31
Medium	0.50	0.25	1.02	1.00	0.41	2.43	0.50	0.21	1.21	0.68	0.30	1.55	0.86	0.31	2.40
High	1.00			1.00			1.00			1.00			1.00		
<b>Level of Disability</b>															
Low	3.38	1.46	7.81	1.41	0.53	3.74	3.77	1.24	11.43	1.68	0.58	4.82	3.74	1.08	13.00
Medium	0.70	0.37	1.34	0.30	0.13	0.73	0.52	0.22	1.20	0.45	0.21	0.94	1.00	0.42	2.39
High	1.00			1.00			1.00			1.00			1.00		
<b>Frequency of Dental Problems</b>															
Once or Twice	0.89	0.45	1.78	1.34	0.58	3.06	2.02	0.84	4.83	1.49	0.72	3.10	1.72	0.67	4.42
Three to Five Times	0.68	0.34	1.39	1.22	0.53	2.80	1.48	0.61	3.56	0.74	0.33	1.67	1.52	0.54	4.23
> Five Times	1.00			1.00			1.00			1.00			1.00		
Pseudo R2 =			0.17			0.18			0.18			0.17			0.12



There were no differences between treatment sites in respondent reports of the different measures of patient centeredness with the exception that dentists were more likely to treat the respondent with courtesy and respect than were EDs.

Services, 2004). Nationally, 55.0% reported that their health provider listened carefully, 56.4% reported their provider explained thing clearly, 57.4% reported that their provider showed respect for what they had to say, and 44.0% reported that their healthcare provider spent enough time with them. More recently, the 2008 National Healthcare Quality Report, using a composite measure of the average percentage of adults who had a physician's office or clinic visit in the last 12 months and reported poor communication with the health providers (i.e., that their health provider sometimes or never listened carefully, explained things clearly, showed respect for what they had to say, and spent enough time with them), found that in 2005, 9.7% of adults reported poor communication (U.S. Department of Health and Human Services, 2009b). Since this was a composite measure, direct comparisons with our findings are not possible. However, it appears that our findings are in general agreement. The National Healthcare Quality Reports have consistently reported that the average percentage of adults with physician's visits reporting poor communication was lowest among adults over the age of 64 (U.S. Department of Health and Human Services, 2009b), we found a similar association, with older respondents more likely to report that their provider spent enough time with them. This finding is also consistent with results from the 2002 Medical Expenditure Panel Survey (DeVoe, 2009).

Another study of patterns of communication between Black patients and dentists found that some communication behaviors were influenced by dentist-patient concordance (Williams et al, 2008). Similarly, the 2008 National

Healthcare Disparities Report found that Blacks were more likely than Whites to report poor communication with their health providers (U.S. Department of Health and Human Services, 2009a). Our findings were the opposite. In the present study, Blacks were more likely than Whites to report that they were listened to carefully, had things explained understandably, and had enough time spent with them. Also, unlike other reports which have documented poorer communication with Hispanics and poorer patients (DeVoe, 2009; U.S. Department of Health and Human Services, 2009a), we found no such association. The reason for these differences was not readily apparent.

The association of a usual source of dental and medical care with access to needed services (Cohen & Manski, 2006; DeVoe et al, 2003; Gross et al, 2000) has been well documented. In the present study, having a regular dentist was positively associated with almost all of the measures of patient centeredness. This finding is consistent with other reports in the literature (DeVoe, 2008; 2009). A dental/medical home has been found to be important to ensure access to needed services (Hale, 2003; Rosenbach et al, 1999). Educational programs should be targeted to individual practices to increase their awareness of the appropriate methods to actively involve their patients in decisions concerning their health (DeVoe et al, 2008).

One potential drawback to telephone surveys is the amount of non-coverage of the target population. In this case, it amounts to a risk that a disproportionate number of low-income households will not have a listed telephone. Specifically in Maryland, the most recent 2000 U.S. Census reported that only 1.6 percent of Maryland households did not have telephone service in 1999, and only 7.9 percent of households with incomes below the federal poverty level did not

have telephone service (Blumberg et al, 2006). More recent national data from the National Health Interview Survey (July-December 2007) indicate that nationally the percentage of households with only wireless service has increased to 15.8% ([www.cdc.gov/nchs/data/nhis/early\\_release/wireless200805.htm](http://www.cdc.gov/nchs/data/nhis/early_release/wireless200805.htm)). Nevertheless, research has shown this not to have been a significant source of bias. For example, estimates from the 2004 and 2005 National Health Interview Survey of the use of health care services for adults with landlines showed relatively small differences from those for all adults (Blumberg et al, 2006). Differences between face-to-face surveys and telephone surveys have generally found few statistically significant differences and even fewer differences of practical significance (Nelson et al, 2003). Although noncoverage bias has not been cause to discontinue the use of general population telephone surveys in helping guide public health policy and program decisions (Blumberg et al, 2006), the ever-increasing use of cell phones will pose a greater problem for public health data collection (Blumberg & Luke, 2009). Finally, although the findings are representative of Maryland residents with recent dental problems/injuries who visited an ED, physician, or dentist, they should be generalized to other populations with caution.

It is clear that doctor-patient communication plays an important role in the delivery of healthcare services. The Agency for Healthcare Research and Quality has recently undertaken a new initiative to encourage patients to become more involved with their health care by asking appropriate questions of their healthcare providers (Ryn & Fu, 2003). Problems with communication may in part be responsible for racial or

ethnic disparities evident in the receipt of health care services and concomitant disparities in health ([www.ahrq.gov/news/press/pr2009/quareapr.htm](http://www.ahrq.gov/news/press/pr2009/quareapr.htm)). The covariates we examined that we expected might influence the measures of different types of providers' patient centeredness resulted in only modest pseudo-R<sup>2</sup>s suggesting that the variables in the model added only a modest amount to our understanding of how providers differ in their patient centeredness. There is clearly opportunity to investigate what other factors play an important role. Chief among these are most likely the behavioral/communication skills of the clinician (Beck et al, 2002; Mead & Bower, 2000). Further research is needed to elucidate those factors that support patient-centered care, and perhaps more importantly, the evidenced-based interventions that are needed to ensure their adoption. ■

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## TECHNICAL GLOSSARY

When appropriate, the editor will provide a short description of terms related to research design and statistics so that readers can more fully appreciate manuscripts that use technical concepts.

**Covariate:** When researchers study the effect of a new drug on oral health they are aware that the effects they observe can be influenced by outside factors such as the patients' ages, systemic health, or oral homecare habits. These potentially complicating factors are called covariables. In the best research designs, large samples and elaborate assignment mechanisms are used to randomly balance out all imagined effects from covariables. In practical terms, an alternative approach is to measure these covariables and then manage them statistically. The authors of this paper measured such covariables as race and sex. They reported the effects of these covariables. They also controlled for them statistically. The analysis performed accounted for the effects of covariables before testing for the impact of location where emergency care was received.

**Logistic Regression:** Typical regression problems involve expressing an average change in an outcome as a function of another factor over a range of values. Palatal expansion is a function of months in treatment; GPA in dental school is a weak function of admissions predictors. These relationships are expressed as regression equations: essentially recipes for "so much of this" and "so much of that" will usually lead to a particular outcome.

Logistic regression is just the special case where the outcome can only take dichotomous values (rather than a full range). Palatal expansion could be measured as either adequate or inadequate; dental school performance could be measured as graduated or failed to graduate. In this study, measures of patient centeredness were captured on a yes/no scale. In these cases, a modified statistical test is required to estimate the relationship expressed in regression analysis. This modified test is called logistic regression.

**Pseudo R<sup>2</sup>:** The term used to express how powerful a prediction is possible in a regression analysis is the coefficient of determination, abbreviated R<sup>2</sup>. When the logistic regression is used, the calculated term is called a pseudo R<sup>2</sup>.

R<sup>2</sup> is the proportion of variance in the predicted outcome that is explained by the predictor variable or by the set of predictor variables taken together. The value can range between 0.0 and 1.0. When R<sup>2</sup> = 1.0, knowing the predictors means that the outcome can be predicted with 100% certainty, no surprises at all. When the R<sup>2</sup> value is 0.0, knowing the predictor value is useless.

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## How DENTISTRY Should Approach ITS PROBLEMS

### A VOTE for PROFESSIONALISM

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#### ABSTRACT

Dentistry, like all professions, has always had ethical problems to contend with, including societal trust, flagrant advertising, commercialism, and access to care. Although the profession's interest and expertise in ethics has grown enormously in the last three decades, the issues facing dentistry have not really decreased, and perhaps have grown more problematic. Thus, despite the invaluable contributions of ethical progress to the structure and function of our profession, this paper argues that reflective ethics by itself appears unable to exact change. For change to occur, dentistry also needs a broad-based display of enlightened, and ethically-driven but action-oriented professionalism. This existed in the 1830s when U.S. dentistry was in its early stages of becoming thought of as a profession. Using the lessons learned from that period of our history, we need to do the same thing now—not excluding ethics, but working hand in glove with ethics. This paper suggests that, as in the 1830s, dentistry now needs the grassroots attention of its membership. Using recent publications about the importance of “connectedness” in dentistry, guidelines are presented that provide a framework for approaching the problems faced by dentistry and contributing to a more satisfying professional career.



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Problems abound for all professions, dentistry included. This was true in the 1830s when U.S. dentistry was merely aspiring to be recognized as a profession, and it is certainly true now. In the 1830s the important issues for dentistry were a failure of societal trust, the absence of clinical standards, widespread flagrant advertising, and a pervasive incompetence (Asbell, 1993). Almost 200 years later, a lack of societal trust is again on the minds of many, as are flagrant advertising and concerns about commercialism, along with the newer problems of access to care and professional misconduct (Rule & Welie, 2009).

