To question the current widely used phrase, “evidence-based dentistry” is similar to questioning the Bible in a meeting with a devoutly religious group. However, in our candid opinion, we clinicians need to express our concern about the obvious respect for and overuse of this phrase and the unquestioning attitude of many dentists and authors toward it. More importantly, we need to open discussion about how evidence-based dentistry (EBD) influences our patients, third-party payers, dental education and ourselves. This school of thought is certain to spark some debate; our intention is to provoke serious thought and discussion on the following topic.

The purpose of this article is to help you to determine if, when and how “evidence-based” research projects can help your practice and your patients, and how to evaluate projects reported in publications.

What is Evidence-based Dentistry?

Throughout the past few years, clinical dental practitioners have heard and read the phrase “evidence-based dentistry” ad nauseum. Almost every article, dental faculty member, research paper, dental continuing education speaker and even lay publications have picked up and used this popular “buzz” phrase. If you were to observe the overall health science literature, you would find hundreds of articles (with which we will not bore you) proclaiming the advent and value of EBD and evidence-based medicine (EBM) in dental, medical, nursing and allied health science literature. However, there are a growing number of articles discussing the limitations of it, especially in medical literature. It is as if we have never had any evidence related to our practice procedures in the past; that we just bumbled on blindly. Because of the predominance and constant bombardment of the phrase “evidence-based dentistry” used by dental teachers, manufacturers and researchers, practitioners are wary of almost any dental paper that is published. All of us see research projects contradict each other in “evidence-based,” “peer-reviewed” dental literature; some even in the same issue of a given journal. Additionally, it is not uncommon to see a so-called “evidence-based” publication offer results that are diametrically opposed to the long-time observations of experienced dental practitioners.

Is the phrase, “evidence-based dentistry” something new, a passing fad, an academic fetish or is it something to which we practitioners should pay strict attention to and use when making decisions regarding patient care? Are there limitations to evidence-based dentistry, and if so, what are they?

Evidence-based medicine is not new. In fact, David L. Sackett, MD, one of the leading physicians involved with analyzing and critiquing EBM in recent years says, “Evidence-based medicine, whose philosophical origins extend back to mid-19th century Paris and earlier, remains a hot topic for clinicians, public health practitioners, purchasers, planners and the public.” He states further, “Criticism has ranged from evidence-based medicine being old hat to it being a dangerous innovation, perpetrated by the arrogant to serve cost cutters and suppress clinical freedom.”

How is EBD or EBM defined? Evidence-based practice (the term that is replacing the use of EBM/EBD) is “the integration of clinical expertise, patient values and the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients to improve clinical and functional treatment outcomes.”1, 2 In other words, we can conclude that it is not just scientific evidence. It includes clinical expertise. Often this aspect of evidence-based dentistry is overlooked in lectures and publications.

Many dentists are familiar with the “hierarchy of evidence” in research, which describes levels of evidence that are superior or more accurate than lower echelon levels. These evidence levels
are commonly positioned or ranked based on the degree of bias or freedom of bias involved in the research methodology used. Most publications and organizations rank the levels of evidence from highest to lowest as follows:

- meta-analysis and systematic reviews
- randomized controlled clinical trials
- prospective cohort studies
- case control studies
- case series and reports
- observations, expert opinions and editorials
- unpublished clinical data and observations of which clinicians are all a part

What is the “best evidence”? The following definitions are self-explanatory. The highest level of evidence is further explained by the following three categories.

**Meta-analysis:** A review in which the results of many randomized controlled trials are pooled and the overall results are analyzed. We routinely observe meta-analyses in our work. The significant problem with these compilations of data is that there are usually supporting papers both on the positive and negative side of any question, and you still have to come to your own conclusions. As an example, the Cochrane Collaboration is a widely used and quoted database of systematic reviews of randomized controlled clinical trials. In this system, outcomes of treatment are categorized as “likely to be beneficial,” “likely to be harmful,” or “evidence did not support either benefit or harm.” This categorization is useful when a large amount of data exists and is included in the review. However, the actual number of randomized controlled clinical trials included is often small, and direction for the dentists in treating their patients is questionable. We often need more than just “likely to be beneficial” to come to our own conclusions. El Dib stated in a 2007 analysis of 1016 systematic reviews from the 50 Cochrane Collaboration Review Groups that 96 percent of the reviews recommend further research. It has almost become a mandatory requirement to end any article with the phrase, “however, further research is required.” What do practicing clinicians do in the interim until the “best evidence” can be provided? Do we ignore the other levels of evidence or our individual clinical expertise?

**Randomized, double-blind controlled clinical trials:** In a randomized, double-blind trial, neither the investigators nor the study participants know who is receiving whatever is being studied versus the control for the study.

**Randomized, controlled clinical trials:** Same as above, but not double-blind.

Our following critique is provided to guide you in making clinical decisions in treating your patients, and it is not intended to be overly critical of dental research.

