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Review Article

### EVIDENCE-BASED DENTISTRY: AN OVERVIEW

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#### ABSTRACT

Dentistry has evolved from the heuristic approach of the past to the present evidence-based approach which is the need of the day to safeguard the building of our clinical practise from collapsing under the burden of thousands of clinical studies conducted every year across the globe. Evidence-Based Dentistry (EBD) helps filter the immense amount of information which emerges in the literature so that the best available current scientific evidence can be applied to improve the abilities of dental practitioners in therapeutic and preventive research so that they can cope with the complexity of dealing with a wide range of oral health related issues. The beneficiaries of EBD are the public, dentists as well as researchers.

**Keywords:** Dentistry, Evidence, Patients, Cochrane, Knowledge, PICO, Checklists

#### INTRODUCTION

Dentistry as a full-fledged profession has evolved through a number of overlapping phases – From the heuristic approach of the primitive to the scientific and research based approach of the present and currently the evidence-based approach. Dentistry has developed a store of specialized knowledge that serves as the basis of professional decision making. This knowledge base has evolved through three phases and currently may be entering the fourth phase. In the first phase, the Age of the Expert, the dental knowledge base was created and held by so-called experts. Knowledge was accumulated through experience, which was nothing more than small-scale uncontrolled observation. The second phase, the Age of Professionalization, was characterized largely by changes in how professional knowledge was maintained and disseminated by colleges, practitioners and journals. We are currently at the end of the third phase, the Age of Science. This has been an extended phase which has seen the rise of the formal clinical study and literature review. We are now into the fourth phase, the Age of Evidence. Whether this phase will continue to develop and eventually emerge as a distinct era in the evolution of dentistry's knowledge base cannot be known at the present time, but is definitely the need of the hour<sup>1</sup>.

Despite the increase in skills that comes with experience in clinical practice, there is evidence, at least in medicine, that expertise and effectiveness in some areas begin to deteriorate the moment physicians leave medical school. This phenomenon has been called “**the slippery slope of clinical competence.**” In our profession, many dentists continue to use the same treatments and techniques learned in dental school, which represented the best practice at the time. The dilemma arises in deciding when something “new” is better than our current clinical management strategy<sup>2</sup>. The current scenario, because of contemporary advances in science, technology and Internet demands a much stronger scientific health care practice. The patients and the general public, at large, are nowadays exposed to the same amount of literature as the practitioners. Patients are becoming partners in the decision-making process. Patients are starting to come to their dental appointments with information downloaded from the Internet, some of which may be unfamiliar to the dentist<sup>3</sup>. Therefore, keeping current with advances in dentistry and being able to manage patients who have complex needs and demands, is a challenge for practicing dentists. But, the desire to keep upto date with current knowledge and new techniques or products is often tinged with doubts about their claims of superiority of these new treatments or products<sup>3</sup>. Hence, a new paradigm in the form of revolutionary Evidence-Based Dentistry was

designed to incorporate current research into education and practice so that the mounting pressure of large volumes of literature on physicians can be eased and the need of consensus of the best available evidence to revise clinical practice guidelines, treatment protocols and policies can be met. Evidence is the currency by which one fulfills the burden of proof. The term 'Evidence', according to the Oxford Dictionary, means 'available facts, circumstances, etc indicating whether or not a thing is true or valid'.

**"If we did not respect the evidence, we would have very little leverage in our quest for truth." – Carl Segan**

The foundation for evidence-based practice was laid by David Sackett who has defined it as "integrating individual clinical expertise with the best available external clinical evidence from systematic research"<sup>4</sup>. Evidence-Based Dentistry is one of the important streams of Evidence-Based Medicine. Given the impossibility of reading the many articles published each year, Evidence-Based Dentistry helps filter the immense amount of information which emerges in the literature so that the best available current scientific evidence can be applied to improve the abilities of dental practitioners in therapeutic and preventive research to help them cope with the complexity of dealing with a wide range of oral health related issues.