Today, as in the 1830s, dentistry's problems, besides being of an ethical nature, are intertwined with our culture and the history of our profession. The good news is that in the last 30 years, dentistry's involvement with ethics has grown enormously. All dental schools must now present courses on professional ethics. A national organization exists that is dedicated to dental ethics, and major organizations incorporate ethics into their mission statements. Dental journals frequently contain editorials with ethical themes, while one major journal offers an ethics case in each issue, and another has a recurring section dedicated to issues in dental ethics. One would think that with all these overt manifestations of concerns about ethics, dentistry ought to be in a fairly good position to figure out how to deal with its problems. However, during the



last three decades, the issues facing dentistry have not really decreased, and perhaps have grown more problematic.

In this paper, I draw a distinction between professional ethics and professionalism in that the former is essentially a theoretical enterprise, whereas professionalism is a matter of practice—in other words, a particular set of behaviors. Since the term “professionalism” tends to be used in very different ways by different authors, most often without a precise definition, let me suggest the following definition for the purposes of this paper: Professionalism is the cluster of commitments and behaviors, shared by the members of a profession, through which they exhibit the values, principles, and norms they hold in common as members of their profession (Welie, 2010).

Considering the above observations, I will argue in this article that professional ethics, though offering an invaluable contribution to the structure and function of our profession, by itself is unable to exact necessary change. Complementary perspective is needed. This paper will develop the idea that in order to make a difference, dentistry needs a broad-based and robust display of professionalism, akin to the spirit that pervaded U.S. dentistry in the 1830s when it was in its early stages of becoming a profession.

Using the lessons about professionalism learned from the 1830s, we need to foster that same spirit of professionalism right now—not excluding ethics, but working hand in glove with ethics. And in my opinion, the concept of an enlightened professionalism has an added benefit. Not only can it help dentistry deal with the issues currently faced by the profession as a whole, it should also increase the satisfaction that each practitioner experiences with dentistry.

This paper will begin with a discussion of the lessons to be learned from

the crisis of the 1830s, underscoring the importance of professionalism. Next, I discuss the importance of dentistry’s history of “disconnectedness.” Following an account of professionalism as exemplified by the concept of “connectedness,” the article concludes with a discussion of what each individual dentist can do to contribute to its welfare.

### LESSONS LEARNED FROM THE CRISIS OF THE 1830s

The dawn of the nineteenth century is a good place to start our historical examination of dentistry and its professionalism. At that time, dentistry was not considered a profession by society at large. Of course, if you were a dentist, you certainly thought of yourself as a professional, especially if you had had some training—for indeed, most practitioners of dentistry did not. By the beginning of the 1800s, there were approximately 1,200 dentists in the whole country. And since there was no standard that required formal training, about 900 of the dentists were a mixture of quacks, wanderers who set up shop wherever they chose, and outright charlatans. Only about 25% of the practitioners had been well-trained, most as a result of apprenticeships with established dentists—the typical pattern in England at the time (Asbell, 1993; Bishop et al, 2002a; 2002b). Parenthetically, this group of 300 included some who had been trained medically but who had decided to concentrate on dentistry. They were considered the cream of the crop.

During the first two decades of the 1800s, little changed. But with the arrival of the 1830s, almost all social sectors in the United States underwent profound disruption (Asbell, 1993). This was mainly due to the major financial upheaval that had begun to simmer. By the early 1830s, the economy was already unstable because of problems with the banking system and wild speculation, both of which were made worse

by the experimental financial practices of the Jackson administration. Then, in 1837 a full-fledged financial panic hit the United States. All over the country financial organizations tanked. Almost everyone, from the wealthiest financiers to the most humble laborers, experienced major problems. Businesses went bankrupt, banks collapsed, and unemployment escalated wildly. The country was close to ruin.

Not surprisingly, dentistry was in deep trouble too. Huge unemployment at all levels of society, plus the complete absence of standards for aspiring dentists, became an open invitation for many jobless people to embark on a dental practice as a quick fix for a nonexistent income. Large numbers of laborers left their workshops and ploughs, paid a fee to a cash-strapped dentist, and were inducted into the art of dentistry—often in just a few weeks. As a result, the overall competence level of the fledgling profession plummeted. To make matters worse, the expanded group of untrained dentists flagrantly advertised unproven techniques and products. The small group of trained dentists, who had already been struggling to raise the standards of dentistry, was now faced with even more troubles. Serious public concerns about the quality of dental care rose abruptly and became a preeminent problem (Asbell, 1993).

Ironically, however, it turned out that the Panic of 1837 gave a big boost to dentistry’s attempts to be recognized as a profession. But this happened only because the small, well-trained community of dentists coalesced and began to cooperate closely. For the sake of the public’s interest, they began to present and demand high standards of dentistry, and to protest the unscrupulous practices of the large number of untrained practitioners. In spite of the fact that they had no national dental association



from which to receive support, it was dentistry's great good fortune that in addition to the energy of the small but well-trained practicing community, several key leaders emerged who gave it direction. It was a demonstration of true grassroots vigorous professionalism. Threatened by destructive crises, they worked together to expose the shoddy practices and misleading advertising of the untrained practitioners and to introduce new standards for dentistry that they hoped would regain public trust.

The grass-roots actions of the band of trained practitioners and their leaders during that terrible time in our nation's history are considered by some historians to be visionary. These dentists were acutely aware of society's essential role in moving dentistry along the path toward recognition as a profession. They understood intuitively that without public trust their goal of recognition was impossible. I fear that they were more aware of the importance of society's role than we are today. Granted, even without this outstanding leadership, dentistry would still have emerged as a profession though not nearly as rapidly as it did. The dentists of those years had a firsthand view—one might even say a battlefield view—of what “connectedness” between dentistry and society meant and how important it was. Did they do this for personal gain? Of course they did. But not only, and maybe not even primarily, to foster their own interests. They understood that the long-term interests of dentists depended on achieving and retaining the trust of society by demonstrating trustworthy competence and trustworthy relationships with their patients.

In the years immediately following the Panic of 1837, these dentists and their leaders turned their attention to three major projects that were designed

to draw public attention to the worthiness of dentistry's professionalization (McCluggage, 1959). In 1839 they created the first dental journal to be published in the United States, the *American Journal of Dental Science*. It presented useful clinical and scientific articles, but its most urgent goal was to counteract the widespread stream of false but very influential advertisements about treatments that were ineffective and possibly harmful that were being promoted by the untrained dentists.

Their second effort was to establish a school of dentistry. This was a project of high priority because they were convinced—correctly as it turned out—that such a school would play a major role in helping to reassure the public that dentistry was concerned about the standards and competence of its practitioners. In 1840 the Baltimore College of Dental Surgery was created as the nation's, and indeed the world's, first dental school proper.

Their third project, also initiated in 1840, was to create a professional organization that would provide necessary resources for the aspiring professionals and ultimately help negotiate with state legislatures for favorable competitive positions in the marketplace. And so the American Society of Dental Surgeons was formed as the first national dental society.

Thus, in three amazing years, three cornerstones had been laid to help dentistry make its case that it should be considered a profession. These accomplishments had a huge impact on the development of dentistry as a profession. In all that was done, the driving force was a robust professionalism.

However, dentistry still had a long way to go. One swallow does not make a summer, and so it would be necessary to expand from a single dental school to a national system of dental education that would, over time, ensure a standardized

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education for all dentists. It would be decades before that goal was accomplished. In addition, there was the immediate need to lobby for legislation that regulated licensure. However, the prevailing political climate in the Jacksonian era was so highly oriented toward individualism and personal rights that any ideas about restricting anything—even obviously beneficial proposals like those requiring training and licensure—were dead in the water. As with a national system of dental education, nothing happened on the licensure front for decades.

Dentistry faced many struggles in its movement towards recognition as a profession. All professions have experienced comparable milestones, and for all of them the process has been painstakingly slow. Society's bestowing of professional status operates at a snail's pace. Even after an occupation is undisputedly recognized as a profession, the maturation process continues. In the United States, it was not until the late 1800s and early 1900s that the current economic conditions of dentistry and other professions were solidly established and their advantageous positions in the marketplace were secure (McCluggage, 1959).

### DENTISTRY'S HISTORY OF "DISCONNECTEDNESS"

In the previous section, the intuitive understanding by the dentists of the 1830 of dentistry's need for "connectedness" with society was mentioned. It was also suggested that their understanding of it probably was more robust than it is now. To understand the importance of "connectedness," one first needs to understand the impact of its opposite, "isolation" or "disconnectedness," on

the challenges faced by the profession of dentistry (Haden et al, 2003).

The issue of access to oral health care offers a good example. The United States Surgeon General's report *Oral Health Care in America* illustrated how pervasive and significant oral disease is among the most vulnerable segment of our population (U.S. Department of Health and Human Services, 2000). As with most of the broad issues faced by dentistry, the cause of oral health disparities is complex and often extends beyond the aegis of dentistry to include cultural and economic factors. Nevertheless, the dental profession and its members, as part of the problem, share the responsibility of correcting it.

Welie and Rule (2006) have proposed that "...the root cause for dentistry's relative ineffectiveness in reducing oral health disparities (relative, that is, to other health professions) lies deeply in its longstanding pattern of disconnectedness, or isolationism." In addition, the American Dental Education Association (ADEA) has stated that, "Reduced access to oral health care is one of the prices of professional isolation that has too often characterized dentistry" (Haden et al, 2003). Similar statements can be made with regard to other major issues facing dentistry, including commercialism, flagrant advertising, and professional misconduct. One can conclude that the importance dentists allot to personal autonomy and privacy tends to restrict how they approach broader issues.

These observations should not come as a surprise. Disconnectedness and dentistry have a long history together. For example, the greater part of U.S. dentistry has always been practiced apart from other kinds of medicine. In addition, until podiatry and optometry came along, the teeth were the only part of the body that had its own group of healers; all the other parts, organs, and

organ systems were treated by medically trained healers.

This isolation of the oral cavity from the rest of the body has had far-reaching consequences. Dental education is largely conducted apart from medical education. The licensing boards for dentists and physicians are distinct. Dental and medical insurance programs are organized completely separately, and in many countries dental care is not part of publicly supported health care financing systems. That is true, for example, of Medicare in this country (Welie & Rule, 2006). And as a matter of fact, much of this separation is just how dentistry wants it. It certainly provides some advantages to dentistry, particularly with respect to avoiding some of the regulatory and financial constraints that medicine has been forced to accept.