**What if only one randomized, properly designed controlled trial is reported in an article you are reading?**

Can you trust the results? The results of one study could be purely a chance happening, in spite of a reported sophisticated statistical analysis on the data the investigators have obtained. Before making any decision about the value of a study, evaluate the following conditions:

- Do you know and trust the investigators/authors?
- Is the article featured in a trusted journal?
- What group, company, manufacturer, third-party payer or individual funded the study? There are often ulterior motive potentials for publications. Many negative research results are not published due to financial contracts with the manufacturers or manufacturer-funded “third-party” evaluation groups.
- Is the research truly blind?
- Does it appear that the funding parties for the research could be biased from a financial standpoint?
- Are the investigators actually practicing what they are studying? There are many authors who publish frequently, but rarely or never pick up a handpiece.
- Was the protocol aligned with real-world practice standards and conditions?

It is extremely difficult to analyze studies. We can name numerous studies in the literature that have had one or more of the preceding challenges, thus confounding the results. In fact, many of these studies have been published in some of the most respected peer-reviewed journals in the dental industry.

Determining whether the peer reviewers are competent and nonbiased can be another challenge. In our opinion, peer reviewers are only sometimes competent and nonbiased. We can cite numerous published studies in which the peer reviewers (who we were acquainted with) did not, in our opinion, have significant real-world clinical background in the subjects they were reviewing. Yet, the papers were published in well-known respected journals, misleading the readers and often providing significant income to the companies involved in the study.

**What if a well-designed controlled clinical trial was not randomized?**

It is obvious that if the group being studied does not represent the broad population, the results will be biased toward that group and only be representative of the characteristics of the group being studied. As examples, a study of dentures made by American Board Certified prosthodontic specialists does not represent the results to be expected from the total population of all dentists of various educational levels and experience. A study of dental caries in one state or country represents only that area and not a broader area. A Class II resin-based composite study accomplished by one excellent clinician does not represent the results to be expected from the broad population of dentists of all abilities. Almost every journal you pick up has studies in which whatever is being studied does not represent the true practice of dentistry. The studies are easily identified. Look for them, and accept them only for whatever specific population they studied.
What if a study has been done in-vitro only, without a clinical component?

In our opinion, there are far too many studies in the literature of this nature. There must be a clinical component to an in-vitro study for any legitimate clinical conclusions to be made.

What about a single well-designed case-control or cohort study?

A cohort or longitudinal study is where subjects are prospectively followed over time without any intervention. A case-control study is where a group of patients and a group of control patients are identified and information about them is determined in retrospect.

We just finished looking at such studies relative to the longevity of amalgam and resin-based composite restorations over time. The results were so variable that only a few questionable conclusions could be made. On the other hand, such studies, which are considered to be of a lower level than the previous ones, are still useful if the groups represent real-world situations, and are accomplished carefully.

Can you trust evidence from literature reviews or single descriptive or qualitative studies?

Many authors review the literature to determine answers to clinical or basic science questions. The reviews might be minimal in scope or broad and detailed. The results could easily be based on chance findings or the biases and opinions of the author(s).

Single descriptive studies are interesting and often provide ideas and potentially useful information. Their results must be scrutinized to determine their value.

How about the reliability of “expert” opinions from authorities or expert committees?

In dentistry we constantly see these types of articles both in respected journals and in commercial magazines. Often, the people writing or speaking are true authorities who have broad knowledge of available research as well as clinical experience. Such trusted individuals have taken the time and made the effort to analyze the available information on a subject and make personal conclusions on the subject. The value of such opinions must be based on the reputation of the person providing the information, and past experiences relative to that person being able to make conclusions based on both research and his or her clinical experience.

Conversely, opinions of persons not based on the available information in the literature which express only personal opinions must be scrutinized to determine their value. Many “experts” or “key opinion leaders” have financial ties to the manufacturers of the products or techniques about which they publish or on which they speak. It is important to recognize those that are broad based in their expert opinions and equally assess all products, treatments and the research item being investigated.

Where are we? Can we trust anything?

Let’s go back to Sackett’s statements on the subject, which, in our opinion, are profound. He states “EBM is the conscientious, explicit and judicious use of current best evidence in making decisions about individual patients. The practice of EBM means integrating individual clinical experience with the best available clinical evidence from systematic research.” This is right on. Evidence comes from many sources and it must contain two components: evidence from systematic research and evidence from individual clinical experience. Neither one by itself is enough.

Another definition of EBD that is in line with our own thinking is “Evidence-based dentistry is the practice of dentistry that integrates the best available evidence with clinical experience and patient preference in making clinical decisions.”

