

Evidence-based Dental Practice at a Crossroads

Evidence-based dentistry is a methodological approach to clinical practice that is directed to aid clinical decision-making. It is a system of information management, and a system of data integration that assists clinicians in the process of meshing systemic clinical expertise and the best literature evidence to enhance treatment outcomes. By emphasizing rigorous analysis of evidence from clinical research as the basis of sound dental practice while discouraging intuitive and unsystematic approaches, evidence-based dental practice promotes the systematic analysis and appraisal of the literature to determine the best treatment alternatives.

The Scottish epidemiologist Archibald Cochrane observed in the early 1970s that in order for the medical establishment to make better and more informed decisions about health care, it must have ready access to the entire corpus of the available research evidence. He noted that less than 10 percent of medical interventions were supported by objective evidence, that certain recommended interventions did more good than harm. Cochrane recognized that many of the randomized controlled trials that established statistical significance were in the medical literature, and thus practically inaccessible to the average medical practice. In 1979, he stated "... it is surely a great criticism of our profession that we have not organized a critical summary, by specialty or subspecialty, adapted periodically, of all relevant randomized controlled trials ..." Within the same decade, Gene Glass proposed a novel statistical approach for combining studies of psychotherapy. In concert to Cochrane's propositions, the meta-analysis "movement" in medicine and dentistry emerged.

A new paradigm of medical and dental intervention emerged that rests on the traditional evidence required of modern clinical

practice (i.e., clinical tests, medical history, observations), as well as on a critical summary of the most appropriate and pertinent research findings. This contemporary paradigm, evidence-based medical and dental practice, is grounded on the fact that the research evidence published in randomized clinical trials must undergo a rigid and stringent process of evaluation. In addition, only the "best available evidence" generated by this process ought to be used in clinical intervention for the benefit of the patient.

In the last three decades, evidence-based research in medicine and in dentistry has become established as the most cutting-edge contemporary research movement in the health sciences. It rests on the scientific method for the identification and systematic evaluation of the best available research evidence. It leads to the conscientious, explicit and judicious use of this information to supplement the clinical observa-



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tions and medical history evidence in order to aid the clinical decision-making process for optimizing the care of each individual patient.

Evidence-based dentistry goes beyond the routine narrative literature review, because it systematically investigates and evaluates the strength of the available evidence, and generates a consensus statement of the best available evidence of the available research. In evidence-based dental practice, the consensus statement is as essential a part in the clinical decision-making process as evidence in the form of medical exam, tests and history.

Evidence-based dental practice is a novel approach to dental care that still suffers from several confines that limit its practicality and application. The American Dental Association has stated that evidence-based dental practice is “the approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patients oral and medical condition and history, with the dentist’s clinical expertise and the patient’s treatment needs and preferences ...” This definition sounds wonderful, but is this, realistic? Additionally, is it not exactly what the dental field has provided for its patients for decades? Is evidence-based dental practice nothing new, merely a new “term” for a previously recognized and accepted system?

The collection of papers in this issue is focused to address these critical and cutting-edge questions.

Evidence-based dental practice is grounded on evidence-based research, which stringently follows the hypothesis-driven scientific process, and dwells in “research on research.” The purpose of evidence-based research is to critically evaluate the methodology, design and data analysis of all available

research reports in order to generate the consensus statement of the best available evidence so that clinicians can make fully informed decisions about the care of individual patients. The consensus statement is generated from the systematic review of the literature, and is supported by statistical analysis (e.g., acceptable sampling analysis, meta-analysis). Evidence-based dental

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practice makes use of the consensus statement obtained from the systematic and critical evaluation of all available research evidence in clinical decision-making. By contrast, the traditional model of dentistry based on the evidence relies on individual pieces of research, rather than the consensus of the best available reported research evidence. In other words, the vast majority of dentistry continues to be delivered based on the weakest levels of evidence since evidence-based dentistry is completely novel for the grass-roots clinician. It will take tremendous effort, much time, and a variety of approaches to bring evidence-based dentistry into mainstream dental practice, and the collection of papers in this issue represents one step toward that goal.

The obvious question then becomes: Is evidence-based dental practice practical? The papers in this issue of the *Journal of the California Dental Association*

illustrate not only the complexity of this novel and emerging model of dental practice, but also its practicality. A great limitation posed to evidence-based dental practice is performing the research to generate the consensus statement of the best available evidence. The papers in this issue do not focus on evidence-based research methodological problems.

