

## Review Article

# EVIDENCE BASED PRACTICE - NEED OF AN HOUR

Harpreet S. Grover, Shalini Kapoor, Nitin Kaushik

Department of Periodontology, SGT Dental College, Hospital and Research Center, Gurgaon

### Abstract:

Dentistry as a profession has developed a store of specialized knowledge that serve as a basis of professional decision making. The world in which we learn and practice dentistry is changing at an astonishing rate. Our desire to keep up to date is often tinged with dilemma whether something new is better than our current strategy. Now the practice of dentistry is becoming more complex and challenging because of the continually changing in dental materials and equipments, an increasing litigious society, an increase in emphasis of continuing professional development, In keeping abreast with advances in dentistry, we are inundated with information about new techniques, tests, procedures, materials and products. Two phenomena - information explosion and consumer movement, both of which are fortified by the extraordinary advancement of the internet, are coming together to change the way all businesses including health care will function in the future. The need for reliable information and the electronic revolution have come together to allow the “paradigm shift” towards evidence-based health care. 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. Aim of evidence-based practice is the systematic literature review, which synthesizes the best evidences and provides the basis for clinical practice guidelines. These practice guidelines give a brief review of what evidence-based dentistry is and how to use it.

Keywords: Evidence-based dentistry, Dental care, Evidence based practice.

Corresponding Author: Dr Shalini Kapoor, Asstt. Prof, SGT Dental College, Budhera, Gurgaon, Email: dr\_shalinibasur@yahoo.co.in

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### INTRODUCTION:

Dentistry as a profession has developed a store of specialized knowledge that serve as a basis of professional decision making. The world in which we learn and practice dentistry is changing at an astonishing rate. Our desire to keep up to date is often tinged with dilemma whether something new is better than our current strategy.<sup>1</sup> Now the practice of dentistry is becoming more complex and challenging because of the continually changing in dental

materials and equipments, an increasing litigious society, an increase in emphasis of continuing professional development, In keeping abreast with advances in dentistry, we are inundated with information about new techniques, tests, procedures, materials and products.<sup>2</sup>

The knowledge of dentistry has evolved through four phases:

**First phase - The Age of Expertise** – knowledge accumulated through experience,

which was nothing more than uncontrolled observation.

**Second phase - Age of Professionalism;** changes in professional knowledge was maintained and disseminated. The most concern form of knowledge was reports of individual experience. Careful yet uncontrolled observation sparing was observed with some but not all experimental reports.

**Third phase - Age of Science** – The Hallmark of this phase is rise of formal clinical study and literature review.

**Fourth phase - Age of the Evidence-** We are entering a new phase “Age of evidence” Whether this phase will continue to develop and eventually emerge as a distinct era in the evolution of dentistry knowledge cannot be known at present time.<sup>3</sup>

The practice of Evidence based knowledge involves a process of lifelong self directed learning in which caring for patients creates the need for important information about clinical and other health care issues.<sup>3</sup> 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>

The importance of evidence for every branch of medicine in teaching in order to orient the practitioners among the great amount of most actual scientific information’s and to support clinical decisions, is well established in health care, including dentistry.<sup>5</sup> The most important reason for practicing evidence is to improve quality of care through identification and promotion of practices that work, and the elimination of those that are ineffective or harmful. It requires clinician to be open minded and look for new methods that are scientifically proven to be effective and to discard harmful.<sup>6</sup> To resolve our uncertainty at times about treatment plan and to refine our clinical skills it is essential to read and understand and critically appraise research evidence.<sup>7-8</sup> The ability to read, understand and

critically appraise research evidence is fast becoming a required core skill for clinical problem solving in our profession. We have become so enamored with our new technologies, materials and techniques that we seem to have lost our collective common sense in their application. J Neiderman said that “one half of what we know today has been learned in the last 20 years”. He also stated that “It’s not enough to do the right thing, it is necessary to do the thing right.”

Dentistry has a rich background of research and scholarship.<sup>9</sup> Evidence-based periodontology attempts to implement the hypothesis-driven scientific processes to critically evaluate the research reports from design, methods, and data analysis points of view in order to produce the consensus of the best available evidence. The key principles associated with making good clinical decisions is the need to be scientifically accurate so that unintentional or hidden sources of bias are not allowed to influence the decisions process. A comprehensive and rigorous literature evaluation process describes the evidence based approach.

