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

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### 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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