Evidence-Based Dentistry 2006: Where Are We?

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Over 15 years ago, a perceived lack of high-level clinical dental research, plus dentists' apparent inability to discern the veracity of much that was published or presented at meetings, provoked this journal's editor, George Zarb, to seek a prosthodontic adaptation of David Sackett's classic work, *Critical Appraisal of the Literature in Medicine*. Together with Jim Anderson, his University of Toronto academic partner, George Zarb sought the guidance and direction of David Sackett's group at McMaster University, where Anderson had also studied. Sackett had pioneered a much-needed paradigm and termed it evidence-based medicine. Zarb's initiative led to a special course of study by 10 North American prosthodontic educators at McMaster, who then went on to develop an evidence-based dentistry model. While other academic colleagues undertook similar initiatives, it was this group of prosthodontic scholars who played a seminal role in disseminating the concept of EBD via 2 international symposia and a series of EBD articles that remain easily accessible (http://journals.elsevierhealth.com/periodicals/ympr/content/evidencebased).

Those early, heady convictions accompanying the topic's introduction survived the many subsequent attempts at gross- and fine-tuning of the original notion. However, a certain amount of confusion also has been elicited by EBD and it is therefore opportune to pose the question: How far have we come and where are we today? As one of the original 10 converts to the new clinical thinking of EBD, I would unhesitatingly answer "very far" to the first half of the posed question. Consider the following facts: (*1*) The Cochrane Collaboration (www.cochrane.org) publishes systematic dental reviews; (*2*) there are currently 2 evidence-based dental journals; (*3*) Dental Clinics of North America devoted an entire issue to the topic[1]; (*4*) Don Brunette wrote a superb text, titled, *Critical Thinking: Understanding and Evaluating Dental Research*[2]; (*5*) there are numerous EBD articles published in various journals with data utilizing EBD; and finally (*6*) the subject is taught in many dental schools, where it continues to grow and evolve into an integral and important part of the undergraduate doctoral curriculum.

Answering the second half of the question—where are we today—is somewhat trickier. The overall EBD picture in clinical circles still suffers from considerable negative perceptions, particularly regarding the correct interpretation of the term. It seems as if the concept was altered as it evolved in dentistry, and faces a real risk of losing its way. It must be underscored that Sackett and his group's original articles in *JAMA* were presented as "User's Guides to the Medical Literature." These authors' goal was to guide practicing physicians to find the best articles on the clinical question with which they were concerned, and to evaluate the articles they were reading. Regrettably, some of our colleagues have somehow leap-frogged over the initial concept and seek to teach clinicians to do their own systematic reviews and meta-analyses. The implicit message here is an expectation to become epidemiologists and statisticians. This is indeed unfortunate since it was clearly not the original intent.

Evidence-based dentistry has 3 levels of use: researchers, who utilize EBD concepts to determine proper study designs and increase the validity of their work; teachers, who need the depth of knowledge to teach EBD to their students and prepare EBD-based clinical lectures; and clinicians, who need to critically appraise the literature they read and the lectures they attend. The goal of EBD was always to teach clinicians to correctly evaluate the literature, not to scare them off by insisting on a depth of knowledge that is both inappropriate and ultimately of little interest to the clinician. To paraphrase a popular metaphor: Some people must be taught to build a wristwatch, some to repair it, but most only need to read the time.

One area that created conflict is the assumption that employing EBD limits dentists to only reading papers based on randomized controlled trials (RCTs). Indeed, if that were the case, there would be very little worth reading. In the accepted scientific hierarchy of clinical evidence, randomization is the acknowledged gold standard for most questions. However, it cannot always be the case. RCTs can be extremely expensive and time consuming, and while the number of trials has been growing, Derek Richards quite correctly points out that "both the size and quality of these [trials] continue to disappoint."[3] Randomization only eliminates allocation bias and only when the N is compelling, since it is possible that chance may prevent the 2 groups from being similar. Other authors[4] maintain that a matched cohort study, in which important potential confounding variables are prognostically stratified prior to allocation of treatment, is critical to prevent errors of chance. Randomization may also be unethical to use in determining a question about harm. How could a researcher allocate a patient to a cohort when the treatment, or lack of it, could be harmful? It seems pertinent to recall that there has never been an RCT that proves smoking is hazardous to a patient's health. Yet the overwhelming body of ev-

idence, albeit on a lower level in the scientific hierarchy, supports that conclusion. Most of our dental literature consists of case studies or case series and much can be ascertained from them. Certainly, if a procedure or material has an extremely high (90+%) success rate, one should be cautious about making changes without a well-done RCT to justify that change. Conversely, if a treatment has a modest or low success rate, can one afford to wait the necessary time for a well-done RCT? In the case of conflicting evidence, the clinician needs to weigh the evidence and this means looking for properly designed and executed research. A poorly designed or poorly executed study doesn't have validity just because it is an RCT. Sackett[5] lamented the time and energy being wasted by disputants "focusing on methods rather than questions." The research question determines the appropriate design and he observes that researchers would be better served if they "redirected the energy they currently expend bashing the research approaches they don't use into increasing the validity, power, and productivity of the ones they do."