The American Dental Association (ADA) has 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
- Patient's treatment needs and preferences."<sup>5</sup>

The Evidence-Based Dentistry (EBD) approach:

- Is objective
- Is scientifically sound
- Is patient focussed
- Incorporates clinical experience
- Stresses good judgement

- Is thorough and comprehensive
- Uses transparent methodology<sup>6</sup>

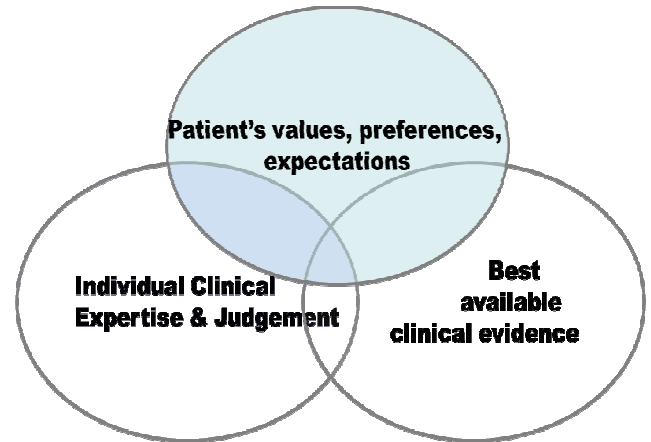


Figure 1: Evidence-Based Dentistry

**Who benefits from Evidence-Based Dentistry?<sup>7</sup>**

- The ultimate beneficiaries of EBD are members of the public, who will reap the rewards of better care. Though the information is readily accessible to the public via Internet, they do not have the tools to evaluate the data adequately and must rely on their educated dentists to help sort fact from fiction. Patients will be more educated, more involved in their treatment decisions, and more appreciative of quality care.
  - Dentists, who will also benefit from EBD. Instead of conducting free product testing for dental product manufacturers, practitioners will have at their disposal more valid research on which to predicate their clinical decisions.
  - Researchers, who will benefit by being called upon to do the clinical testing necessary before new products are placed on the market<sup>7</sup>.
- Thus, EBD is, in fact, "Everybody's Dentistry".

**Table 1: Comparison of Evidence-Based Practice VS Traditional Practice<sup>8</sup>:**

<u>Evidence-Based Practice</u>	<u>Traditional Practice</u>
<b><u>Similarities:</u></b>	
<ul style="list-style-type: none"> <li>• High value of clinical skills and experience</li> <li>• Fundamental importance of integrating evidence with patient values</li> </ul>	
<b><u>Differences:</u></b>	
Uses best available evidence	Unclear basis for evidence
Systematic appraisal of quality of evidence	Unclear or absent appraisal of quality of evidence
More objective, more transparent and less biased process	More subjective, more opaque and more biased process
Greater acceptance of levels of uncertainty	Greater tendency to black and white conclusions

**Advantages of EBD:**

- It improves the effective use of research evidence in clinical practice:
- It uses resources more effectively:
- It relies on evidence rather than authority for clinical decision making:

- Monitor and develop clinical performance<sup>2</sup>
  - Increase the cost-effectiveness of the treatment
- There are basically 5 main steps in practicing Evidence-based Dentistry<sup>7</sup>:

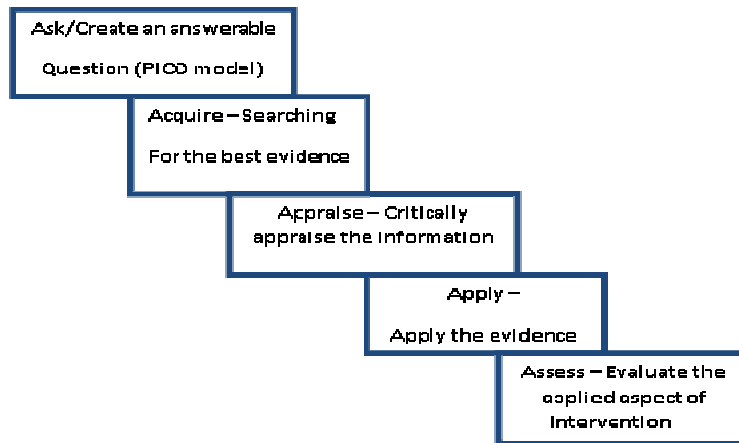


Figure 2: Five steps in EBD

**1. ASK : Create an answerable question (Asking evidence-based questions)** (Framing an answerable question from a clinical problem) The first step in the quest for answers to clinical questions (and often the first stumbling block) is the formulation of a clear and focused question - one that is relevant and will help to carry out a quick and effective search. Most often, the original question is too broad<sup>4</sup>.

