

Chapter Fourteen

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Evidence Based Dentistry – 25 Years Later



▲ Dr. James Anderson

In 1986, Dr. James D. Anderson, a prosthodontist at the University of Toronto, was granted a sabbatical year to study clinical epidemiology at McMaster University Medical School in Hamilton, Ontario. His professor was David L. Sackett, a nephrologist and epidemiologist who, in 1967 and at the age of thirty-two, had been awarded the department chair. Dr. Sackett combined his skills in epidemiology and biostatistics into a method of not only evaluating and appraising the quality and validity of scientific literature, but also of clinical action. He had been given the title “Father of Evidence-based Medicine” by one of his students, and his department grew to such numbers that it was described as “the department that ate a medical school.” Even in 2017, it was the largest medical school department in Canada. In 1995, Dr. Sackett repeated a five-year hospital residency because, although he was a professor, he felt he was not a very good doctor. He personally confirmed what he had been teaching his medical colleagues for years: valid, up-to-date (via immediate computer search), patient-centered treatments can be delivered

even in a busy hospital ward.¹ After his sabbatical, Dr. Anderson returned to Toronto, the first to bring the McMaster model of clinical epidemiology to dentistry.

In 1989, the Federation of Prosthodontic Organizations (FPO) along with other organizations sponsored a national symposium held at the Mayo Clinic in Rochester, Minnesota, to address current and future aspects of prosthodontic education, research, clinical practice, and marketing for the twenty-first century: Prosthodontics 21, which was organized by Dr. William R. Laney.² The Section Report on Research was chaired by Dr. George A. Zarb, who laid the groundwork for implementing Dr. Anderson’s Toronto educational initiative. Afterwards, an FPO Research Symposium Committee was organized with representatives from many prosthodontic organizations and academic institutions under the leadership of Dr. Dale E. Smith and populated by Drs. George A. Zarb, Cosmo V. DeSteno, Stephen F. Bergen, Jack D. Gerrow, Robert D. Schweitzer, and James D. Anderson. Discussions ended in negotiations with McMaster University and the esteemed Sackett faculty and the creation of a specially designed program to mentor ten prosthodontic educators in understanding and teaching methods of evidence-based medicine.³ In turn,

these ten educators would bring their newly acquired skills to prosthodontic program directors and educators in North America.

In 1993, the ten attendees were recognized as persons with a strong relationship with the major prosthodontic journals: *International Journal of Prosthodontics*, *Journal of Prosthetic Dentistry*, *Journal of Prosthodontics*, and the *International Journal of Oral and Maxillofacial Implants*. These ten individuals were Drs. James D. Anderson, Alan B. Carr, David A. Felton, Gary R. Goldstein, Rhonda F. Jacob, Brien R. Lang, Patrick M. Lloyd, Glen P. McGivney, Jack D. Preston, and George A. Zarb.



