

## Evidence based Prosthodontics: Beginning with Doubts and Culminating in Certainties

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Received: January 17, 2019; Published: February 18, 2019

### Abstract

The diversity of prosthodontic treatment modalities renders the choice of the appropriate treatment option a challenging process, affirming the essential requisite for evidence-based prosthodontics in the era of technological boom and information explosion. Currently, the literature needs more evidence based data to support the patient needs and investigator's requisites. Evidence-based prosthodontics can provide a more effective standard of care and better-quality data could be available to both researchers and decision makers.

**Keywords:** Prosthodontics; Evidence-based Medicine (EBM); Evidence-based Practice (EBP); Evidence-based Dentistry (EBD)

### Introduction

Clinicians need to continually update their knowledge on treatment options, modalities and rationale as new research emerges. However, this is often accompanied with skepticism about the claims of superiority of the novel treatments or products. Also, even though there is current increase in skills and clinical experience. There is some evidence that clinical skills and knowledge decline with increasing years since graduation. This has been referred to as "The slippery slope of clinical competence". The problem develops when deciding where the "Novel" technique or drug is better than the current management strategy. It is also worth mentioning that, nature of the relationship between the patient and the clinician is tremendously changing. Patients are becoming partners in the decision-making process, not only in the office setting, where decisions are made about their individual care, but also at the procedure and financing levels, where consumer input is increasingly appreciated. Recently, the technology boom has aided patients to come to their dental appointments with lots of information downloaded from the Internet, some of which may be unfamiliar to the dentist. In addition, litigation is increasing and the availability of free information is beginning to render obsolete the old legal standard of commonly accepted practice. Thus, a new paradigm for medical education designed to incorporate current research into education and practice was developed to help practitioners provide the best care for their patients. Accordingly, Evidence-based care is currently regarded as the "gold standard" in health care delivery worldwide [1,2].

David Sackett the "Father of Evidence-based Medicine (EBM)" defined it as "The conscientious, explicit, and judicious use of best evidence in making decisions about care of individual patients". However, this definition has evolved to be "The integration of best research evidence with clinical expertise and patient values". The new model set by EBM utilizes a systematic process to incorporate current research into practice [3,4].

It was proposed that the concept of EBM shall be expanded to evidence-based practice (EBP) to reflect the benefits of entire health care teams and organizations implementing a shared evidence-based approach. EBP evolved from the application of clinical epidemiology and critical appraisal to overt decision making within the clinician's quotidian practice. According to EBP the decisions about health care are based on the best available, current, valid and relevant evidence. These decisions should be made by those receiving care, informed by the tacit and explicit knowledge of those providing care, within the context of available resources [5].

The American Dental Association (ADA) defined Evidence-based dentistry (EBD) as: An approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences [6].

With appropriate skills and the availability of literature searching hardware and software, evidence-based practice is a powerful means for the practitioner to establish the effectiveness of individual patient treatment, and to prevent the diminution of clinical skills over the course of a career. Then, along with the dentist's professional skill and expertise, EBD allows dentists to stay up to date on the latest procedures and patients to receive improved treatment [7].

The aim to reduce the variation in patient care and outcomes is associated with:

1. The quality of science underlying clinical care.
2. The quality of clinical decision making.
3. Variation in the level of clinical skill.
4. The large and increasing volume of literature.

### Evidence based practice versus traditional practice

The traditional model of care in dentistry involves use of individual clinical expertise and patient treatment needs to provide dental care. This model of care based on observations, beliefs, and personal and expert opinions and precludes systematic assimilation, acceptance, and assessment of new treatment effects. Furthermore, it provides minimal confidence to clinicians for making clinical decisions for new scenarios and new treatments. Contrary to evidence based practice which is objective as it relies on evidence rather than authority for clinical decision making. Moreover, it uses resources more effectively based on systematic appraisal of quality of evidence, rendering it less biased and more effective in monitoring & developing clinical performance [7,8].