On the other hand, the American Dental Education Association points out that the consistent separation between medicine and dentistry opens the door to assumptions by the public, by policymakers, and by other groups of healthcare providers that oral health lacks the importance of general health. It may also be true that dentists themselves often make the same assumptions and perhaps think of themselves as less important than physicians (Haden et al, 2003).

In addition, these patterns of isolation are fostered by the very structure of dentistry. Most physicians work closely with their colleagues in clinics and hospitals. In contrast most dentists either work solo or in relatively small practices. "Dentists like to be their own boss, run their own office, and practice dentistry their way" (Welie & Rule, 2006). And a lot of people enter dentistry in part because of these intrinsic features.

There are other examples of "disconnectedness" in dentistry. Our concerns about our own professional privacy generate suspicion of such intrusions as treatment protocols, utilization reviews,

practice standards, professional regulations, and governmental control.

Dentistry's isolationism is also reflected problematically in its reluctance to engage in constructive peer review. Self-regulation is supposed to be a hallmark of any profession. However, dentistry has been less forthcoming than most professions in developing effective peer review programs (Welie & Rule, 2006).

Just how damaging to the public's trust the profession's wariness of standardization can be is illustrated by an article that appeared in a 1997 *Reader's Digest* entitled, "How Honest Are Dentists?" (Ecenbarger, 1997). In the article a journalist pretending to be a patient made appointments with 50 different dentists and received examinations and treatment plans from each of them. The treatment plans varied hugely, as did the costs of treatment, which ranged from \$500 to \$30,000. The article itself was damaging enough, but the cover title of the magazine was even worse: "How Dentists Rip Us Off." Dentists were clearly outraged, but for many patients it was a source of genuine concern.

Similarly, the trustworthiness of dentists in the public eye was called into question by Gordon Christensen in a 2001 monthly column published in the *Journal of the American Dental Association*. Christensen had noted the public's concerns about the trustworthiness of dentists and judged that it was based on their perceptions that dentists were overly concerned with making money and with other aspects of their own interests—but not so concerned with the interests of their patients. [Editor's Note: See the editorial in the spring 2009 issue (Volume 76, Number 2) of this journal for corrections to the facts underlying Dr. Christensen's remarks.]

Dentistry's isolationism and disconnectedness from the public is furthermore manifested by the increasing wave of

commercial competition among dentists, as evidenced by salesmanship tactics surrounding elective treatments, flagrantly misleading advertising, and for-profit sales of commercial products within the dental office. These concerns about commercialism and its failure to fulfill societal expectations are well articulated by Ozar (1985) and by Ozar and Sokol (2003). Along with many members of the profession, Rule and Welie believe that this demonstration of isolationism, in the form of rising self-interest over the interests of the public, "is nothing less than the transformation of dentistry from a profession to a business" (Rule & Welie, 2009).

The concern here is that dentistry may be heading towards its own ultimate disconnection: claiming the status of a profession while operating mainly as a business. The first indication of this development was the U.S. Supreme Court ruling in 1975 that certain professions, including dentistry, were no longer exempt from antitrust laws. This ruling paved the way for the Federal Trade Commission's (FTC) decision soon afterwards that the ADA (along with the American Medical Association and the American Bar Association) functioned as trade organizations because their primary concerns were the business interests of their memberships. As a result, these professions could no longer prohibit advertising.

Any such restriction placed upon a profession is of concern because it represents a battle that was fought and lost by the profession. At first glance, it may also appear that victory belonged to the public. However, because of what actually happened, such is not the case. The FTC ruling opened the door for dentists to fully embrace a competitive business model and focus on building multi-million dollar practices using all available business tactics. The real loser was actually the public. Patients, already rendered vulnerable by their oral

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disease, dysfunction, and pain, now had to adopt a “buyer beware” attitude instead of simply trusting that their dentist would act in their best oral health interests. Then again, if dentistry exchanges its professional paradigm for a commercial paradigm, as the FTC contended it already had by the late 1970s, the public has little choice but to impose on dentistry the rules of the business game.

More recently, again usually with strong opposition by state dental organizations, more such battles with the public were lost—the general issue this time being access to care. For example, the California state legislatures passed new laws that conditionally credentialed certain Mexican dentists to provide services in California in a move to increase access to oral care services to certain groups of people. And in the mid 2000s, a plan to provide dental care by nonden- tists was initiated by the Alaska Native Tribal Health Consortium despite the ADA's attempts to block it legally (Nash & Nagel, 2005). Most recently, Minnesota has embarked on developing a system of midlevel oral providers with the goal of reducing oral health disparities, and other states are moving in that direction as well (Minnesota SF, 2009; Connecticut HB, 2009; New Hampshire GC, 2009).

In most of the above examples, the actions of state legislatures were intended to address a problem that the public thought was not being dealt with adequately by the profession. Furthermore, the actions by state legislatures were in most instances met with vigorous opposition by the profession. When a profession and the public are at odds with each other, the situation must be taken seriously. In the 1830s the trained dentists of that era intuitively understood the importance of dealing effectively with the concerns of the public. At that time the chief public concern was

whether dentists could be trusted to provide competent care. Public concerns change over time, but after almost 200 years, public trust is once more an issue, as is commercialism. In addition, there is the entry of access to care as a new and powerful concern to the public. It makes little difference whether one agrees with the details of the remedies for access to care issues that have been proposed and initiated. The point is that the profession and the public are at odds about very important issues, and the profession's view has not prevailed. Given the importance that public approval has on the well-being of professions, dentists must do a better job recognizing the concerns and needs of the public. Failing that, we must pay the price of decreased trust and public esteem, and ultimately the potential loss of our status as a profession.

#### PROFESSIONALISM'S FOUR REALMS OF CONNECTEDNESS

From this author's standpoint, if one is concerned about dealing effectively with the issues of the day—and for that matter, adding to the satisfactions of one's professional life as well—the path to take is a combination of two approaches. First, remember the lessons learned from the 1830s. In that time of crisis, a small group of 300 trained dentists, among them some outstanding, visionary leaders, showed that hard work, a cooperative spirit, and a robust professionalism could have an enormous impact on their profession.

The second approach starts with the previously discussed premise that dentistry's disconnectedness (or isolation) contributes substantially to its own problems. Thus, the obvious thing to do is to promote its opposite. This section shows the range of contributions that “connectedness” can make to professionalism.

In 1994 Hershey stated that what is needed is, “A willingness to be connected—a willingness to go beyond the isolation of narrowly interpreting one's profes-

sional role in order to be connected to the concerns of other individuals and to the overall well-being of society” (Hershey, 1994). In 1994 DePaola, also discussed connectedness, but from an educational standpoint: “It is imperative that students in all education settings, including dental education, be taught in a manner where they are connected to the world and the quality of connectedness is ingrained in the very culture of the institution” (DePaola 1994). The belief here is that if dental professionals would demonstrate a comprehensive connectedness in their approach to professionalism, it would be an important first step in reducing the structural problems facing the profession.

The concept of “connectedness” with respect to professionalism covers four different realms (Welie & Rule, 2006):

1. *With Patients.* This is the most familiar component of connectedness and includes, for example, the idea of a fiduciary relationship and the understanding of the partnership of patients in the dentist-patient relationship.
2. *With the Profession.* This includes the understanding that the concept of a profession is social in nature and embodies collective action rather than the action of its individually committed members.
3. *With the Community.* This includes the understanding that dentists are expected to contribute to the well-being of their communities, often in leadership roles. Their contributions can focus on oral health issues, general health issues, or general concerns of community betterment.
4. *With Society at Large.* Dentists should be fully aware of the role of society in the sanctioning of profes-



sions and therefore have concerns and responsibilities for the well-being of society at large.

If we want dentistry to overcome its historical tendency towards isolationism through the development of the four realms of professional connectedness, then we must rely on the practitioners themselves to take the first steps. The following paragraphs present suggestions about how ethics, professionalism, and connectedness are joined together as important influences on how one thinks and functions as a dentist.

### WHAT SHOULD BE DONE?

We know from the 1830s that concerned professionals with good will and a willingness to work together can make an important difference in the issues they face. Concerned professionals today who want dentistry to ensure its future as a helping profession and who want the satisfaction of participating in that process should get together to talk about their profession. Ozar and Patthoff (2009) have suggested a similar approach: "Each new generation of dentists should contribute to the general dialogue about how to address the current ethical challenges that differ from those faced by their predecessors."

The idea is to form your own small groups, or use the format of an existing study club, or encourage dental societies to hold discussions as part of their agendas. Using the framework of the discussion questions given below, which are based upon the four realms of connectedness—or discussion questions and topics of your own making—find out what the members of the group believe about their profession and their roles in it.

#### DISCUSS CONNECTEDNESS BETWEEN DENTISTS AND THEIR PATIENTS

How would you like to be thought of by your patients and by your colleagues? Are you satisfied with your own percep-

tion of yourself as a professional? What is the nature of the relationship between you and your patients? Is part of your relationship fiduciary in nature, and if so, what does that mean to you? What are your rights and responsibilities in contrast with those of your patients? What does it mean to consider the patient as a full partner in the dentist-patient relationship? Discuss and analyze examples of successes and failures to be a full partner.

Are the days of paternalism in the dental office really gone? Is there a difference between being paternalistic and making recommendations based only on the patient's clinical needs? Are a patient's clinical needs synonymous with a patient's best interests? Some people think that it is impossible for a professional to really know the best interests of the patient. Do you agree?

If a dentist sells electric toothbrushes for profit in his or her office, is it an acceptable professional paradigm? Does its acceptability depend upon how marketing occurs? Does its acceptability depend upon the dentist's disclosure of profit? Is this practice consistent with a fiduciary relationship?