This article attempts to review in detail about basic of need for evidence based practice, advantages, disadvantages, strengths, level of evidence and how to translate this evidence into clinical practice. The concept of Evidence based medicine (EBM) defined as the “Integration of best research evidence with clinical expertise and patient values.” Although the application of evidence based medicine is a fairly new practice, the concept itself has long-established roots. Documentation of ancient and medieval medicine shows some degree of decision-making based on the results of prior testing, however the most-widely recognized dawn of the evidence based medicine era is the work of Professor Archie Cochrane in 1972.

Throughout the 1980’s and early 1990’s, Cochrane’s work was being formulated into a more practical approach by scientists across the Atlantic, namely David Eddy, at Duke

University, North Carolina and Gordon Guyatt and David Sackett at McMaster University, Toronto. Their work developed into a methodology capable of being applied to modern healthcare practice and in 1992 the National Health Service Research and Development Programme funded the establishment of the Cochrane Centre in Oxford in order to carry out further research into this concept.<sup>10</sup>

Evidence based medicine, whose philosophical origin extends back to mid -19<sup>th</sup> century. Paris and earlier, remains a hot topic for clinicians, public health practitioners, purchasers, planners, and the public. British centers for evidence based practice have been established to plan in adult medicine, child health, surgery, pathology, pharmacotherapy, nursing, general practice and dentistry. In 1993, the Cochrane Centre became part of an international venture to be named the Cochrane Collaboration, which included the establishment of 12 additional research centers and a number of researchers totaling over 11,500. Today, evidence based medicine is a fundamental in the workings of the British healthcare system and forms an integral part of both undergraduate and postgraduate medical studies. Older professionals, who have not received the relevant education relating to this concept, are encouraged to familiarize themselves with this practice and keep up-to-date with modern clinical research, in line with British Medical Association (BMA) recommendations.<sup>10</sup>

**Evidence-based dentistry:** It was first introduced by Gordon Guyatt and the Evidence-Based Medicine Working Group at McMaster University in Ontario, Canada in the 1990s.<sup>11</sup> EBD uses current scientific evidence to guide decision-making in dentistry.<sup>6</sup> Dental schools are integrating the principles into their curriculum and resources are becoming more widely available and Evidence Based Dentistry (EBD) practice which offer reviews of the current literature on dental-related topics.<sup>7</sup>

## TERMINOLOGIES:

### 1. Evidence-based practice (formerly medicine)<sup>8</sup>

Originally defined by Sackett as the “conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients” and currently defined as “the integration of best research evidence with clinical expertise and patient values. Best research evidence refers to clinically relevant research, especially from patient-centered clinical research. Clinical expertise means the ability to use clinical skills and past experience to rapidly identify each patient's unique health state and diagnosis, individual risks and benefits or potential interventions, and personal values and expectations.

2. **Evidence-based health care** extends the application of the principles of evidence-based medicine to all professions associated with health care, including purchasing and management.

3. **Systematic review** is a process of systematically locating, appraising and synthesizing or summarization evidence from scientific studies in order to obtain a reliable overview. The aim is to ensure a review process that is comprehensive and unbiased. Findings from systematic reviews may be used for decision-making about research and the provision of health care. It is considered as gold standard for evidence.

4. **Meta-analysis** is a review that uses quantitative methods to combine the statistical analysis from two or more studies into one analysis and generates a weighted average of the effect of an intervention, degree of association between a risk factor and a disease, or accuracy of a diagnostic test.

5. **Randomized controlled clinical trial** is a study in which participants are randomly

(i.e., by chance) assigned to either an experimental group or control group. The experimental group receives the new intervention and the control group receives a placebo or standard intervention. These groups are followed up for the outcomes of interest.

**5. (a) Controlled clinical trial** is a study that uses the same design features of a randomized controlled clinical trial, but, for reasons beyond the control of the investigators, the subjects are assigned using a non-random process into control or experimental groups.

