

# Evidence-based dentistry: From knowledge to practice

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## ABSTRACT

We live in an era of evolution. Conventionally, clinical decisions in dentistry have been based on the experience of the dentist. If a given treatment seemed to work, it was utilized again; if the results were disappointing, the procedure was deserted. Evaluating clinical treatment in this fashion is difficult because it is hard to know which factors are important for success and which ones contribute to failure. This lead to a new model called evidence-based dental care. A great effort and research are currently being directed at developing an evidence-based approach. This paper aims to give an overview of the evolution and importance of evidence-based dentistry.

**KEY WORDS:** Clinical research, Dentistry, Diagnosis, Evidence, Patient preference

## INTRODUCTION

We are living in the information age, bombarded by bits and bytes of information. How do we know how good any of it is? Conventionally, clinical decisions in dentistry have been based on the experience of the clinical dentist. If a given treatment seemed to work, it was utilized again; if the results were disappointing, the procedure was deserted. Evaluating clinical treatment in this fashion is difficult because it is hard to know which factors are important for success and which ones contribute to failure. This lead to a new model called evidence-based dental care. This model is based on sound research studies. One of the aims of evidence-based dentistry is to help the practitioner identify the best evidence. This concept augments knowledge derived from clinical training, experience, continuing education courses, and dental school with the results of clinical research adhering to the highest standards of scientific proof.

The evidence-based approach offers a bridge between science and clinical practice. The dentist must integrate the literature evidence with patient preferences, scientific knowledge, clinical judgment, and personal experience. This approach empowers the dentist by allowing clinical decision-making based on research facts rather than opinions. The best part

is that it will allow us to treat our patients better with predictable outcomes. Evidence-based approach is ideal in today's situation to maximize the potential for successful patient care outcome.

## EVOLUTION OF EVIDENCE-BASED PRACTICE (EBP)

EBP is an interdisciplinary approach to clinical practice that has been gaining ground following its formal introduction in 1992. It started in medicine as evidence-based medicine (EBM) and spread to other fields. EBP is an approach that tries to specify the way in which professionals or other decision-makers should make decisions by identifying scientifically sound evidence. Its goal is to eliminate unsound or excessively risky practices in favor of those that have better outcomes. The evidence-based approach has emerged in response to improve the quality of health care. The evidence-based approach is better than other methods because it is objective, scientifically sound, and patient focused.<sup>[1]</sup>

The evidence-based approach puts the most weight on research that has clearly defined goals. It acknowledges potential sources of bias within the study design and uses analytical methods to determine both statistical and clinical significance. Every new technique, material and diagnostic test should ideally be subject to rigorous long-term randomized clinical trials. If this were not available, clinicians would use other types of studies or expert-based opinions. A double-blind,

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placebo-controlled, randomized clinical trials are considered the gold standard for evidence-based care; however, due to costs and difficulties performing these studies, many times they are not readily available in the literature.<sup>[2,3]</sup>

## EBM

The term EBM has spread through medical practice with amazing speed during the past 15 years. In 1973, John Wennberg *et al.* began to document wide variations in practice patterns. In the 1980s, a group at Research and Development Corporation began publishing studies showing that large proportions of procedures being performed by physicians were considered inappropriate even by the standards of their own experts. The term EBM was coined by the clinical epidemiology group at McMaster University in Canada (1992).<sup>[4]</sup>

EBM is commonly defined as the conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients.<sup>[5]</sup> EBM was initially defined in opposition to clinical experience, but later, definitions have emphasized its complementary character and have aimed to improve clinical experience with better evidence. Professor Archibald Cochrane was a pioneer in this area and can be considered the father of EBM. He realized that despite his adoration for academia, laboratory research would not give him a lifetime satisfaction - a self-realization that subsequently proved to be tremendously beneficial to the medical community. His passionate call to require collection and analysis of systematic reviews (SR) led to the creation of Cochrane Collaboration 5 years after his death.<sup>[6]</sup>

## EVIDENCE-BASED DENTISTRY (EBD)

Dentistry as a profession has developed a store of specialized knowledge that serves as a basis of professional decision-making. The world in which we learn and practice dentistry is changing at an astonishing rate. The practice of dentistry is becoming more complex and challenging due to the continually changing in dental materials and equipment, an increase in emphasis of continuing professional development. Recent years have seen an increase in the importance of evidence-based dentistry, aiming to reduce to the maximum the gap between clinical research and real-world dental practice.<sup>[7]</sup>

EBD is the integration of the best research evidence with clinical expertise and patient values.<sup>[8,9]</sup> The American Dental Association has defined evidence-based dentistry 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.<sup>[10,11]</sup>

Anderson has enlisted three major reasons for being attentive to this new paradigm.<sup>[12]</sup>

1. The explosion in the volume of information makes it virtually impossible to keep up with the current reading.
2. The increasing use of randomized controlled trial and more emphasis on research methodology has resulted in much greater strength of evidence.
3. There is evidence from both medicine and dentistry that clinical skills deteriorate with increasing years since graduation.