Are you satisfied with your informed consent process? Do you view it as a legal or as an ethical process? Which should it primarily be: an important risk management procedure or an important demonstration of your relationship with your patients? How do your patients view your informed consent process?

#### DISCUSS CONNECTEDNESS BETWEEN DENTISTS AND THEIR PROFESSION

What does it mean to you to be a member of the dental profession? How has being a dental professional changed you? What do you like and dislike about what you do? What kinds of professional

activities give you the most satisfaction?

Besides your obligations to your patients, what do you see as your obligations, if any, to your profession? Do your obligations include maintaining and improving your clinical skills? Should you feel obligated to join the ADA and your component societies? Why or why not? If so, does joining mean that you are also obligated to play an active role?

Do you think your local dental society and state and national associations function primarily to further the professional obligations of dentistry or to advance its business interests? What do you think should be the balance between the two? Should there be changes made in the agendas of these organizations?

What role should professional organizations play in their communities and states? And with respect to national organizations, what role should they play in societal interests?

One of the characteristics of a profession is that it is self-regulating, partly through collegial discipline. What does collegial discipline mean and what does it entail? Does collegial discipline work well as a self-regulatory method? When you see a member of the profession operating outside the bounds of acceptable behavior (anything from incompetence to the use of drugs), what do you see as your responsibility to that dentist, to affected patients, and to the profession? Do your responsibilities extend to making contact with the offending dentist? What is the biggest obstacle to discussing problems with an offending dentist?

With respect to colleagues who are incompetent, should dentists with significant knowledge of a problem interact with them? Are the considerations the same with impaired colleagues? What about dishonest colleagues or those who engage in legally dubious behaviors? Under what circumstances, if any,



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should dentists act as whistleblowers against incompetent, impaired, or dishonest colleagues? What should be the role, if any, of state boards in the kinds of issues listed above?

Since much of the concept of self-regulation is manifest in the educational system of the profession, do you think that dentists have a responsibility to participate in the process of dental education and even in dental research? Should dental organizations encourage their members to participate in the education of future dentists and the advancement of the science of dentistry?

How do you assess the *ADA Principles of Ethics and Code of Professional Conduct*? Do you ever refer to it? Do you think it is a useful and meaningful document in terms of enhancing collegial discipline? Do you see flaws within it? Should some changes be initiated?

One of the concepts that is inherent in the structure of professions is that they have "a service rather than a profit orientation." Another concept that is widely endorsed is that "professionals should consider their services to be ends unto themselves rather than a means to an end." What do you think these statements mean? Do you agree with them?

Do you agree with how professional peer review committees in dentistry usually function, which is primarily to resolve disputes between patients and their dentists? Is the current peer review process suited to fulfill an expanded role that includes, for example, patient safety and error prevention programs? Should peer review committees perform monitoring functions related to patient care?

It is clear that professionals may legally advertise. However, many dentists believe that advertising is unprofessional. What are the boundaries between

acceptable and unacceptable advertising? Given the legal restrictions on the control of advertising, how can the profession assure that advertisements by its members foster the public's trust in the profession?

Regarding the issue of the encroachment of commercialism on the profession, what are examples that concern you, if any? Are any or all of the examples a threat to the public or to the profession?

#### DISCUSS CONNECTEDNESS BETWEEN DENTISTS AND THEIR COMMUNITIES

Is there an obligation for dentists and dental organizations to be involved in oral health programs that benefit the community? If so, in what way: financial support, through actions in their offices, community clinics, through participation in Medicaid?

Should individual dentists and professional dental organizations help promote and be involved in general health issues such as heart disease, breast cancer, smoking cessation? If so, in what way: financial support, volunteer activities, involvement in community clinics, collaboration with medical organizations?

Should dentists consider their arena of interest or responsibility to include involvement in non-health community activities, such as town or city government, charity drives, bank directorships, homeless shelters? If so, with what motivation?

#### DISCUSS CONNECTEDNESS BETWEEN DENTISTS AND SOCIETY AT LARGE

At the general societal level, how should dentists view their responsibilities to become involved in socially based oral health problems such as oral cancer screening or access to care? Is there any duty for dentists to participate in the improvement of access to care at some level? If so, what is the extent of a dentist's duty to do so?

How do you view the above questions with respect to societal concerns of a general health nature?

Should dentists be engaged in public causes, such as fighting gender or racial discrimination, environmental issues, or global projects in developing countries?

Finally, if the concept of connectedness becomes important to you or your organization, and you do good things as a result, then take credit for it. For example, organizations could catalog and publicize their community oriented oral health activities, their collaborative efforts with dental schools and with other professions, and their non-health related activities that benefit the community. Outreach efforts such as public health initiatives, public nutrition, reducing racial discrimination, Big Brother or Big Sister organizations, and community church programs are all good examples of connectedness with one's profession, with the community, and with society at large.

## CONCLUSION

Addressing the problems that currently confront dentistry, such as commercialism, flagrant advertising, and a reduction of public trust requires the consideration of several components. An emphasis on ethics is essential, but unless it is combined with a robust professionalism such as existed in the 1830s when U.S. dentistry was in its early stages of becoming a profession, beneficial change is not likely. This paper holds the view that the concept of "connectedness"—with patients, with one's profession, with community, and with society at large—is an important component of professionalism. In addition it provides guidelines for discussing questions of importance to dentistry that are based on the four realms of professionalism. Finally, while readily admitting that I have not provided evidence in this paper

to support this conclusion, I am convinced that the broadening concept of "connectedness," besides being a worthwhile approach to dealing with dentistry's problems, can play an important role in enhancing the satisfaction in a dentist's own professional life. ■

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## EVIDENCE-BASED DENTISTRY

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### ABSTRACT

Both panegyric and criticism of evidence-based dentistry tend to be clumsy because the concept is poorly defined. This analysis identifies several contributions to the profession that have been made under the EBD banner. Although the concept of clinicians integrating clinical epidemiology, the wisdom of their practices, and patients' values is powerful, its implementation has been distorted by a too heavy emphasis of computerized searches for research findings that meet the standards of academics. Although EBD advocates enjoy sharing anecdotal accounts of mistakes others have made, faulting others is not proof that one's own position is correct. There is no systematic, high-quality evidence that EBD is effective. The metaphor of a three-legged stool (evidence, experience, values, and integration) is used as an organizing principle. "Best evidence" has become a preoccupation among EBD enthusiasts. That overlong but thinly developed leg of the stool is critiqued from the perspectives of the criteria for evidence, the difference between internal and external validity, the relationship between evidence and decision making, the ambiguous meaning of "best," and the role of reasonable doubt. The strongest leg of the stool is clinical experience. Although bias exists in all observations (including searches for evidence), there are simple procedures that can be employed in practice to increase

useful and objective evidence there, and there are dangers in delegating policy regarding allowable treatments to external groups. Patient and practitioner values are the shortest leg of the stool. As they are so little recognized, their integration in EBD is problematic and ethical tensions exist where paternalism privileges science over patient's self-determined best interests. Four potential approaches to integration are suggested, recognizing that there is virtually no literature on how the "seat" of the three-legged stool works or should work. It is likely that most dentists choose to wait for collective professional standards to reveal acceptable practice or follow a strategy of punctuated equilibrium, only switching out established practice habits when very conspicuous advantages are identified. Integration in medicine appears to follow the statistically sophisticated practice of updating estimates of clinical parameters (probabilities) for diagnoses, treatments, prognoses, and side-effects. This approach is likely beyond the skill or interest of clinical dentists and it fails to incorporate values in the integration. The use of decision trees to integrate both research and experiential parameters and values is illustrated and it is shown that such a technique identifies why there are very few cases in dentistry where evidence needs to be consulted and indicates what such cases are.

The renaissance thinker Buckminster Fuller suggested that in order to change the way people function, it is better to give them a tool than an argument. He must have been thinking particularly of dentists. Evidence-based dentistry certainly qualifies as one of the hot tools in the profession today. But it is well-known that large numbers of dentists have garages filled with materials and devices that were once the "must have" tools of their day.

Evidence-based dental practice (hereafter EBD) is a three-legged stool. Straus, Richardson, Glasziou, and Haynes (the successors to EBM founder, David Sackett) define the concept as "the integration of the best research evidence with our clinical expertise and our patient's unique values and circumstances" (Straus et al, 2005). This is essentially the definition adopted by the American Dental Association. One of the legs of EBD is practitioners' professional judgment derived from experience. Another, usually described as patients' values, is the presenting condition of the patient, including the patients' personal preferences regarding their treatment. The third leg is high-quality clinical epidemiology that permits justifiable estimates of clinical parameters such as risk factors and success rates associated with various interventions. These three legs support a seat, the place where dentists take a position, that consists of the prudent, rational, and judicious integration of information derived from weighing and balancing information from all three legs. EBD is decision mak-

ing done by practitioners; it is not research done by academics.

If a dentist accessed a systematic review or meta-analysis from the literature showing that treatment W produced incontestably superior results in numerous, large randomized controlled trials, and preceded based solely on this information to perform procedure W, he or she would not be engaging in EBD (clinical experience, patient preferences, and integration have been omitted). If another practitioner proceeded with treatment X because it had always worked “in his hands” in the past and the patient strongly favored this general approach, the dentist would probably not be recognized as practicing EBD. If dentists reviewed the literature and discovered that performance characteristics of material Y are consistent with what is known generally about physics, materials science, biochemistry, and human anatomy, they would still not qualify as evidence-based practitioners (although we might praise them for being “science-based”). If the same dentist who labored to integrate clinical experience and patient factors conducted a literature search and discovered that there were no good studies proving the efficacy of Z or that there were a few studies and they were slightly inconsistent, it would be entirely a matter of definition whether the dentist is practicing EBD. If the dentist had at hand a rich repertoire of clinical experience, was oriented toward honoring the

patient, and found definitive, high-quality clinical research, he or she may still fall short of evidence-based practice. It would be necessary to calculate number needed to treat values (NNT), patient value-adjusted likelihood of help and harm (f\*LHH), unique patient expected event rates (PEER), and then use Bayesian logic or some other form of decision science for integration. If a researcher or group of subject matter experts in a consensus conference setting declare the evidence overwhelming in favor of treatment R on average, they are not doing EBD. Only practitioners do it, and they only do it in the context of treating individual patients. Certainly, unreflective adherence to clinical guidelines generated by others is not EBD. Nor is EBD to be equated with the approach to improving performance known as best practices or benchmarking. Importing what has been proven to work does not count because the information comes from other, similar practices and not from the research literature.