▲ Dr. Alan Carr



▲ Dr. David Felton



▲ Dr. Gary Goldstein



▲ Dr. Rhonda Jacob



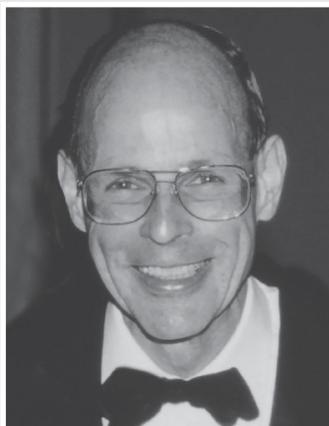
▲ Dr. Brien Lang



▲ Dr. Patrick Lloyd



▲ Dr. Glen McGivney



▲ Dr. Jack Preston



▲ Dr. George Zarb

In 1993 and in 1994, they traveled to McMaster University and attended two one-week courses with small-group, self-directed, problem-based learning/teaching methods pioneered by the McMaster group. Faculty were from the medical school and included Drs. George P. Browman, Gordon H. Guyatt, Mark N. Levine, and Ray Gilbert. The first week, the workshop on “How to Teach the Critical Appraisal of Clinical Evidence” comprised eight units: Therapy, Diagnostic Test, Overview, Clinical Measurement, Prognosis, Causation, Quality of Care, and Economic Evaluation. The second week, the “Research Methods” workshop reviewed the knowledge base required to prepare a research protocol. Topics included establishing the research question; selecting design architecture appropriate for the question, sample selection, and size; and describing the maneuver, measurement, outcomes, and statistical analysis. The goal was for the group of ten to disseminate its synthesis of the experience to the prosthodontic community working with the McMaster faculty in preparing dental examples and teaching modules to the prosthodontic community.

In 1994, an editorial written by Dr. George A. Zarb and echoing the sentiment of his colleagues was published simultaneously in all four journals represented by the attendees.³ The editorial described the state of our “treatment dilemmas” due to lack of clinical evidence to support one treatment decision over another. In this editorial and in a subsequent 1995 announcement for an upcoming international evidence-based dentistry (EBD) symposia, he recognized the support that carried the EBD mission forward, crediting the Federation of Prosthodontic Organizations and the Editorial Council of the *Journal of Prosthetic Dentistry (JPD)*. The Editorial Council of the *JPD* under Dr. I. Kenneth Adisman’s direction had pledged significant financial support from the outset of the initiative. Other organizations were involved in supporting the Prosthodontic Research Symposia noted in Chapter 12.

In 1995 and 1997, the original group of ten assisted by Dr. Browman held two international research symposia sponsored by the American College of Prosthodontists and Editorial Council of the *JPD*. The target audience was prosthodontics educators, who were given the tools to begin teaching their students the concepts of EBD.⁴ The curricula included critical appraisal exercises directed at core clinical decisions related to diagnosis, harm, therapy, prognosis, and systematic review.⁵ Discussions of research design and measurement methods were directed at various clinical research questions of interest. The attendees were encouraged to become involved with the Cochrane Collaboration research activities established in 1993 by Dr. Sackett, who was the first chair of the Cochrane Steering Group. In the 1997, several other dental specialties and dental educators attended the symposia, having observed the expertise that was being introduced to the dental community by this prosthodontics initiative.

In 2000, the *JPD* published a series of six articles written by the ten attendees and associates to guide appraisal of the validity of clinical research and its applicability in patient care.⁶⁻¹³ The first two articles provided information regarding study design and measurement methods that are helpful for determining the strength of evidence and the quality of the outcomes. The following articles focused on the valid design of four types of studies that aimed to answer core clinical questions. These articles were categorized as diagnosis, prognosis (probable course of a disease), harm (observational studies of

exposures that may cause harm), therapy (whether a specific treatment is better than another course of action), and the systematic review (a structured review format that uses explicit methodology for conducting rigorous assessments of evidence).

In 2002, Dr. Gary R. Goldstein was the guest editor and author of evidence-based dentistry in *Dental Clinics of North America (DCNA)*. Several of his prosthodontic colleagues and others in the epidemiology specialty were authors in the edition. In 2009, a DCNA issue titled “Evidence Based Dentistry in the Private Office” and in 2017 a third issue titled “The Science and Art of Evidence Based Pediatric Dentistry” were published.¹⁴⁻¹⁷

In 1999 through 2002, the Academy of Prosthodontics (AP) dedicated a half-day of its annual scientific sessions to the concepts of EBD. These programs included guest speakers and breakout sessions implementing EBD in reviewing various clinical questions and available literature. Academy Fellows Alan B. Carr and Rhonda F. Jacob along with Sreenivas Koka and Steven E. Eckert were the planning committee and facilitators for the sessions.

The *Journal of Evidence Based Dental Practice* was first published in 2002.¹⁸ The process of formulating patient-centered questions begins by asking: What is the patient, population, or problem? Which intervention is being considered? What comparator to this intervention will be used? What outcome will be measured? Collectively, this is expressed as the “PICO” question. This methodology is used when performing a critical appraisal of the literature.