**5. (b) Crossover study design** is the administration of two or more experimental therapies, one after the other in a specified or random order, to the same group of patients.

**5. (c) Cross-sectional study** is the observation of a defined population at a single point in time or in a specified time interval. Exposure and outcome are determined simultaneously.

**6. Cohort study** involves identifying two groups (cohorts) of subjects, one that did receive the exposure of interest and another that did not, and following these cohorts forward for the outcome of interest.

**7. Case-control study** involves identifying subjects with a clinical condition (cases) and subjects free from the condition (controls), and investigating if the two groups have similar or different exposures to risk indicator(s) of factor(s) associated with the disease. Case control studies are less reliable than either randomized, controlled trial or cohort studies.

**8. Case-series** is a report on a series of patients with an outcome of interest. No control group is involved to compare outcomes so have no statistical validity.

**9. Bias<sup>12</sup>:** It is a systematic error, leads to results which are consistently wrong in one or another direction, leads to an incorrect estimate

of the effect of a risk factor or exposure on the development of a disease or outcome of interest. The observed effect will be either above or below the true value. Many types of bias have been identified, however, the main types relate to:

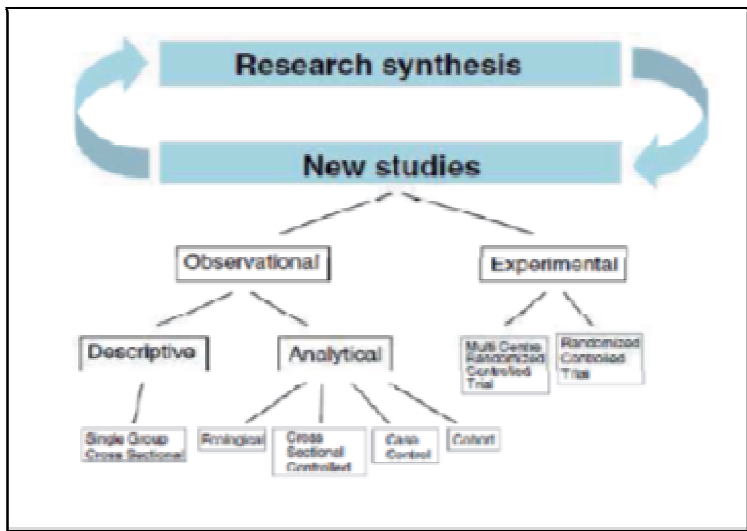
- **Selection bias** – Occurs when selection of subjects for inclusion in a study. The avoidance of selection bias is a major concern in the design of case-control studies.
- **Performance bias**- Occurs when different study groups do not receive therapy in the same fashion or to the same standard.
- **Detection/Measurement bias** - When the measurements of exposure and/or outcome are incorrect.
- **Attrition bias** - Occurrence and handling of patient attrition.
- **Publication bias** – It refers to the greater likelihood of publication of studies with positive results than those with neutral or negative results.

**10. Cochrane collaboration:** Cochrane collaboration is an international endeavour in which people from many different countries systematically find, appraise and review available evidence from randomized controlled trials. The Cochrane collaboration aims are to develop and maintain systemic upto date review randomized controlled trials and make this information readily available to clinician and other decisions at all levels of health care systems. (<http://www.cochran.org>).

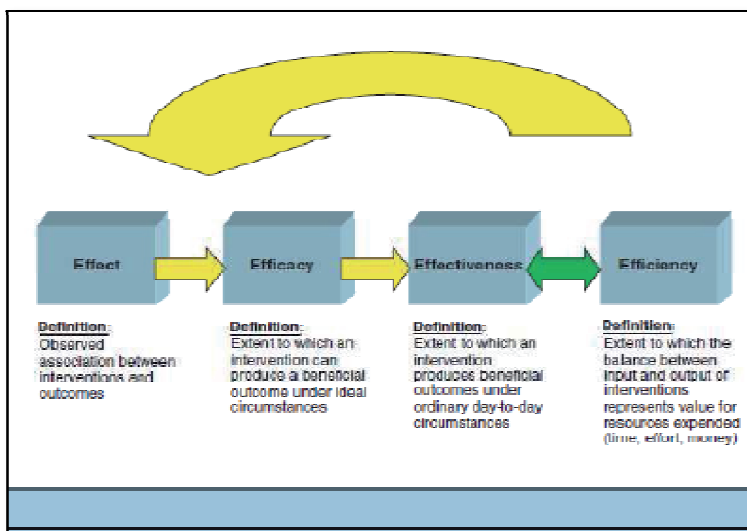
**11. Sensitivity** - Proportion of all the documents that are relevant that your search manages to find or the likelihood of retrieving relevant items (precision). Increase sensitivity if not retrieving enough by broadening the question, using “OR” with synonyms and related concepts. Find more search terms from relevant records by using truncation relevant terms. Sensitivity of a diagnostic test refers to the proportion of truly diseased persons as measured by the gold standard that identifies disease by the test under study.