Only the integration by a dentist in a unique practice setting of the relevant clinical epidemiology literature, professional judgment from experience, and the patients’ circumstances and values counts as EBD.

EBD enthusiasts generally offer something like the three-legged stool definition and then focus their energies on summarizing what high-quality clinical epidemiology exists, making it available to practitioners, and propagandizing that what they have done is the complete package for improving dental

EBD is not about the scientific base for practice or even about research. It is about evidence: the factual justification for choice.

practice. The Hackshaw, Paul, and Davenport (2006) book *Evidence-based Dentistry* is a standard statistics text book with an introductory chapter on the philosophy of EBD and some standards for literature searches. Enthusiasts are fond of rehearsing statistics about the rapidly explosion of the dental literature. The volume of science exceeded practitioners’ practical capacity many years before the Internet became a tool EBD experts could demonstrate to dentists.

The three-legged stool of EBD is not currently a comfortable sit. Far and away the best developed leg, and the one capable of bearing the greatest weight, is the dentist’s professional judgment. By contrast, incorporation of patient values into treatment decisions seems to be rather stubby, and we would gain much



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by learning to engage patients more fully in their care. The availability of “best evidence,” a comprehensive body of high-quality clinical trials showing a consistent superiority of one or another approach to treatment, is more a promise than an actuality in dentistry. Perhaps the stability of the system could be improved if we add a general understanding of science and the practitioner’s own circumstances and values as the fourth and fifth legs.

The situation that makes EBD so discomforting is the complete lack of a seat, an integration of the support provided by three types of evidence. There is no consistent theory for how to integrate diverse sources of information in practice. (There has been extensive work on criteria for ruling out of court research findings that do not meet standards for experimental rigor: but that is another matter.) My own paper in the *Journal of the American Dental Association* (Chambers et al, 2010) is the only study I have been able to locate that explores how dental practitioners actually integrate information in deciding on care. My fellow researchers and I found that dentists place unwarranted emphasis on research data, that such inaccurate use of evidence decreases as practitioners gain greater clinical experience, and that practitioners have a natural suspicion of procedures that limit their professional judgment. There is virtually no evidence that the adoption of evidence-based medicine improves the quality of medical care (Straus et al, 2005). At best, there are anecdotal stories about once held but now discarded theories (without appreciation that today’s evidence may be the source of snickers in future generations). It is not uncommon to find EBD researchers advancing what “works in their hands.” There is a small body of research intended to identify the factors that retard the intro-

duction of evidence-based practice (Cabana, 1999; Houser & Oman, 2011; Tracey, 2005; Webster, 2005). Generally the evidence suggests that practitioners make trade-offs between external data sensitivity to the clinical context and their own judgments.

Evidence-based approaches began in medicine in the 1980s, and have been imitated to some extent in dentistry. It has not been popular in the discipline of education, where several professional groups have formal policies denying its usefulness (*Educational Researcher*, 2008). In her 2005 presidential address to the Academy of Management, Denise Rousseau (2006) proposed that the field of academic management might profitably follow medicine’s lead. After a few rebuffs (see Ashkanasy, 2007), the subject has been largely dormant. One can only speculate as to the reasons evidence-based language would be congenial to some in medicine and a few in dentistry, but not elsewhere. Just possibly, it is the money. Almost all of medicine and much of dentistry is driven by procedures and materials or drugs in which there is a tremendous commercial stake. That is not the case in disciplines that have been slower to respond to the potential of empirical justification for treatments that can be purchased. (See [www.provationordersets.com/common/flash/pvოსdemo/demo.html](http://www.provationordersets.com/common/flash/pvოსdemo/demo.html) for a commercial about “evidence vendors”.) Alternatively, medicine is a practice where the contribution of technology is larger relative to the contribution of operator variance (professional experience). The balance between operator and technology is different in dentistry, and strongly in favor of the “operator” in educational and business.

### THE EVIDENCE LEG

It is certain that the recent increased attention to EBD has been a boon to the profession. Multisite practice collaborations are producing answers



to clinical questions. The emphasis on methodological rigor in research design has raised the quality of clinical science. New money and recruiting of talented researchers to address clinical questions is probably happening. Publication of systematic reviews showing lack of sound studies or inconclusive results has called attention to areas where research is needed. A new group of academics skilled in accumulating and summarizing clinical epidemiology has been formed. Internet tools are more readily available to practitioners to guide focused, quick searches for information. There is renewed suspicion regarding the claims of commercial interests, both corporate and private—although everyone who has a solution to sell now seems to be tacking “evidence-based” onto their claims.

These are blessings to dentistry, but they are not the whole story. Recently we have stretched the evidence leg of the stool, but it remains to be seen whether the sit is any more secure. We certainly would not want to mistake the brightness of this tool for the work it does or does not actually accomplish.

#### WHAT MAKES EVIDENCE GOOD?

Notice that EBD is not about the scientific base for practice or even about research. It is not about understanding why this or that approach works or fails to produce any worthwhile effect. EBD is about evidence: the factual justification for choice (Sivia, 2006). What is to count for one contemplated action and against others? If research is just objectively true but fails to guide behavior, it is not evidence. But there is no way to determine whether a set of numbers is evidence without knowing its intended use. Unlike a datum that simply is, evidence lives or dies depending on what we intend to do with it.

In a word: there is no set of research method or experimental design criteria that allow us to say whether this or that dataset constitutes good evidence, or even “best evidence.” This is Lee Cronbach’s

classic observation (Cronbach & Meehl, 1955), later codified by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (1985), that the validity of evaluation data is in the decision made using the evidence, not in the evidence itself. [See also *Educational Researcher*, 2007, entire issue.] Does the leg fit the stool: not does the stool fit the leg (Messick, 1994)?

Certainly, every observation is not good evidence. It must pass “admissions standards.” Confessions and physical evidence obtained at crime scenes are rules out of court in legal systems unless obtained via recognized procedures. Hearsay is not evidence in court or in dentistry. When diverse actions are contemplated, it is only prudent to look to the quality of the evidence, or even the existence of any evidence, that supports alternative choices. The pyramid of evidence developed for grading evidence is helpful because it draws our attention to the fact that, other things being equal, certain types of evidence (meta-analyses and RCTs) are stronger than others (one-off correlational studies and case reports). Methodological rigor is a necessary condition for good evidence, but it is not a sufficient one. Although it is fun to jab at the gaffs of the past, proving others wrong or not useful does not prove us right or of value.

There are innocent individuals in our prisons who were convicted based on good evidence. Evidence does not constitute proof. It supports predictions that may or may not prove to be sound guides to action.

#### INTERNAL AND EXTERNAL VALIDITY

Straus, Richardson, Glasziou, and Haynes (2005) propose a two-step process for considering evidence. First, is the evidence

internally valid (in the sense of meeting criteria for methodological rigor); second, is it applicable to our clinical situation? This evaluation procedure is understood to apply only in the order given. This rule trades on the paradigm-shifting monograph by Donald Campbell and Julian Stanley, *Experimental and Quasi-experimental Designs for Research on Teaching* (1963). Still taught widely today in lit review courses, Campbell and Stanley identify some types of flaws or uncertainty that block conclusions from research because of the design of the study, pure and simple. These are called issues of internal validity. There is a second type of validity, external validity, where flaws or uncertainty block application of research findings to practical application. In the standard test of EBM proposed by Straus and colleagues, if the standard of internal validity for the research in and of itself is satisfied, that a “good enough” estimation of external validity can be applied to determine whether to use the research on a particular patient. The authors frame the decision about external validity in these terms: “Are the study patients so different from ours that we should not use the results at all in making predictions for our patients?” (Straus et al, 2005, p. 112).

It makes equal sense to reverse these screens on the evidence. Does the research speak exactly to the patient I have in the chair? If so, is there any reason why the found evidence should not be used to guide treatment? The pyramid of evidence may be sometimes upside down when considering the issue of applicability of the evidence to various clinical practice settings. The order of privileging methodological rigor over clinical applicability in EBD makes sense only where it can be demonstrated that a little help is worse than none. Low-quality research is not as effective as high-quality research in reducing the

variance in treatment outcomes, but all such information benefits patients unless a clear case can be made that the information is biased.

#### DOES EVIDENCE MAKE OR SUPPORT DECISIONS?

Not all high quality dental research counts as evidence. Understanding the properties of materials, common biological reactions to classes of chemical agents, and natural maturation patterns in young patients, for example, are good science that practitioners need to master, but they are wide of the EBD net.

What does it mean to say that evidence justifies a decision? There are two ways to answer this question. On one hand, evidence might be taken to mean that one treatment is superior to another (in a large number of cases similar to the one faced by the practitioner). In this sense, the burden of justification rests on the practitioner who decides to treat contrary to the evidence, as it currently does with respect to the standard of care. On the other hand, evidence may be understood as estimates of clinical parameters that inform the practitioner's decision for each particular patient. The latter is the sense of evidence most often understood in EBM as it is presented from a theoretical point of view. Specifically, evidence-based physicians are interested in getting information that will allow them to more accurately predict any of the following four factors in treatment: (a) diagnosis and screening—what is the likelihood that a patient presenting with a set of characteristics has any of several disease conditions? (b) prognosis—what is the most likely course of the condition, given both reasonable interventions and no intervention? (c) therapy—what are the most likely outcomes of various inter-

ventions? and (d) harm—what are the potential downsides of intervention? In each case, a parameter (probability, average life expectancy, quality of life, and so forth) is determined along with an estimate of the variation in the parameter. Physicians understand that accurate (close to the real case) and precise (close most of the time) estimates of parameters are helpful in caring for patients. Such information can be combined with clinical judgment and patient values to guide treatment decisions.