It has been suggested that evidence-based dental practice is presently at a crossroad: status quo ante vs. challenge. Professional dentists can be grouped in four more or less distinct groups: those who know about evidence-based dental practice, those who do it, those who want to do it, or those who try to do it. They might either continue to be where they are, or they might take the challenge to take the field to the next frontiers; these individuals are the leaders of our profession in the 21st century. They are the teachers, the future of evidence-based dental practice. Other dentists think they know about evidence-based dental practice, and state that they have been doing it always. They see nothing new in this paradigm, and argue that they have been doing “it” right all along — thus, by inference, they need not change. Unless they remain on the road of status quo, they will set up hurdles along the path of success of evidence-based dental practice. A third group of dentists state honestly they have no idea what evidence-based dental practice stands for, are talking about, but really wish not to hear about it lest they be unsettled in their ways and in their views. They may most likely take the road of status quo or at best, state their intent and take a few steps of inquiry into the road of challenge to turn around right back into the model of dental practice with which they are more familiar and comfortable. Lastly, there are those dentists who have no clue about evi-

dence-based dental practice, but want to learn because they sense that in doing so, they will best serve their patients. They seek to grow professionally and will most likely read assiduously this collection of papers. They are the *tabula rasa*, they are ready to absorb this new model. They are the future of evidence-based dental practice.

This issue of the *Journal* provides an introduction to the fundamentals of evidence-based dental practice and to how it must be distinguished from and can enrich the traditional model of dentistry based on the evidence. It does not discuss certain research challenges, which are currently addressed through other venues. For instance, the papers in this issue do not address the fundamental problem of what type of studies should or should not be included in a systematic review. Clinical trials, which are often attributed close to the highest level of evidence, ideally provide clinically relevant, practical, and statistically significant results because they rigidly rest on a design that is randomized, double-blinded, and placebo-controlled. In practical research, adequate control groups are rare, and randomization is difficult to obtain. Hence, in reality, clinical trials are often neither properly randomized nor fully controlled. Therefore, with respect to the evaluation of the study design, the commonly used consolidated standards for randomized trials ought to be re-evaluated. Furthermore, with the realization that clinical studies can often not be structured as randomized controlled trials (e.g., cancer treatment studies), but are best conducted as observational studies, new standards should be established in evidence-based research for this purpose (e.g., consolidated standards for observational studies).

In addition, research in animal studies, dental materials, and in cellular and

molecular biology, while vital for the creation of new knowledge in oral biology and medicine, and for developing and testing new dental products, never follow the design of clinical trials. Case in point, restorative dentistry, the operative dental procedure that aims to replace diseased or lost tooth structure with certain materials that are biocompatible to the oral cavity. These restorative materials have an ultimate goal to restore the function as well as the appearance of the natural tooth. At present, gold and porcelain have emerged to be the most commonly used indirect inlays. Recent research breakthroughs in restorative dentistry include the use of calcium phosphate as an alternative restoration of similar effectiveness as gold and porcelain indirect inlays. The relevance of this domain of research to dental practice is unquestionable, but evidence-based research, as presently held, precludes the generation of systematic reviews and consensus statements on these different types of materials for indirect inlays. Other domains of dental research can be taken as case examples as well. For instance, fundamental research in cellular and molecular immunity has yielded profoundly new and important knowledge about the mechanisms of immune surveillance in the oral cavity in a variety of pathological processes from periodontal disease to mucositis and stomatitis. The new frontier of molecular biology, which studies the regulation of what determines noncoding vs. coding DNA, is most likely at the root of the regulatory mechanisms of these immune processes.¹ Somehow, this body of evidence must be pooled and evaluated systematically to aid not only the formulation of the next generation clinical trials but also, and more directly, the understanding by the treating dentist of the fundamental processes of the pathology and the mechanism of the treatment regimen.

In brief, it is important that evidence-based research evolve to incorporate all fields of dental research, and all types of research designs. Often times, the outcome of a clinical trial provides the foundation for the evolution of future research in the domains of animal, materials and laboratory, and of observational clinical studies. These research issues are being actively addressed in academic circles and our professional organization.² In the context of this *Journal* issue however, the focus was maintained on the implications and applications of the evidence-based movement in clinical decision-making and implementation in next month's issue.

The ADA has described dentistry based on the evidence as that approach to dental practice that incorporates the elements of dentist's expertise, evidence obtained from the patient, and any relevant published report. It has contrasted that traditional approach to dental practice with evidence-based dental practice, which integrates the traditional model of dental practice based on the evidence with the "best available" research evidence.³ This guiding the model of evidence-based dental practice postulates the urgency of improving quality of care by utilizing efficacious methods, and by controlling or minimizing the elimination of the harmful ones. This will be achieved when clinical practice guidelines will be supplemented with comprehensive and well-crafted consensus statements from systematic reviews of the research literature, and evidence-based dental practice will have become a reality. **CDA**

References / 1. cf., International Post-Genetics Society, Chiappelli co-founder.

2. AADR Science and information committee, Chiappelli, chair 2006-07.

3. cf., Evidence-based clinical recommendations: Professionally applied topical fluoride report of the council on scientific affairs, American Dental Association, January 2006.