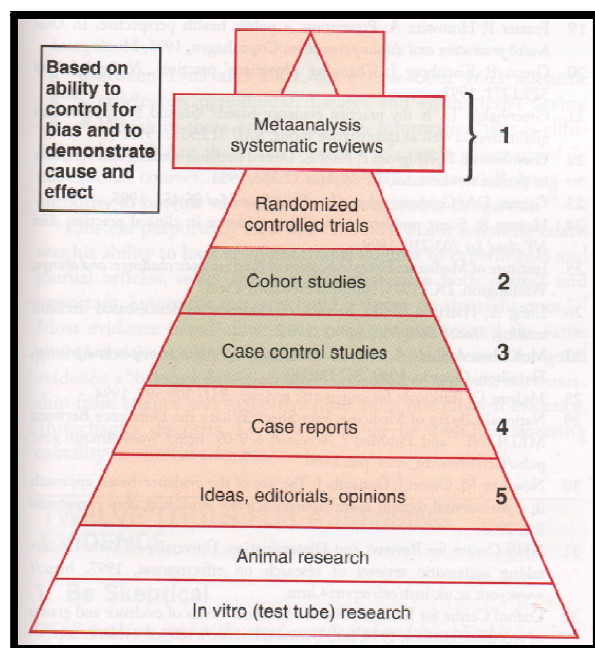
**Figure 1:** Relationship of clinical skills, the patient and the 'evidence' to Evidence Based Periodontology



**Figure 2:** Evidence cycle



**Figure 3:** The Four 'E' s<sup>9</sup>



**Figure 4:** Levels of clinical evidence

**12. Specificity** - Likelihood of excluding irrelevant items. Increase specificity if retrieving too much by narrowing the question and using more specific terms. Specificity of a diagnostic test refers to the proportion of truly non diseased persons, as measured by the gold standard, who are so identified as diseased by the test under study.

**13.PICO** - A systematic process for converting information needs/problems into questions so that they can be answered. A “well-built” question includes 4 parts that identify the patient problem or population (P), intervention (I), comparison (C) and outcome(s) (O), referred to as *PICO*.

(<http://cebm.jr2.ox.ac.uk/docs/focusquest.htm>)

### WHAT IS EVIDENCE BASED PERIODONTOLOGY

Evidence Based DENTISTRY is the application of evidence based health care to all patients. The evidence based health care as proposed by Muir Gray (1997) is “An approach to decision making in which clinician uses the best evidence available in consultation with the patient, to decide upon the option

which suits that patient best”. Therefore evidence based periodontology is a tool to integrating the best evidence available with clinical practice.<sup>6</sup> The foundation of evidence based practice was laid by David Sackett (1997) who has defined it as” integrating individual clinical expertise with the best available external clinical evidence from systematic research”.<sup>13</sup> 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 patient's oral and medical condition and history, with the dentist’s clinical expertise and the patient’s treatment needs and preferences”.<sup>14</sup> Evidence based periodontology is the comprehensive integration of appropriate research evidence, patient preference and clinical expertise.