What about the other interpretation of evidence, the one that says this treatment is better than that one? That is what my PhD advisor called a "horse-race research design," and it is uniquely suited to the randomized controlled trial (RCT) that is thought of as the "gold standard" in dental research. It is certainly correct that the RCT is good at picking winners. But it is not effective for deciding how other horses would run, or whether the track and weather make a difference, or even whether the owners of the horse want to accept the odds on offer. The "one-size-fits-all" search for superior treatments in head-to-head competition does not inform the practitioner or patient so much as pretend to make the choice for them. It is certainly not in the spirit of EBM. But commercial interests have certainly been quick to recognize the unreflective embrace of EBD and now regularly attach this adjective to marketing claims as if to relieve the practitioner of the need to integrate the information in making a clinical judgment in practice.

#### THE "BEST EVIDENCE" PROBLEM

Imagine that an important visitor is coming to town and you wish to entertain him or her properly. You intend to take your guest to the best restaurant in town. But your spouse correctly observes that you have some wonderful places you enjoy, but no French Laundry, Inn at Little Washington, or Tour d'Argent.

Reluctantly, you tell your visiting friend that he or she is on their own because you do not have a "best restaurant." That is silly, you say. That is not what "best" means; it means the best that is available.

Of course this is right, but it is not in tune with EBD enthusiasts. "Best" to them means research that meets standards for research rigor. What is envisioned is systematic reviews of large numbers of RCTs and other methodologically rigorous research.

It is assumed in the EBD sense of the qualifier "best" that all high quality research is determinative of practice and that low quality research is not. As Straus, Richardson, Glasziou, and Haynes (2005) put it: "If the study wasn't randomized, we'd suggest that you stop reading it and go on to the next article in your search." It is unlikely that we will ever have RCTs involving the effects of smoking or pregnancy on periodontal health because true randomization is not possible over some variables.

There are three problems here. First, the best evidence in the EBD sense may not justifiably influence practice decisions. It may be "proven" that too little is known with certainty to alter what professional judgment and patient values urge. It is very common to read in journals regarding contain systematic reviews: "1,562 articles were identified in the initial PubMed search; 341 of these met inclusion criteria for the review; of these 244 were excluded after review because they did achieve standards for "best evidence"; the 17 remaining studies were inconclusive."

Second, the out-of-hand dismissal of research that does not meet the abstract criteria for "best" research assumes that excluded studies contain bias. The multiplication of biased studies will always misguide clinical practice; but the multiplication of low quality but unbiased studies will reduce clinical variance in

judgment. That means multiple, unbiased studies can be used to provide evidence in EBD.

Third, “best evidence” may not exist. EBD supporters are silent on this point. The examples they present almost always demonstrate that the clinician’s question can be answered in a few minutes or even seconds with a computerized search. If “best evidence” does not exist, the clinician must still proceed with treatment. But the problem is a little deeper than “nothing ventured, nothing gained.” No stopping rule exists for EBD searches. How is it known whether it is worthwhile initiating or continuing a search?

#### REASONABLE DOUBT

John Iannidis (2005) has argued persuasively that over half the research published in medicine makes false claims. Regrettably, he is not able to clearly identify which these are.

But do knowledgeable people really have serious doubts about the role of evidence in professional practice? Who could be against EBD? Of course, the question is malposed. Who could be against fluoride, for example? Most scientists recognize that it is not just the fluoride that matters but how much, for whom, by what delivery system, etc.

Nancy Cartwright, in her 2009 presidential address to the Western Division of the American Philosophical Association, said: “RCTs are just the bad penny” (Cartwright, 2009, p. 18), meaning that they circulate more frequently than other currency because their actual value is less than their face value. Cartwright’s point is that randomization is effective in controlling those dimensions of a clinical decision over which one has randomized. But practice is so multidimensional that conspicuous randomization in one direction can actually be dangerous in lulling others to believe that all relevant dimensions have been randomized. We have a preoccupation for randomization across

subjects in clinical trials, but not always for randomization regarding operator, setting, clinical protocol, and other factors. Counting subjects as the critical dimension also substantially inflates the sample size, thus exaggerating statistical significance. In the end, the application of evidence in practice always involves an  $n$  of 1.

Occasionally, EBD is used in a normative sense. Those with whom one disagrees are said to “lack evidence”; not publically embracing EBD is sometimes understood as being unreasonable. Philosophers usually make a clear distinction between reasons and evidence. The reason is what causes an action (Bratman, 1999; Kolodny, 2005; Sober, 2008). “I was so tired that I did not notice the change in the patient’s color in time to administer pure oxygen.” By contrast, evidence is normative; it offers a *prima facie* justification for a course of action. Certain changes in patient color are an indication that pure oxygen, and other recovery techniques, should be administered immediately. But evidence controls action only in a *prima facie* fashion. Not all changes in patient coloration preclude continuation of treatment. Practicing in ways that do not match researchers’ understanding of best evidence is not automatically unreasonable. Considerations of cost, patient selection, comorbidities, and practice delivery systems may differ from the conditions that prevailed on average in controlled research settings.

Evidence contributes to patient care. Better evidence contributes more than motley evidence. But evidence does not dictate patient care, and characteristics of the evidence in the abstract are insufficient to determine the extent to which they are deterministic of treatment in particular situations.

Physicians understand that accurate (close to the real case) and precise (close most of the time) estimates of parameters are helpful in caring for patients. Such information can be combined with clinical judgment and patient values to guide treatment decisions.

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### THE CLINICAL EXPERIENCE LEG

Sometimes it is thrown up as an epithet that one must not be much of a practitioner if all one can say is “it works in my hands.” On the other hand, patients always want to go to dentists whose treatments work in the hands of those dentists. There is a deeper implication in the criticism, one that suggests that dentists may not be the best judges of what actually works. It is unlikely that EBD will get very far in promoting an integration of evidence and clinical experience when it begins from a position of disparaging rather than understanding the power of clinical judgment.

### OBSERVATION BIAS

There is a voluminous social psychology literature about unconscious bias, self-confirming hypotheses, herd mentality, placebos, and selective searching for information. [See Chambers, 2003; 2009 for summaries with dental examples.] There is no reason to believe that dentists would be immune from these “all-too-human” character traits. Dentists may misinterpret what actually works in their hands.

But this is also a dangerous argument for advocates of EBD. Literature searches are known to be biased, especially in terms of going with only the first positive hit (Kuiper et al, 2005). There is almost certainly a “Hawthorne effect” in new movements such as EBD. This phenomenon was named for a Western Electric plant that assembled telephones. When volunteers in the 1930s were recruited to participate in a study to assess the effects of brighter lighting on productivity, the results of the RCT were impressive. The trouble was that when the study was repeated to test for lower levels of lighting that reduced glare, the results were equally effective. In neither case did the results last. Novelty and a public expectation of change are often temporarily effective in the absence of any true causal intervention (Mayo, 1933).

Human nature will always leave the door open to misapplication of both clinical experience and evidence. Dentists are more vulnerable to this natural failing than are physicians because more dentists practice in isolation. Public inspection of work—through study clubs, group practices, teaching in dental schools, and continuing education—may go further to correct distorted interpretations of experience than do Internet searches. After all, the latter are conducted in private.

### POLICY-BASED DENTISTRY

There is, however, an extreme form of EBD that aims to drastically curtail or even eliminate clinical experience from practice. It might be called PBD, for policy-based dentistry. Critical paths or clinical guidelines are sometimes proposed as a means for reducing practitioner judgment. Once a patient has been classified, even tentatively, one or a few alternative treatments are initiated automatically. Some organizations have published “evidence-based consensus statements.” Often, these are advanced by specialty groups and have the effect of limiting involvement in certain procedures by general practitioners. Third-party carriers are also interested in PBD.

There are some advantages in using PBD. Treatment variation is reduced, allowing for more rapid detection of approaches that do not work. Policy is a platform from which opinions and evidence can be compared. Policy also allows more ready management of care for third parties by unitizing disease conditions. The role of diagnosis relative to treatment is also elevated in this system. It is worth noting that systematic reviews in dentistry are more often inconclusive than in medicine and that reviews in medicine are dominated by drug trials. It is more difficult to get con-



clusive evidence when operator variance plays a part in the treatment outcome.

PBD seems well suited to medicine. Physicians practice in hospitals, and staff working in committees there review evidence and craft critical paths that the entire medical staff agrees to. This is a nice blending of EBM and PBM, but it may not be so easy to achieve this synthesis in dentistry.

But PBD should be carefully distinguished from EBD. In the policy version, groups of practitioners pool the evidence and their practice experience to create guidelines. The patients' and the practitioners' values and the circumstances in the practice are not considered or are only allowed to the extent that a decision is made that the guidelines are applicable in the particular case or they are not. Exceptions require external approval.

#### OUTCOMES-BASED PRACTICE

There is a close cousin to EBD that does not rely on either primary or screened evidence from the research literature. All the evidence comes from within the individual practice itself. It certainly ought to be possible to apply objective and systematic methods to individual practices in order to minimize bias, just as such methods are applied in classical research. There are some very simple techniques for these purposes. The focus here is on practice outcomes (rather than practice inputs drawn from other people's evidence). I have written a 12-part series of articles showing how existing charts, staff members, and paper-and-pencil tabulations can help identify what works reliably in a particular dentist's office (Chambers, 2001b). The techniques lack the sophistication and complexity of publishable research. Most involve simple tallies and computations that can be completed on a hand-held calculator. The focus is not on evaluating the usefulness of what

researchers are doing. It is on isolating the activities that make the largest differences in practice outcomes and then reducing the variations and unwanted surprises on those activities.

My outcomes-based practice (OBP) alternative to EBD has been criticized by some purists because the results are not generalizable across practices. The outcomes certainly apply only to the office where the data are collected and the findings cannot be published. There actually is not need to make claims that apply in other settings: all that is being done in OBP is applying some research rigor to observing evidence in order to improve outcomes in one practice only. That is what most practitioners are interested in.