**PICO Model:** The PICO model is an important criterion for framing an answerable research question and is the most widely used in evidence-based practice. PICO represents an

acronym for Patient, Intervention, Comparison and Outcome. These four components are the essential elements of the research question in EBP and of the construction of the question for the bibliographic search of evidence. The PICO strategy can be used to construct several kinds of research questions originating from clinical as well as research practice. The formality of using PICO to frame the question forces the questioner to focus on what the patient/client believes is the most important problem and the desired outcome<sup>1</sup>. PICO format was first developed at McMaster University in the 1980s<sup>9</sup>.

Table 2: PICO Format

P	Patient, Problem and/or Population	Describes either the patient’s chief complaint or by generalizing the patient’s condition to a larger population
I	Intervention	It is important to identify what you plan to do for that patient. This may include the use of a specific diagnostic test, treatment, adjunctive therapy, medication or the recommendation to the patient to use a product or procedure. The intervention is the main consideration for that patient
C	Comparison (Optional)	It should be specific & limited to one alternative choice in order to facilitate an effective computerized search. It is the only optional component in the PICO question since oftentimes there may not be an alternative.
O	Outcome(s)	This specifies the result(s) of what you plan to accomplish, improve or affect and it should be measurable. Outcomes may consist of relieving or eliminating specific symptoms, improving or maintaining function or enhancing aesthetics

**2. ACQUIRE: Track down the best evidence with which to answer the question:**

Several options are available, which could include asking a colleague (or expert), checking text books and their references, looking through articles in journals, or searching through a bibliographic database. But the clinician must check for quality (strength) of evidence while obtaining best possible answer to his/her question. <sup>4</sup> Using an evidence-based approach will help clinicians who want to stay abreast of changes in their areas of health care by assisting them with the selection of relevant articles and will aid them to efficiently extract and apply the information.

Information can be acquired by asking a consultant or a colleague, consulting a textbook or using a bibliographical database like Medline, PubMed, Index Copernicus.

**3. APPRAISE- Critically appraise the evidence:**

The next stage is appraisal that is making sense of the evidence. This appraisal should be critical, that is systematically considering its validity, results and relevance to our own work. Once the evidence is collected, it must be screened for validity (closeness to the truth), impact (size of the effect) and applicability (usefulness in clinical practice). The user's guides are designed to test an article on these three parameters. These guides are basically a set of questions whose answers should be provided to the reader by the article in order to obtain best clinical evidence for the question in focus. EBD is the further expansion of the science of critical evaluation<sup>9</sup>.

**4. APPLY THE EVIDENCE:** The information obtained from assessing the evidence should then be considered in

relation to the question that prompted you to undertake the research. Integrate the critical appraisal with clinical expertise and with the patient's unique biology, values and circumstances<sup>4</sup>.

5. **ASSESS:** Evaluate the applied aspect of intervention (Evaluate the outcome) Finally, evaluate performance in terms of effectiveness and efficiency by questioning the ability to complete steps 1-4 successfully and seek ways to improve performance in future.<sup>4</sup> Evaluate the overall results and your process. Make any necessary changes. Following appraisal of evidence, there are four courses of action. We can act on it, discard it or store it but we should be aware that new evidence is always emerging, so we need to continually update<sup>10</sup>.