### NEED FOR EVIDENCE

#### Need for evidence?

The classic example for the need for evidence is William hunter’s focal infection theory which was originally proposed in 1900, but was later discarded in 1940’s due to lack of proper evidence. Again the theory was accepted in 1989, due to studies which proved the same with proper evidence.<sup>8</sup> The most important reason for practicing evidence based approach is to improve the quality of care through the identification and promotion of practices that work, and the elimination of those that are ineffective or harmful. EBM promotes critical thinking. It is important that health care professionals develop key EBM skills including the ability to find, critically appraise, and incorporate sound scientific evidence into their own practice.<sup>1</sup>

The basic principle of EVIDENCE BASED DENTISTRY – that we should treat where there is evidence of benefit and not treat where there is evidence of no benefit (or harm) – is of relevance at all levels of the National Health Survey(NHS).<sup>15</sup>

## **HOW TO PRACTICE EVIDENCE-BASED DENTISTRY<sup>16</sup>**

### **1. Defining Clinically Relevant Questions**

The most important step in evidence based dentistry are asking clear questions about a clinical problem. Every time a clinician sees a patient, some need for information regarding the diagnosis, prognosis, or management is generated. Clinical questions must be formulated in such a way that the search for the answers will yield relevant and helpful results. Poorly worded questions are more likely to result in either an unmanageable amount of information to review or none at all. To pose a clear question, the clinician must identify 4 components: the patient population, the intervention/ treatment, a comparison group, and the outcome of interest.

### **2. Searching for the Best Evidence**

With an answerable, focused, and clinically relevant question in hand, the clinician now turns to finding the answer. A few years ago, this search for answers was a very daunting project. It involved long hours hunting through back issues of medical journals in the library. Now this process is made infinitely easier with computers and access to medical bibliographic databases via the Internet. Clinicians may be fortunate to find that their specific clinical question has already been asked, and the results are readily available for their review. Examples of databases offering these services are the Cochrane Library, Best Evidence, Upto Date, PEDro, and Hooked on Evidence. Other routes to find most current available evidence are – textbooks, asking an expert etc.

### **3. Critically Appraising the Evidence**

Once the relevant information has been retrieved, the next step is to determine its validity and usefulness. Additionally, this is the step in which the most judgment is required. Two issues arise with regard to appraising the evidence: rating the quality of studies and applying statistical results to clinical practice.

Formal evaluation of study quality, through rating scales and analytic methods, is used to quantitatively rank or rate each study against some set of standard criteria for the purpose of publishing systematic reviews of the literature. To overcome this, a structured but simple method named “Critical appraisal”, developed by McMaster University and several other teams working in North America and the United Kingdom, enables individuals without research expertise to evaluate clinical articles.

### **4. Applying the Evidence**

Now that the clinician has found the needed information and determined it to be valid and important, the next step is to integrate it into the particular clinical situation involving a patient. Even though the evidence may point to the “best way” to handle a clinical situation, it may not be the right decision in an individual case.

### **5. Evaluating the Performance of EBM**

One of the hallmarks of EBM is critical thinking. Critical thinking is applied to evaluate the usefulness of the research and again when the clinician determines which course of action is best. In the final step, clinicians must again engage critical-thinking skills to evaluate how well the whole process worked. Was the intended outcome achieved? Did the evaluation or treatment method helped? How much time did the process take? Each step in the EBM process, from posing a good clinical question to finding the helpful evidence to appraising and applying that evidence, needs to be examined and thought given as to how to make it more effective.<sup>15</sup>

Four courses of action are:

1. Act on it
3. Store it
2. Update it
4. Discard it

## **PROBLEMS OF EVIDENCE BASED DENTISTRY**

The aim of evidence based dentistry is to encourage the ordinary dental practitioner in primary dental care to look for and make sense of the evidence available in order to apply it to everyday clinical problems. However, making clinical decisions based on evidence does pose several problems for the dental practitioners which are as follows:\

### **Amount of evidence**

Currently over 2 million biomedical articles are published annually in some 20,000 journals. There are about 500 journals related to dentistry. Clearly not all of these articles are relevant to all areas of dental practice, nor can one hope to read any more than a small minority.

### **Quality of evidence**

Much of the ever increasing volume of evidence is produced to enhance career prospects rather than to increase knowledge. This can compromise quality. A number of publications that are widely read in dentistry are not subjected to peer review and even when they are subjected, there is tendency for publication bias.