### Beginning with doubts and ending in certainties

Process of EBP includes five steps, described in 1992 [9]:

1. Translation of uncertainty to an answerable question
2. Systematic retrieval of best evidence available
3. Critical appraisal of evidence for validity, clinical relevance, and applicability
4. Application of results in practice
5. Evaluation of performance.

The decision process in clinical practice includes clinical reasoning, problem solving, and awareness of patient and health care context end with clinical decision making. This process is uncertain and frequently no "correct" decision exists. EBP can help with some of the uncertainties in this decision process by using the explicit knowledge obtainable from research information. But to do so the research information must be transformed into clinicians' knowledge [10].

Rapidly growing developments in EB practice paralleled technological advancements as we moved from desktop computers to laptops, with evidence now available on portable tablets and on mobile phones. While eliminating the barriers to accessing information and evidence the quality syntheses and guidelines for applying that evidence are ever increasing [11]. The evidence tree has also evolved, allowing clinicians to efficiently access and translate evidence into their clinical practice. Most practitioners realize the evidence tree as having case reports and expert opinion at the bottom of a pyramid and systematic reviews at the top. In 2009 the 6-S hierarchy of evidence-based resources model introduced the expansion of evidence beyond that of systematic reviews. Single studies continue to form the first layer, but above systematic reviews (called syntheses), synopses and systems have been added. Synopses are critical appraisals of studies or reviews written by epidemiology experts. Allowing the clinicians to access appraised evidence in a meaningful and timely manner. In some areas, clinical system guidelines have been developed, and this is regarded to be the highest evidentiary layer [12].

### Evidence-based prosthodontics

The rapid innovations in dental materials and dental technology together with enhanced comprehension of clinical outcomes, led to overabundance of published research in prosthodontics. Additionally, a massive amount of published research in interdisciplinary fields that are relevant to prosthodontics. It is accepted that not all published literature is scientifically valid and clinically useful. Consequently, a critical analysis of the quality of published research and consolidation of the excess scientific information is necessary to render them significant and useful. Currently, there is no definition for evidence-based prosthodontics but it is understood that it encompasses the application of EBD with respect to prosthodontics. The practice of evidence-based prosthodontics can be described as a "Life-long process which incorporates problem-based learning leading to the need for clinically important information about prosthodontic diagnosis, prognosis, therapy and other clinical related issues within the specialist". It starts with a patient and ends in a patient [13,14].

In dentistry, the evidence-based movement is at a relatively early stage of development. In the field of fixed and removable prosthodontics like in other dental disciplines, several clinical procedures are practiced which lack the support of high-quality evidence, meaning that the effect of the treatment is not known completely or partially. Many of the common clinical prosthodontic procedures lack scientific support. It is recommended that in the era of evidence-based dentistry, those interventions that are

ineffective must be eliminated, and all the clinical decisions should be made according to the best available clinical evidence. Therefore, due to the unique nature of prosthodontics, it is necessary to establish a consensus on guidelines for reporting prosthodontic outcomes. These guidelines can ensure that investigators provide standardized reporting of their studies in order for them to be clear, complete, and transparent and allow integration of their evidence into clinical practice [15].

Hence, evidence-based prosthodontics is needed to:

- Enable the recognition of best available scientific evidence in prosthodontics.
- Consolidate the scientific information overload in prosthodontics and related literature.
- Scrutinize the scientific basis for existing prosthodontic treatments.
- Improve current and future treatments.
- Encourage improvement in the quality of clinical research as well as in reporting.
- Distinguish and advance the specialty of prosthodontics.

A core element of prosthodontics is the treatment outcome, amenable for application of principles of EBD. There are 3 predominant items crucial to understanding challenges in reporting treatment outcomes in prosthodontics [16].

#### (a) Defining the outcomes of clinical interest

Fundamental issues in defining prosthodontics clinical outcomes are complex due to the inherent nature of the treatment. For instance, differentiating success versus survival, complications versus consequences, and prosthesis outcomes versus patient-centered outcomes. Additional characteristic is describing the appropriate endpoint of a clinical study. Hujuel and DeRouen [17] categorized clinical endpoints (outcomes) as surrogate endpoints and true endpoints. Surrogate outcomes include measures that are not of direct practical importance but are believed to reflect outcomes that are important as part of a disease/treatment process. True outcomes, however, reflect unequivocal evidence of tangible benefit to patients. Both types of outcomes are important in prosthodontics, because surrogate outcomes are helpful for preliminary evidence and true outcomes are helpful for definitive evidence.