#### THE PATIENT VALUE LEG

When I first heard the term EBD, I was overjoyed. "At last we will give proper attention to ethics in dentistry." There is little doubt but what patient values are so much the shortest leg of the stool that the seat is unstable.

There are two reasons for this lacuna. First, patient values are not included in the designs for research that constitutes the evidence in EBD. EBD is widely believed to be a discipline in the natural sciences, so intangibles such as values are difficult to study. (If it is correctly understood as centering on the integration of multiple courses of information in clinical decision making, EBD is actually a social science discipline.) The problem is not acute with regard to the relationship between evidence and practice judgment since it is often assumed that research evidence will simply substitute for clinical experience. The second reason why so little is heard of with regard to patient (and practitioner) values in EBD is that the application of values to diagnostic and treatment decisions requires a different logic from the logic of clinical research. Inferential tests of hypothesis, p-values, confidence

intervals, measures of effect, and such are essential for research. But they are not the stuff of integrating this evidence in clinical decision making. This is a fatal impediment to the advance of EBD: attempts are being made to use the tools of research for the work of dental practice.

In medicine, the procedures for integrating evidence with patient values are better worked out than for integrating evidence with clinical judgment. What has not been developed is good systems for soliciting reliable expressions of patient values. This is a rich field in economics, where there is a good theory of utility functions (Binmore, 2009; Keeney & Raiffa, 1993). Marketing research also knows a thing or two about how to elicit the expressions of values that will drive behavior (Kotler & Clarke, 1987). The *ADA Code of Professional Conduct* specifically states that "the dentist's primary obligations include involving patients in treatment decisions in a meaningful way, with due consideration being given to the patient's needs, desires and abilities, and safeguarding the patient's privacy." Informed consent is the ethical position and legal requirement that patients (not practitioners) make the final selection of when to begin and end diagnostic testing and whether to engage in therapeutic interventions.

The implication is that use of evidence, absent consideration of patient values, is indefensible practice. Dlugokinski and Browning (2001) present research that bears on this point. They reported on the informed consent practices of dentists who were major users of composite for posterior restorations and those who were not. The driving force in informed consent was



the practitioners' personal beliefs about the procedures: those who preferred to use composites for posterior restorations found more patients in need of these restorations and systematically altered the presentation of benefits and costs to favor treatments the dentist preferred. This is a case where, at least potentially, an Internet search and an outcomes-based practice database of the efficacy of posterior composites in the practice could provide useful information. Such activities would not, however, furnish all the information needed to make the correct decision.

Paternalism is the ethical position that professionals are justified in selectively presenting information or even substituting their own decisions for those of the patient when patients are thought to lack the capacity to exercise their own judgment (Beauchamp & Childress, 2009). Unless one is prepared to take an extreme position that scientific evidence always overrides patient's values, some structure is needed for integrating such values into clinical decision making. It is evident that something more than what EBD has so far developed will be needed to manage this successfully.

## INTEGRATION

Regardless of the irregularity in length and strength of the three legs of the EBD stool, if there is no place to sit comfortably that spreads the weight uniformly, this tool will be set aside as nonfunctional. There is virtually no research showing how dentists actually integrate diverse sources of information in their approaches to treatment.

At this point in our immature understanding of how practitioners integrate

evidence, experience, and values in clinical decision making, perhaps we can do no better than inventory and sketch several alternatives. There are at least four such positions: (a) policy matching, (b) punctuated equilibrium, (c) probability updating or advance on baseline, and (d) decision trees. Very likely, future research will show that practitioners use these and other approaches in various combinations depending on circumstances.

## POLICY MATCHING

The simplest approach to grounding practice is to conform to a standard. The decision rule here is "follow the standard" or come close enough so that one could not be criticized for ignoring it. The standard of care is the obvious example, and those who depend on this approach appear to accept the position that research evidence will move the standard of care, in its time and to the extent the professional as a whole approves. The weight of professional opinion will emerge and until it does, it is safe to follow convention.

Everett Rogers's pioneering work on the *Diffusion of Innovations* (1995) describes the characteristics of early and late adopters of innovation. Dentists appear to have many of the socioeconomic features of early adopters, such as high formal education and socioeconomic status (but not working in large organizations), but also many of the personality features of late adopters, such as discomfort with uncertainty and preference for concrete over abstract issues (Chambers, 2001a). Following the suggestion that John Colobolos (1989) made regarding physicians, dentists who accept the policy matching strategy will prefer a minimal standard or one that allows the maximum of professional freedom in choice. The driving question is not what some researchers might think is slightly better practice but what the profession at large feels is allowable

practice. On this view, many of the nuances in EBD will be entirely too fine to deserve the practitioner's time.

## PUNCTUATED EQUILIBRIUM

The concept of punctuated equilibrium is due to Niles Eldredge and Steve Gould (1985) and it refers to the view that biological evolution is not a steady and gradual process. Instead, there are long periods of stability, broken by episodes of rapid innovation. The analogy being suggested here is that dentists maintain stable practice patterns, and make changes only occasionally. They may retain a second-generation material and only move to a new product in the fourth or fifth generation. They may perform the occasional endodontic procedure long after they might have logical reason to discontinue this activity altogether. The point about equilibria is that the entire practice exerts forces for stability and against change, even when a slight objective advantage might be demonstrated for doing something other than what habit recommends. Again, we come face to face with the strong possibility that the objective desirability of a product, material, or technique demonstrated in the literature cannot be evaluated only in the context of the literature.

The practice logic of punctuated equilibrium is counterfactual. That is a fancy way of saying that the practitioner has to make a bet on the value of EBD. Actually, there are two bets. The first one is whether it is worthwhile to search the literature. The second is whether it is worthwhile to change habits based on new evidence.

There is a simple rule for evaluating the wisdom of searching for information. Is the likely benefit of a search and change, minus the cost of the search and the cost of making the change, greater than the likely benefit of continuing

with the status quo? One of the great benefits from EBD has been to reduce the cost of searches. The increase in useful information from clinical epidemiology has not been as noticeable. The very real possibility remains that practitioners will not be able to find any information that specifically addresses many of the issues they face. As individuals tend to exaggerate the cost of those activities they do not understand, it is reasonable to expect that EBD searches will be rare unless there is a clear and unavoidable cost of continuing with the present approach. A similar cost formula applies to making changes once relevant information is found. The cost of implementing the new approach may not justify switching (including the cost of the learning curve and uncertainty) if there is a statistically significant difference in the literature, on average, across many patients treated in other settings.

#### ADVANCE ON BASELINE

The first two approaches to integration involve all-or-none changes in practice habits, usually based on recommendations made by others who have no direct knowledge of the individual practitioner's circumstances. We can call this the exogenous understanding of integrating evidence, experience, and values to improve practice, meaning "coming from outside the practice." The next two approaches are endogenous in the sense that the evidence, experience, and values are evaluated afresh within the practice with each potential application. Of course, this decision making need not be from scratch with each situation. Sometimes, a challenging diagnosis or decision about whether to continue with diagnostic tests may present itself as a novel element in a familiar clinical context with well understood values. Perhaps, the patient presents with values that challenge evidence and experience, as might be case with a Christian Scientist.

The essence of endogenous integration of evidence, experience, and values is that a new and particular decision is called for that extends beyond habit.

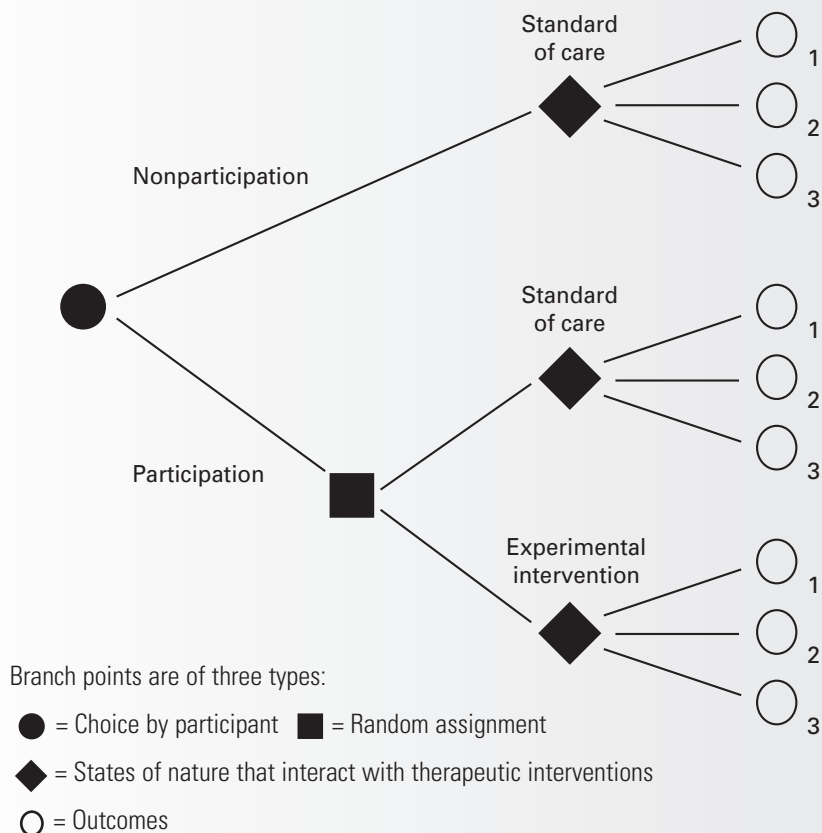
In medicine, EBM approaches to clinical decision making are endogenous, typically focused on reducing the variance around an estimated parameter. Perhaps the physician knows little or nothing of the patient's five-year survival rate given a certain form of cancer. A good literature search could provide a more accurate probability estimate. In dentistry, one may be confused by competing claims from two bonding agents. A review of several good RCTs may show that one has sheer strength of 32.5 MPa and the other 33.1 MPa. The idea is that more accurate estimates of relevant parameters facilitate better decisions.