### **3. Dissemination of evidence:**

Unless good methods of dissemination are available, even where there is good evidence, it takes many years for a particular treatment to become the norm.

### **4. Practice based on authority rather than evidence:**

The use of techniques or therapies based on the views of authority rather than evidence may lead to the wrong treatment being performed.<sup>16</sup> In an ideal evidence cycle, new studies should be designed and implemented in the context of research synthesis (systematic summary of previous research) and research synthesis should in turn provide guidance for further research. (Figure 2)

## **ADVANTAGES/ DISADVANTAGES OF EVIDENCE BASED DENTISTRY**

### **Advantages of Evidence Based Dentistry:**

#### **For individuals**

- Enables clinicians to upgrade their knowledge base routinely
- Improves clinicians understanding of research methods and makes them more critical in using data
- Improves computer literacy and data searching techniques
- Improves reading habits

#### **For clinical teams**

Given team a framework for group problem solving and for teaching  
Enables juniors to contribute usefully to team

#### **For patients**

- More effective use of resources
- Better communication with patients about the rationale behind management Decisions.

### **Disadvantages of evidence based dentistry:**

It takes time both to learn and to practice: For example, it takes about two hours to properly set the question, find the evidence, appraise the evidence and act on the evidence, and for teams to benefit all members should be present for the first and last steps.

Establishing the infrastructure for practicing evidence based dentistry costs money: Hospitals and general practitioners may need to buy and maintain the necessary computer hardware and software. CD-ROM subscriptions can vary from £250 to £2000 a year, depending on the database and specifications. But the shortage of resources need not stifle the adoption of EBD.

Medline and the other electronic databases used for finding relevant evidence are not comprehensive and are not always well indexed. On the other hand, creative and systematic searching techniques are increasingly available, and high quality review articles are becoming abundant. To minimize bias at the centre of the research and the



development of systematic review methodology, much has been elucidated about the quality of research. In this context, quality relates to the extent to which research design, conduct and analysis minimizes biases. Research synthesis has provided us with an improved framework for the clinical and scientific application of evidence.<sup>17</sup>

(Figure 3) The four 'E's

### LEVELS OF EVIDENCE QUALITY:

The collected evidence should be classified according to the hierarchical quality of evidence. The hierarchy or strength of the evidence is classified as:

I Type of evidence (based on AHCPR1992)<sup>18</sup>

- a) Evidence obtained from meta analysis of randomized controlled trials (RCT's)
- b) Evidence obtained from at least one RCT

II

- a) Evidence obtained from at least one well designed controlled study without randomization.
- b) Evidence obtained from at least one other experimental study

III Evidence obtained from well designed non experimental descriptive studies, such as comparative studies, correlation studies, and case control studies.

IV Evidence obtained from expert committee reports or opinions and/or clinical experience of respected authorities.

### STRENGTH OF EVIDENCE

In an evidence based approach, all evidence is not given the same weight. The stronger the evidence, the stronger the recommendation it will support. Evidence so ranked in the following order of importance by World workshop of clinical Periodontics.

1. Randomized blinded longitudinal clinical trial
2. Cohort or consecutive series longitudinal studies

3. Case controlled studies
4. Non controlled case studies
5. Descriptive studies
6. Indirect evidence - animal studies
7. Indirect evidence – laboratory studies

There is a direct relationship between the level of the evidence and the strength of the recommendation regarding therapy supported by it. It is apparent that the best way to acquire the most definitive, clinically useful information is through randomized controlled trials. (Figure 4)<sup>18</sup>

### CONCLUSION:

Evidence based health care has the potential to improve health care by providing mechanism for transforming the teaching and practice of oral health care professionals as they continue to face an exploding volume of literature, rapid introduction of new technologies, deepening concern about health care disparities, and increasing attention to the quality and outcomes of oral health care. The principles of evidence based healthcare provide structures and guidance to facilitate the highest levels of patient care.

The evidence based approach:

- is objective
- is scientifically sound
- is patient focused
- incorporates clinical experience
- stresses good judgment
- is thorough and comprehensive
- uses transparent methodology

That is why the evidence based approach is better than other assessment methods.

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