### Need for Evidence-based Dentistry

The basic principle of EBD is that we should treat where there is evidence of benefit and not treat where there is evidence of no benefit (or harm) relevance at all levels of the National Health Survey.<sup>[13]</sup>

The need of EBD is important for the dentist, especially with regard to patient safety and for dentists to update with developments in diagnosis, prevention, and treatment of oral disease and newly discovered causes of disease.<sup>[14,15]</sup> Advances in dentistry are usually first reported in dental journals, and to keep up with new research, health-care professionals need to feel confident that they can read and evaluate dental papers. EBD is founded on clinical research. The ultimate beneficiaries of EBD are members of the public, who will reap the rewards of better care. The internet allows patients, as well as professionals, access to health-care information. The public, however, does not have the tools to evaluate the data adequately and must rely on their educated dentists to help sort fact from fiction.<sup>[16,17]</sup>

The use of evidence-based dentistry may help in reducing the variations of patient care and outcomes that appear to be associated with four factors:

1. The quality of science underlying clinical care
2. The quality in making clinical decisions
3. The variations of the level of clinical skill
4. The large and volume of literature.<sup>[18]</sup>

The advantages of evidence-based dentistry are as follows:

1. It improves the effective use of research evidence in clinical practice.
2. It uses resources more effectively.
3. It relies on evidence rather than authority for clinical decision-making.
4. It enables the practitioner to monitor and develop clinical performance.<sup>[19]</sup>

### Components of evidence-based dentistry

It is the comprehensive integration of appropriate research evidence, patient preference, and clinical expertise [Figure 1].

### Steps for practicing evidence-based dentistry

The practice of evidence-based medicine is a process of life-long, self-directed learning in which caring for our own patients creates the need for clinically important information about diagnosis, prognosis, therapy, and other clinical and health-care issues.

It can be seen as a five-stage process:

1. Convert the available information needs into answerable questions;
2. Track down, with maximum efficiency, the best evidence with which to answer them (whether from the clinical examination, the diagnostic laboratory from research evidence, or other sources);
3. Critically appraise that evidence for its validity (closeness to the truth) and usefulness (clinical applicability);
4. Integrate this appraisal with our clinical expertise and apply the results in clinical practice and
5. Evaluate your performance.<sup>[20]</sup>

## LEVELS OF EVIDENCE

The hierarchy of evidence is based on the concept of causation and the need to control bias [Figure 2]. Although each level may contribute to the total body of knowledge, not all levels are equally useful for making patient care decisions.

The highest level of evidence is the SR and meta-analysis using two or more randomized controlled trials (RCTs) of human subjects. They are considered the gold standard for evidence due to their strict protocols to reduce bias. These reviews provide a summary of multiple research studies that have investigated the same specific question.

SRs use explicit criteria for retrieval, assessment, and synthesis of evidence from individual RCTs and other well-controlled methods. Meta-analysis is a statistical process often used with SRs. It involves combining the statistical analysis of several individual studies into one analysis.<sup>[21]</sup>

SRs and meta-analyses are followed respectively by individual RCT studies, cohort studies, case-control studies, and then studies not involving human subjects.<sup>[22]</sup> In the absence of scientific evidence, the consensus opinion of experts in appropriate fields of research and clinical practice is used.

However, the highest level of evidence associated with questions about prognosis will be from SRs of inception cohort studies.<sup>[23,24]</sup> Knowing which type



Figure 1: Components of evidence-based dentistry

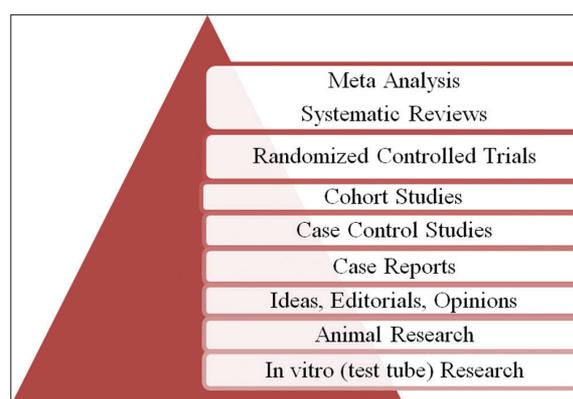


Figure 2: Levels of evidence

of study will provide the best evidence for clinical decision-making and how to retrieve this information quickly from scientific literature is important to EBP.

## SOURCES OF EVIDENCE

### Primary Sources

They are original research publications that have not been filtered or synthesized. PubMed is designed to provide access to both primary and secondary research from the biomedical literature. PubMed provides access to MEDLINE, the National Library of Medicine's premier bibliographic database covering the fields of medicine, nursing, dentistry, veterinary medicine, the health-care system, and the preclinical sciences. Primary evidence is also available online through electronic journals. These are often peer reviewed and they exist as electronic companions of print journals or standalone journals.<sup>[25]</sup>

### Secondary sources

They are synthesized publications of the primary literature. Recognizing that finding relevant studies is difficult, evidence-based groups are developing many resources for easy access. These resources include SRs, meta-analyses, evidence-based article reviews,

and clinical practice guidelines and protocols. Evidence-based journals are an emerging resource designed specifically to assist clinicians. Depending on the journal, they provide concise and easy-to-read summaries of original research articles and SRs selected from the biomedical literature.

The Cochrane Collaboration is an international, volunteer, non-profit organization. There are approximately 50 specialist review groups in 13 countries including an oral health group and a tobacco addiction group. All Cochrane groups provide peer-reviewed SRs that meet international standards and have an obligation to update their reviews every 2–4 years to account for new evidence. The results of their work are stored in the Cochrane Library Databases, one of which is the Cochrane Database of SR (COCH), a rapidly growing collection of SRs of the medical literature.<sup>[26]</sup> Other growing sources of synthesized information on a specific topic include practice guidelines and protocols.

## CONCLUSION

In this tech-driven era, patients are aware about all treatment strategies. Research evidence helps us to face this generation and also to decide which interventions are most effective. The principles of evidence-based approach provide structure and guidance to facilitate the highest levels of patient care. This approach empowers the dentist by allowing informed clinical decision-making based on research facts rather than opinions. The best part is that it will allow us to better treat our patients with predictable outcomes.

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