#### (b) Duration required to appropriately study the outcomes

It depends on the definition of a treatment outcome, surrogate or true endpoint desired, treatment effect desired, and adverse events related to a treatment under investigation. Presently, there is no consensus in prosthodontics on definitions for preliminary, short-term, or long-term studies. As a result, the investigator, editor, and reader decide if the result of a study reports on short-term

or long-term outcomes. Often, a study with a follow-up period of up to 6 years is described as “long-term follow-up” where only a scanty number of samples have actually made it to a 6-year follow-up and the rest have a follow-up of less than 2 years. It is implicit that preliminary and short-term studies have high clinical impact when they report failures of a particular treatment; only long-term studies can have high clinical impact for treatment success. Treatment success reported in short-term studies, nevertheless, can lay the justification whether supplementary research is needed.

#### (c) Minimum sample required to study the outcome of interest

The sample size of a study depends on the difference in treatment effect desired. In prosthodontics, it is difficult to obtain large sample sizes from a single study center because of the elective and expensive nature of prosthodontic treatment, which has led to a large body of published research in the prosthodontic literature with small sample sizes. For a study to have a large clinical impact and provide sufficient evidence to change a particular clinical practice, sample size is critical. Currently, there is no consensus in prosthodontics on definitions for sample sizes as small, moderate, and large. The validity of defining such sample sizes is currently unknown.

The commitment of prosthodontics to the implementation of evidence-based decision-making is revealed by the fact that evidence based dentistry education is now a prosthodontic standard for all dental schools in the United States according to the Commission on Dental Accreditation. Moreover, educated audiences require more quality of research design and validity of outcome assessment at scientific sessions [11].

But, in spite of integrating of evidence based practice concepts in the curricula, it was found that clerkship-level medical students able to implement only half of the steps of EBM with difficulties particularly in critically appraising the evidence found. This deficiency suggests a need for future research to focus on the effectiveness of EBM interventions and educational approaches designed to overcome these challenges [18]. Additionally, cross sectional survey concluded that despite the fact that dental students are aware of the importance of EBD in restorative dentistry, they seldom apply the concept, mostly due to time constraints. So, implementation of EBD would probably require faster access to evidence-based knowledge [19].

#### Limitations of evidence-based prosthodontics

Such limitations include:

- Applicability of research to a specific patient population,
- Publication biases,
- Paucity of current data,
- Cost and ethics.

Prosthodontics is a unique specialty combining art, philosophy, as well as science and an absolute extrapolation of evidence-based concepts widely described in medicine is impossible. Establishing exceptional evidence, however, for prosthodontic treatment outcomes is paramount for the present and future of the specialty [7].

One of the most popular criticisms for applying concepts of EBD to prosthodontics is that the information gained from clinical research may not directly answer the principal clinical question of what is best for a specific patient. This is because it is acknowledged that the homogeneity and characteristics of patients participating in clinical trials may be significantly different from those seen in dental offices.

It is important to recognize, however, that EBD does not advocate absolute adoption of clinical evidence but calls for an integration of the clinical evidence along with the dentists' clinical expertise and patient needs and preferences. EBD does not provide a cookbook that dentists must follow nor does it establish a standard of care [20,21].

According to the ADA [6], the EBD process must not be used to interfere in the dentist/patient relationship nor be used entirely as a cost-containment tool by third-party payers.

### Conclusion

- By following a systematic approach, evidence can be considered and applied to clinical practice. This approach is standardized and repeatable, and facilitates the practice of evidence-based prosthodontics.
- The application of evidence is essential in modern dentistry, and this approach is the core of the evolution towards an evidence-driven practice.
- EBD closes the gap between clinical research and real world dental practice and provides dentists with influential tools to interpret and implement research findings.

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**Volume 2 Issue 3 March 2019**

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