The ADA Center for Evidence Based Dentistry was established in 2007.¹⁹ Many dental schools and dental organizations have implemented EBD in their curricula. PICO questions and critical appraisal topics drive literature searches in the clinic and in seminars. The commitment of prosthodontics to the implementation of evidence-based decision making is demonstrated by the fact that EBD education is now a prosthodontic standard for all US dental schools according to the Commission on Dental Accreditation. Educated audiences demand more from speakers at scientific sessions related to quality of the research design and validity of the assessment of the outcomes.

The concepts of EBD can be applied across all health disciplines. Identifying interventions that are known to be beneficial, are known to be harmful, or have outcomes which are not yet well understood relies upon being able to find and understand the evidence. In dentistry, collation of evidence is often challenged by the extended period of time it can take for outcomes to become apparent. This makes it difficult to design and fund investigative studies and to track patients forward



▲ Dr. Sreenivas Koka



▲ Dr. Steven Eckert

in time. However, it must be remembered that EBD means that clinical prosthodontists seek the most appropriate evidence and assess it in light of their own abilities and their patients' wishes.

The technology boom has assisted in the identification of appropriate evidence and has facilitated EBD. The Medical Literature Analysis and Retrieval System (MEDLARS) online replaced the manual *Cumulative Index Medicus* system in 1971, with MEDLINE launching free to the general usership via PubMed in 1997. Other bibliographic databases and search engines across many languages are now either freely available or accessible through library subscriptions. EBD development paralleled technological changes as researchers moved from desktop computers to laptops, with evidence now available at one's fingertips on portable tablets in every office. Barriers to accessing information and evidence are ever decreasing, and quality syntheses and guidelines for applying that evidence are ever increasing.

The evidence tree has also evolved from the original evidence pyramid to the 6-S model, helping clinicians access and translate evidence into their practice more efficiently.²⁰ The model still contains single studies (the foundation layer, studies) and systematic reviews (known as syntheses), but synopses and systems have been added as additional layers to the tree. Synopses are critical appraisals of either studies or reviews written by epidemiology experts and made available through resources such as the TRIP database (www.tripdatabase.com.au) and evidence-based dentistry (Springer Nature), so that practicing clinicians can access appraised evidence in a meaningful and timely manner. Finally, clinical system guidelines have been developed in some areas, and this is now considered to be the highest evidentiary layer.

Although evidence in prosthodontics is not yet sufficiently mature to offer “system” guidelines, we have good access to syntheses and synopses and continue to work with and improve our evidence base. We recognize that different evidence is needed to answer different prosthodontic questions, and that different study designs are more appropriate for the exploration of different prosthodontic outcomes. Assessing patient-related outcomes with cross-sectional surveys, lifespans of implant prostheses with cohort studies, or dental material choice with randomized controlled trials (RCTs) are a few examples. Clinically, when providing prosthodontic treatment, we almost always make and guide daily decisions by weighing the costs of treatment against potential benefits. To do so, we must assess evidence from a variety of resources. The inclusion of patient-related outcomes (PROs) by recording clinical outcomes, known as patient-reported outcome measurements (PROMs), in clinical practice and research provides an opportunity for a more complete understanding of the impact of an intervention, therapy, and patient treatment.^{21, 22}

More than twenty-five years have passed since evidence-based prosthodontics became the headliner for prosthodontic annual sessions, symposia, study clubs, and resident seminars. Like the introduction of root-form dental implants in North America, it also grew under the leadership of our prosthodontic colleagues at the University of Toronto. A select few had the vision to recognize its potential, and as they became trained, they then became the mentors. The Academy of Prosthodontics, and prosthodontics in general, provided

the leadership to support the EBD initiative and guide the path for others to follow. The fruit of this “evidence stewardship” has improved the quality of research by asking the right questions followed by scrutinizing research design methodology, which resulted in improved presentations and scientific published manuscripts that hopefully will be translated into better patient care.^{23, 24}

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