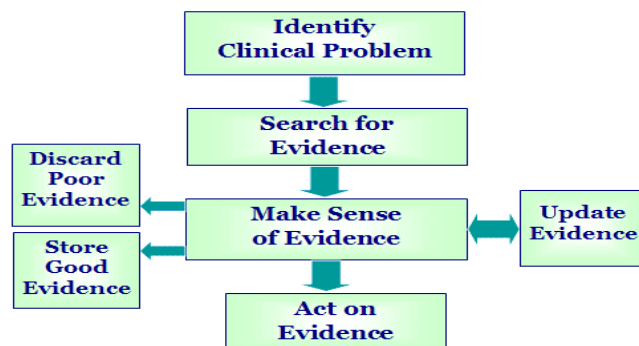


Figure 2: Courses of action

**Checklists:**

A structured approach to critical appraisal using simple checklists for different studies can be useful to screen out research that is of low quality or of little relevance.

**Table 3: Checklists used in different types of studies**

Acronyms	Description of the checklist	No of items in the checklist
PRISMA	Preferred Reporting Items for Systematic Reviews And Meta-Analysis	27
CONSORT	Consolidated standards of Reporting Trials	25
STARD	Standards for The reporting of diagnostic Accuracy Studies	25
STROBE	Strengthening the reporting of Observational Studies in Epidemiology	22
MOOSE	Meta-analysis of Observational Studies in Epidemiology	33
QUORUM	Quality of Reporting Meta-Analysis	21
AMSTAR	Assessment of Multiple Systematic Reviews	11
CASP	Critical Appraisal Skills programmes	10-12
STREGA	Strengthening The Reporting of Genetic Association Studies	-
ASSERT	A Standard for the Scientific and Ethical Review Trials	18
SPIRIT	Standard Protocol Items: Recommendations for Interventional Trials	33
COREQ	Consolidated criteria for reporting qualitative research	32
ENTREQ	Enhancing transparency in reporting the synthesis of qualitative research	21
SQUIRE	Standards for Quality Improvement Reporting Excellence	19
TREND	Transparent Reporting of Evaluations with Nonrandomized Designs	22
CARE	Consensus-based Clinical Case Reporting Guideline Development	13
CHEERS	Consolidated Health Economic Evaluation Reporting Standards	24
REMARK	Reporting Recommendations for Tumor Marker Prognostic Studies	20

“For more information on these and many other checklists, visit <http://www.equator-network.org/>”

**Levels of Evidence:**

To deal with a wide range of available scientific papers on one subject, levels and hierarchy of evidence need to be fostered and generated.

The gold standard for evidence is strong evidence from at least one published systematic review of multiple well-designed randomized controlled trials. However, this is not the only evidence and a list of levels of evidence is shown (level one being the best)<sup>2</sup>.

**Table 4: Levels of Evidence<sup>2</sup>**

Level	Type of Evidence	Strength of Evidence
1a	Systematic review of randomized controlled trials(RCT).	Better ↑ ↓ Worse
1b	Individual RCT.	
2a	Systematic review (with homogeneity) of cohort studies.	
2b	Individual cohort study.	
2c	Outcome research; Ecological studies.	
3a	Systematic review of case-control studies.	
3b	Individual case-control study.	
4	Case-series (and poor quality cohort and case-control studies).	
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research, or first principles.	