Another frustrating and growing use of “evidence-based dentistry”

Many insurance companies are moving toward “evidence-based reimbursement” in which they will not pay for treatment unless it can be proven by the highest levels of evidence. The medical industry has witnessed lawsuits against this practice, yet it still continues to be pursued. This growing trend is not only questionable, but limits new and improved treatments for patients. One technique exception is the growing number of insurance companies that are covering implant restorations in place of fixed partial dentures (bridges). Many more years will pass before the strongest level of evidence will be available on this subject.

Where can clinicians find the “best evidence”?

We know that practitioners have very little time to look up information and analyze multiple projects for their clinical value. However, from time to time you might want to look up a question which is bothering you. We have listed a few locations below for you to find answers. Use these locations to find scientific information:

- PubMed www.pubmed.com
- Embase www.embase.com
- MEDLINE www.medscape.com
- Cochrane Collaboration www.cochrane.org
- Google Scholar www.scholar.google.com
- Peer-reviewed journals
- Professional associations that publish guidelines when not all of the highest levels of research are available.

A recent example, The Academy of Osseointegration recognized that not all of the evidence is yet available, and they published useful guidelines for specialists and general dentists. Their 2010 Guidelines of the Academy of Osseointegration for the Provision of Dental Implants and Associated Patient Care states,

. . . the Council (ADA) recognizes that evidence-based care requires the judicious use of current best evidence. It is nonetheless recognized that much of the current evidence base lacks consensus and, to this end, implant dentistry is often practiced on the basis of best anecdotal evidence.
which may or may not be supported by lower echelon studies and/or case reports. As such, there is a responsibility for individual clinicians to avail themselves of the parameters for patient care for the safe and effective provision of dental implants and to continue to avail themselves of ongoing documentation.

This statement gives clinicians guidance based upon many levels of research and advises the clinician to “follow” the literature for those improvements in treatment or higher levels of evidence.

• Independent research groups.
• Our own nonprofit group, Clinicians Report (CR) (Previously CRA), has for 35 years conducted controlled clinical trials, blended them with the trials of other groups, determined practitioner experiences and opinions on the subjects being studied, and made conclusions and suggestions for implementation into practice. All CR research and the subsequent publications have contributions from experts in their area, including all the specialties and representing both academic and practitioner orientation. CR implements a vigorous review process to ensure that the information is accurate, timely and representative of the majority of practicing dentists. The CR conclusions are based on the best scientific research available and the clinical information and opinions obtained from hundreds of experienced full-time practicing Clinicians Report Evaluators. The information is published monthly.

Conclusions on “Evidence-based Dentistry”

• It is fortunate that we now have the concept “evidence-based dentistry” re-identified. However, it is not new. It is only a logical system to assist us in identifying current truth for implementation into practice.
• The phrase evidence-based dentistry is greatly overused, misunderstood by many and perhaps too trusted by the profession.
• Projects that claim to be evidence-based can be and often are flawed, and the research needs your personal evaluation and comparison with your own clinical observations to determine the usefulness of the information.
• Basing your clinical decisions on just the “best scientific evidence” does not provide complete answers to questions. Clinical observations must be considered also.
• Often there are multiple “correct” treatments or solutions to our patients’ needs that are equal in level of evidence. Infrequently is there only one treatment for a specific condition.
• Published articles must be scrutinized on many levels to determine their value for practicing dentists.
• There is “scientific evidence” on both the positive and the negative side of almost every clinical question.
• After observing the best scientific evidence available, clinicians should blend the scientific information with their own and their peers’ clinical observations and experiences and finally make clinical conclusions.
• Whatever is considered truth (fact) today will probably be questioned or disproven tomorrow.
• Evidence-based dentistry concepts are only a guide. They are not inviolate and they must be observed with caution.
• Dentists are smart people. They can usually determine truth from hype on any clinical question. Such decisions come with careful analysis and time.

References

Author Bios

Dr. Gordon J. Christensen is founder and director of Practical Clinical Courses (PCC) in Utah. This group is an international continuing education organization providing courses and videos for all dental professionals. He is also co-founder of the nonprofit Gordon J. Christensen Clinicians Report (previously CRA), as well as an adjunct professor for Brigham Young University and University of Utah. He is a Diplomate with the American Board of Prosthodontics. Dr. Christensen has presented more than 45,000 hours of continuing education throughout the world and has published many articles and books. Further information is available at www.pccdental.com.

Dr. Paul Child is the CEO of CR Foundation, a non-profit educational and research institute (formerly CRA). He conducts extensive research in all areas of dentistry and directs the publication of the Gordon J. Christensen Clinicians Report, and their other publications. Dr. Child is a prosthodontist, a certified dental technician, and maintains a private practice at the CR Dental Health Clinic in Provo, Utah. Dr. Child lectures nationally and co-presents the “Dentistry Update” course with Drs. Gordon and Rella Christensen. He lectures on all areas of dentistry, with an emphasis on new and emerging technologies. He maintains membership in many professional associations and academies. Further information is available at www.cliniciansreport.org.