All of our clinical prescriptions involve a risk-reward ratio. Risk is an integral component of almost every clinical intervention, but choosing to not treat might also create risk and eventual morbidity. Harm is a measurable outcome entity and can be gauged in many ways, with different degrees of morbidity and mortality representing medicine's classic adverse outcomes. In dentistry, monetary loss (cost) and time loss (long exhaustive treatment procedures) also need to be considered. A routine prophylaxis for a patient with gingivitis or a posterior single-surface composite restoration are widely regarded as time-proven, absolute minimal risk interventions. However, the harm/risk potential escalates when treating a patient with an active endodontic/periodontic infection on a maxillary first premolar with a poor prognosis. The dentist has to find answers to several questions, including: Would you consider an immediate-placement implant? Would you do immediate loading? Or in the case of another clinical scenario: What if you have a patient with severe recurrent ulcerative apthous stomatitis and suffering from a severely compromised quality of life? Would you prescribe thalidomide? What if the patient was a male? It should be immediately apparent that compelling clinical evidence is essential if we are to make the best treatment decisions to help such patients.

Therapeutic decisions may be flawed since they are subjected to numerous influences. The former have their genesis in what most of us are taught in dental school—that time-dependent and singularly achievable package of "core techniques" that are an outgrowth of the traditional requirements mastered by the large majority of all dental students. It is admittedly not the only way to acquire a dental education, but it tends to be the one with which most of us are familiar. Following graduation, the young dentist is influenced by evolving anecdotal evidence as a result of early personal or collegial clinical experiences. While it is important to constantly evaluate treatment results, it may be difficult to do so because of the inherent biases involved. We all tend to overrate the success of our own treatment, which is why blinded studies have greater validity. Also, most often there is a chronology bias in that the dentist's follow-up observation time is too short. Thus, while we may have performed a procedure only 1 year ago, we are now making clinical decisions based upon limited and clearly short-term results. We are also influenced by the esteem of the professor giving the lecture or the "podium educator" who presents techniques and teaching material more suitable for presentation than application. The latter often score high on the entertainment index but fall short of EBD criteria for efficacy and effectiveness. The quality of the graphics or the number of computers is not an indicator of scientific validity. Further, how much digital manipulation of the image is acceptable? Computers allow the digitally talented not only to crop, eliminate dust spots, and enhance contrast and brightness, they can also alter the color, shape, and translucency of restorations, close margins, alter gingival contour and color, correct root canal fillings, place or remove decay, etc.

Clinical decision making may also be vulnerable to commercial pressures, and the critical appraisal of an advertisement is as important as the critical appraisal of a publication. Laboratory studies, which are necessary aspects in the development of a product or treatment, are not on the EBD hierarchy of evidence and should not be used to determine clinical therapy. It is also a manufacturer's obligation to do clinical trials on a new product before introducing it for widespread clinical dissemination. Often, after wading through the marketing/sales spin, we find an isolated reference that may have never been published. The "information available on request" reference should raise concern. However, keep in mind that the difference between marketing and advertising is only cost. In a free market society, commercialism is a partnership. Our scientific programs are supported by commercial sponsors and it must be acknowledged that without such support, we could not afford the quality of meetings we have come to expect. In addition, commercial companies fund much of the clinical research being performed, especially in prosthodontics. A healthy symbiotic relationship should and can exist between industry and clinical dentistry with mutual benefits for both constituencies.

Evidence-based clinical decisions as an outgrowth of clinical appraisal of selected literature is a patient-centered mandate. It is driven by patients' need to ob-

tain answers to the perennial clinical questions: Will it hurt? How long will it last? How much does it cost? And would you do it for your mother? EBD has already brought enormous intellectual rigor to this mandate and every effort should be made to strengthen our resolve to sustain its intellectual momentum. Derek Richards' has suggested an alternative name for EBD—"everybody's dentistry"[3]—because practitioners must be able to critically appraise the information presented to them. I would like to suggest we rename it EBP, *evidence-based practice*, as this is the ultimate goal since it effectively underscores the very special interface between both patient- and dentist-mediated concerns in the determination of what "above all does no harm."

References

1. Goldstein G. Evidence Based Dentistry. Philadelphia: WB Saunders, 2002
2. Brunette DM. Critical Thinking: Understanding and Evaluating Dental research. Chicago: Quintessence, 1996.
3. Richards D. EBD—Everybody's dentistry. Evid Based Dent 2005;6:57.
4. Feinstein AR. An additional basic science for clinical medicine: II. The limitations of randomized trials. Ann Intern Med 1983;99:544–550.
5. Sackett DL, Wennberg JE. Choosing the best research design for each question: It's time to stop squabbling over the "best" methods. BMJ 1997;315:1636.