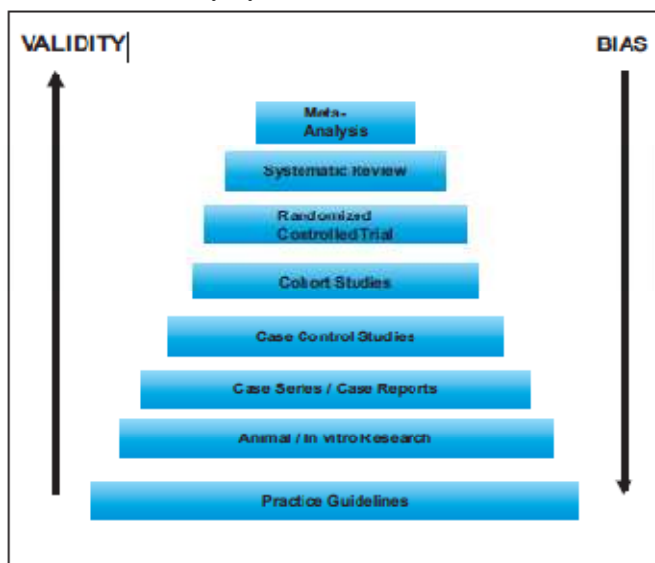
Evidence Hierarchy Pyramid<sup>4</sup>

Figure 3: Evidence Hierarchy Pyramid

**Cochrane Oral Health Group (COHG)**

The Cochrane Collaboration is an independent, non-profit organization formed to organize medical research in the interest of Evidence-Based Medicine. The British National Health Service created the Cochrane Centre at Oxford, UK named in honour of Archie Cochrane, to facilitate the preparation & maintenance of systematic reviews for all areas of health care<sup>11</sup>. It has formed an official relationship with WHO in January, 2011 as a partner NGO<sup>12</sup>. The Cochrane Oral Health Group, which is one of the 50 review groups of the Cochrane, plays an important role in the dissemination of EBD across the dental profession. The OHG was initiated in New England (USA) by Alexia Antczak Bouckoms in 1994 and moved to University of Manchester, UK in August, 1996 with Bill Shaw and Helen Worthington as co-ordinating authors, securing NHS funding for the editorial base in 1997<sup>8</sup>. It was registered with the Cochrane Collaboration in June, 1994. The scope of OHG is oral health, broadly conceived to include the prevention, treatment and rehabilitation of oral, dental and craniofacial diseases and disorders<sup>8</sup>. COHG seeks to develop a database of all RCTs related to oral health and prepare systematic reviews of particular topics, including oral health promotion activities.

**CONCLUSION**

Scientific evidence is the end-product of various well-designed, well-controlled studies and genuine, non-fabricated data. A single study does not constitute evidence; it just adds to the vast body of knowledge which can later be subjected to levels and hierarchy of evidence to decide the treatment modality best suitable for a clinical case. EBD comes into picture here as the new paradigm in dental sciences which needs to be welcomed by us as dental practitioners. It is not a rigid “cookbook” but rather a directional guidebook to best align and navigate the clinical as well as research practices so that the public is benefited at large and the dental profession blossoms scientifically.

**REFERENCES**

1. Krishna M, Dasar P. Principles and Practice of Public Health Dentistry; New Delhi; Jaypee Brothers Medical Publishers (P) Ltd; 2010.
2. Kapila R, Subhash BV, Sudhir R, Garg S. Evidence-Based Dentistry. IJDA. 2011 Apr-Jun; 3(2): 499-501.
3. Sutherland S. Evidence-Based Dentistry: Part I Getting started. J Can Dent Assoc. 2001; 67: 204-6.
4. Mehta A, Kaur G, Gupta S. Evidence-Based Dentistry-A New Paradigm. IJDS. 2011 Dec; 3(5): 24-8.
5. Ismail AI, Bader JD. Evidence-based dentistry in clinical practice. J Am Dent Assoc. 2004; 135: 78-83.
6. Ballal JL, Adusumilli P. Evidence based Dentistry: An Introduction. SRM University Journal of Dental Sciences (Streamdent). 2010 July-Sept; 1(2): 173-6.
7. Goldstein G. What is Evidence based dentistry? Dent Clin North Am. 2002 Jan; 46(1): 1-9.
8. Clarkson J, Harrison JE, Ismail AI, Needleman I, Worthington H. Evidence-based dentistry for effective practice :UK; Martin Dunitz; 2003.
9. Nagesh L: A handbook on Journal Club & Critical Evaluation: Bangalore; Swaprajyothi Publications; 2007.
10. Richards D, Lawrence A. Evidence-Based Dentistry. Br Dent J. 1995 Oct; 179(7): 270-3.
11. Padiyar N. Evidence based dentistry: Why and How? J Int Oral Health. 2011 Feb; 3(1): 1-6.
12. [http://en.wikipedia.org/wiki/Cochrane\\_Collaboration](http://en.wikipedia.org/wiki/Cochrane_Collaboration); Accessed on 16.12.2012.

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