Sometimes the analysis and interpretation of such parameters is complex, often well beyond the training or time available for practitioners. Sometimes the exact type of estimate sought cannot be located (usually because it does not exist). Sometimes the results are expressed in units or for conditions that are not exact matches with the presenting patient condition. Sometimes the parameter estimates from the literature are at odds with the estimates from clinical experience.

The reflex response to complex or conflicting information is usually to pick one or another value and ignore the rest. That, however, is not an integration of available information; it is a privileging of one source over another. There is a well-established procedure for integrating probability estimates for parameters that is statistically sound and perfectly accurate. It is called Bayesian updating (Hoff, 2009; Silvia, 2006), and a simple formula is used to combine new evidence

It is unlikely that EBD will get very far in promoting an integration of evidence and clinical experience when it begins from a position of disparaging rather than understanding the power of clinical judgment.

FIGURE 1. SCHEMATIC REPRESENTATION OF THERAPEUTIC INTERVENTIONS AS LOTTERIES OVER TREATMENT ALTERNATIVES.



with what one already “knows.” Thus new evidence either permits an “advance on baseline” or it does not. The expected advance on baseline should always be greater than the cost of a search for new evidence.

As is the case with “best evidence,” there is a subtle, but significant confusion in EBD over what it means to apply evidence from research in the clinical setting. It may seem obvious that the parameter estimates (probabilities of one treatment being superior to another, a diagnostic test having a certain accuracy, or the odds of a risk factor or side effect mattering, for example) should slide over just fine from summarized RCTs. Statisticians would state the relationship between evidence and the

research observations they are based on with the expression  $\Pr(E|O)$ , where  $E$  is a research claim and  $O$  are the data researchers use to justify their claim and the “|” means “given” or “based on.” From the practitioner’s perspective, the expression looks more like  $\Pr(O|BE \& PJ \& PV)$ . Here  $O$  stands for clinical outcomes,  $BE$  is the best evidence the clinician can find,  $PJ$  is professional judgment, and  $PV$  expresses the patient’s and the practitioner’s values. This express just states that clinical outcomes are a function of the integration of evidence, judgment, and values—exactly what EBD is supposed to be. It is immediately obvious that  $\Pr(E|O) \neq \Pr(O|BE \& PJ \& PV)$ . It is even true that  $\Pr(E|O) \neq \Pr(O|E)$ , if we were to bracket out professional judgment and patient and practitioner values. The observant reader will say, this last inequality is simply due to fact that  $O$  in one equation stands for observation in a research study and  $O$  in

the other stands for clinical outcomes in somebody else’s practice. That is correct: research observation and clinical outcomes are not the same thing. But even if they were, in the case where EBD enthusiasts are academics with part-time practices,  $\Pr(E|O) \neq \Pr(O|E)$  by mathematical necessity. There are ways around this problem, but they involve gathering information or making assumptions about factors beyond the research evidence and using Bayesian techniques.

What cannot be done with Bayesian approaches to integrating evidence and experience is to manage values.

### DECISION TREES

Although research shows that health-care professionals are not especially good at Bayesian updating as would be required by EBD, they do seem to possess an intuitive and workable approach to practical decision making. One of the oldest and best established findings in decision science is that the expected value (what one expects to get) is the product of the value of the outcome should it occur and the probability that this outcome will occur (Bodily, 1985; Luce and Raiffa, 1957). This is abbreviated  $EV = Pr * V$ ; think of EVs as bets. And to make matters even more wonderful, complex paths through multidecisions networks are simply chains of EVs. Better still, the probability of any of the possible events occurring is always equal to 1.0. An example of a decision tree is shown in the side bar. In EBM this is known as clinical decision analysis or CDA. An example in dentistry is developed in the context of informed concern and agreement to participate in clinical research in my paper “Confusions in the Equipose Concept and the Alternative of Fully Informed Overlapping Rational Decisions” (Chambers, in press).

As one might have guessed by now, the value part of decision trees is deter-

mined by the patient values and the likelihood is determined by the evidence, as adjusted by the practitioner's experience. The overall structure of tree, knowing which alternatives to consider is the special province of the practitioner. Patients and dentists agree on which paths to pursue based on which will give both the patient and dentist the likely most desirable outcome. The whole tree can be evaluated using a pocket calculator, or more often by natural intuition.

Aside from the compelling fact that standard decision theory is the only approach so far considered that permits the systematic integration of evidence, judgment, and values, there are some further benefits. Decision analysis is action-oriented, rather than concerning itself with abstract claims. The researcher pays the price of advancing a claim that does not follow the canons of science; the practitioner pays the price of performing a procedure that damages a patient's health. Only potential courses of action (as identified by the practitioner) have meaning. Thus, practitioners are always deciding between alternative actions, not theories.

Because the plausible course of action is the essential question in decision making, evidence can have meaning well beyond the accuracy and precision reported in the literature. This is called sensitivity analysis in technical terms, but the idea is very simply that information is only of interest if it might change the course of action chosen. In the case of two materials that had sheer strengths above 30 MPa cited earlier, further RCTs to determine which really is superior would be a waste of time since both are clinically acceptable. The decision between the materials will be based on other considerations, such as cost, ease of use, familiarity, and "whether it works in the clinician's hands." That is exactly as it should be. When one course of action is dominated by advantages in another, differences, regardless of the

relevant evidence, on the dominated path should not be considered at all. Several Nobel prizes in economics have been awarded for work that assumes this statement among the givens (Arrow, 1963; Nash, 1950). This is just the familiar argument that reasonable people will look for their missing wallet where they believe they have lost it rather than where engineers have placed streetlamps.

The argument for decision analysis and the for practitioners to perform sensitivity analyses to determine whether information about dominated alternatives could reasonably change the action taken is not a council of despair about EBD. Rather, what is being proposed is a rule of thumb for the wise use of evidence in practice: If it is plausible that evidence exists that would change the decision about how the patient in the chair should be treated, consider getting this evidence and integrating it with what else is known. There are two parallel rules: If the practitioner's experience might be biased due to haphazard notice of treatment outcomes, a system of outcomes-based practice should be initiated, especially so since one of the steps in this process is to isolate those activities that most strongly influence clinical outcomes. Finally, if it is likely that the values of various patients or the values of the practitioner may make one or another alternative preferable, those values should be identified and integrated into treatment and ethics texts should be consulted for discussions of the limits of paternalism. ■

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## TECHNICAL NOTES

**Confidence Intervals:** It is common and useful practice to express the variation of the parameters estimated by clinical epidemiology in terms of confidence intervals. The problem is that such intervals that figure so prominently in the forest plots of systematic reviews and meta-analyses are generally taken to mean that the estimated parameter will fall within a  $CI_{95}$  95% of the time in individual cases. This, of course, is wrong. The correct interpretation is that if researchers conducted 100 research studies, the data reported in their papers would be replicated in 95 of the studies, on average. The  $CI_{95}$  reported in the literature (unless it is specifically stated that Bayesian statistics were used) does not inform the practitioner about his or her patient. The problem is very simple: researchers present confidence intervals in systematic reviews that are appropriate to the research context and imply or allow practitioners to believe that this is a measure of the variation the practitioner should expect in his or her office. It is not.

**Randomization:** Most RCTs are semirandomized. Inclusion and exclusion criteria on patients may alter generalizability of findings in material ways. In other words, steps taken to increase internal validity normally reduce external validity. It is also necessary to randomize over all factors that may have a measurable effect on outcomes in the application context. I have published research showing that a substantial, if not the largest, source of variation in technical dentistry outcomes is the operator (Chambers, 2005; Chambers et al, 2009; Re et al, 2009). Most published research randomizes across patients, but not conditions, operators, or even the underlying scientific features of the materials and techniques used. The statistical models necessary to isolate the sources of variance that matter in clinical practice are complex. Performing large meta-analyses on studies that ignore these factors, however, does not correct this deficiency.

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## 2010 MANUSCRIPT REVIEW PROCESS

Four unsolicited manuscripts were received for possible publication in the *Journal of the American College of Dentistry* during 2009. One was returned to the author because it did not fit the format of the *Journal*. One manuscript was accepted for publication following peer review; one was declined; and one was returned for substantial rewriting and subsequently accepted for publication. Ten reviews were received for these manuscripts, with an average of 3.33 per manuscript. Consistency of reviews was determined using Cramer's V statistic, a measure of association between review recommendations and the ultimate publication decision. The Cramer value was .535, where 0.00 represents chance agreement and 1.00 represents perfect agreement. The College feels that authors are entitled to know the consistency of the review process. The editor also follows the practice of sharing all reviews among the reviewers as a means of improving calibration.

The editor is aware of two requests to reprint articles appearing in the *Journal* and four requests to copy articles for educational use received and granted during the year. There was one request for summaries of recommended reading associated with Leadership Essays.

In collaboration with the American Association of Dental Editors, the College sponsors a prize for a publication in any

format presented in an AADE journal that promotes ethics, excellence, professionalism, and leadership in dentistry. Ten manuscripts were nominated for consideration. The winner was a pair of essays on evidence-based dentistry by Abhijit Gune which appeared in the *Delta Sierra [California] Dental Digest*. These essays are reprinted by permission in this issue of the *Journal*. Fourteen judges participated in the review process. Their names are listed among the *Journal* reviewers below. The Cronbach alpha for consistency among the judges was .869.

The College thanks the following professionals for their contributions, sometimes multiple efforts, to the dental literature as reviewers for the *Journal of the American College of Dentists* during 2010.

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*Shirley, MA*

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# Journal *of the* American College *of* Dentists

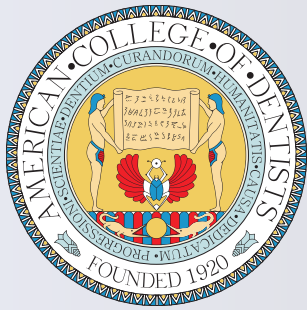
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